MEi:CogSci Conference 2019

Ljubljana, Slovenia

MEi: CogSci

Middle European interdisciplinary master's programme in Cognitive Science

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Proceedings of the

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Ljubljana, Slovenia

Editors:

Peter Hochenauer, Tim Reinboth, Katharina Roetzer, Julius Tacha

University of Vienna, Austria

Igor Farkaš

Comenius University in Bratislava, Slovakia

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Proceedings of the MEi:CogSci Conference 2019

The conference took place at the Faculty of Education, University of Ljubljana, Slovenia,
on 13-15 June, 2019

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Ela Praznik & Barbi Seme

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Welcome!

Dear Coxies, dear MEi:CogSci partners and friends, dear guests,

Welcome to our 13th MEi:CogSci Conference; this year hosted by our partner at the University of Ljubljana.

Due to the rise of cognitive technologies in our everyday lives, cognitive science has received increased attention in the public over the last year(s). We are proud to be part of this development by organising an interdisciplinary conference in this field: the MEi:CogSci Conference. MEi:CogSci means to contribute to cognitive science by offering a high-quality master's programme that teaches cognitive science and its applications in a wide variety of interdisciplinary domains. Furthermore, it aims to educate not only experts in cognitive science, but also humans acting in an ethically and socially responsible manner in this highly relevant and impactful field.

We want to express our gratitude to Urban Kordeš, Olga Markič, Toma Strle and their team. We want to thank the Center for Cognitive Science and the Faculty of Education of the University of Ljubljana for hosting our conference this year. We further thank Ela Praznik and Barbi Seme for creating the cover art for the conference proceedings and all other MEi:CogSci students of the University of Ljubljana who helped organising the event locally.

We want to welcome our invited speakers Franci Demšar (Slovenian Quality Assurance Agency for Higher Education, Slovenia), Bipin Indurkhya (AGH University of Science and Technology in Krakow & Jagiellonian University, Poland), and Grega Repovš (University of Ljubljana, Slovenia). Thank you for joining us this year and for sharing your expertise and knowledge with us.

We also welcome our graduates, who join this event and provide insights into possible careers after MEi:CogSci. Thank you for supporting MEi:CogSci even after graduation!

The printing of the proceedings was supported by the project "GOING GLOBAL" (No. 002UK-2/2016), and in part by the KEGA project (no. 017UK-4/2016), both from the Ministry of Education, Science, Research and Sport of the Slovak Republic. Thank you, Igor Farkaš, for organising this, as well as the publication of these proceedings under an ISBN number.

We also want to thank all reviewers and supervisors, who provide the foundations for this event.

And last but not least, it is you, Coxies, who make this conference happen. Your posters, talks, and initiatives will make the MEi:CogSci Conference 2019 an exciting and joyful event!

Thank you all for coming! Enjoy the 13th MEi:CogSci Conference!

Peter Hochenauer
Tim Reinboth
Katharina Roetzer
Julius Tacha

Editor's Note

We, the editors, thank all MEi:CogSci students/authors for submitting their work to the MEi:CogSci Conference 2019. We are happy to present your work in the conference proceedings and to contribute to the field of cognitive science by covering such a variety of interesting topics.

The MEi:CogSci conference and its proceedings are a joint effort. The editors ensure that the work submitted to the conference is in accordance with the conference guidelines for authors. Thus, the editors revise the submissions in respect to formal criteria and formatting issues. Participating students/ authors are expected to adhere to good scientific practice and to honour the regulations relating to good academic conduct. The students'/authors' responsibilities include the usage of references and citations in a transparent, precise, and correct manner, as well as issues regarding style, spelling, and grammar of their abstracts. Despite our best efforts to meet our responsibilities as editors, the MEi:CogSci Conference 2019 proceedings may contain errors and we apologise for any inconveniences.

Thank you all for allowing us to represent MEi:CogSci and our programme's understanding of cognitive science through your submissions of original work.

Thirteenth Middle European Interdisciplinary Conference in Cognitive Science (MEi:CogSci Conference 2019)
Faculty of Education, University of Ljubljana
13-15 June, 2019

MEi: CogSci
Middle European interdisciplinary master's programme in Cognitive Science

MEi:CogSci Conference 2019

Thursday, June 13, 2019

13:30 – 15:30	**Registration**
15:30 – 16:00	**Welcome & Conference Opening** [Lecture Room 048]
16:00 – 17:00	**Plenary Talk: Science in Slovenia – Main Characteristics and Challenges** *Franci Demšar* [Lecture Room 048]
17:00 – 17:15	SHORT BREAK
17:15 – 18:45	**Poster Session 1**

Friday, June 14, 2019

10:00 – 11:00	**Plenary Talk: Cognitive Science and Technology** *Bipin Indurkhya* [Lecture Room 048]		
11:00 – 12:10	**Track A:** Spaces and Play	**Track B:** Algorithms	**Track C:** Cognitive Control
	[Lecture Room 048]	[Lecture Room 012]	[Lecture Room 014]
	Education in the City: Planning Urban Enabling Spaces for Learning Activity *Leonie Jung-Irrgang*	Identifying Attribute Interactions by Interpreting Model Predictions: The Case of Grapevine Yellows Disease *Enja Kokalj*	Cognitive Control, Motivation and Affect — A Study of the Interrelations and a Proposal for a Joined Cognitive Model *Alicja Grządziel*
	The City as a Playground: Influence of Practicing Parkour on Divergent Thinking *Johanna Köllner*	Dynamic Determination of Appropriate Training Instances Using Reinforcement Learning *Benjamin Fele*	The Role of Auditory Feedback in Singing *Borut Orozovič*
	Immersion – An Altered Conscious State in Live Action Role-Playing and Other Fields? *Rok Mioč*	Blink and You'll Miss It: Comparing Results of Removing Artifacts from EEG Recordings Using ICA Versus ASR *Alja Debeljak*	Influence of Working Memory Load and Task Importance on Prospective Memory Performance *Marek Sokol*
12:10 – 12:40	COFFEE BREAK		
12:40 – 13:20	**Track A:** Paradigms in Cognitive Science	**Track B:** Behaviour Patterns and Information Systems	**Track C:** Evolution of Cognition
	[Lecture Room 048]	[Lecture Room 012]	[Lecture Room 014]
	Bayesian Modelling in Cognitive Science: An Inceptive Psychologist's Reflection Informed by a Little Hands-On Experience *Fabian Marvin Renz*	Automaticity in the Context of Computer Technologies *András Balaton*	Core Cognitive Processes in Human Evolution: An Interdisciplinary Analysis of the Human Mind *Maria Lolich*
	The Study of Dance as an Art Form in Cognitive Science — A Paradigmatic Turn? *Christina Regorosa*	Ontology Based Simulations of Socially Intelligent Agents in Bystander Effect Scenarios *Jana Harvanová*	The Value of Friendship *Jakob Schneider*

13:20 – 14:30	LUNCH BREAK		
14:30 – 16:00	**Poster Session 2**		
16:00 - 17:00	**Track A:** Altered States of Being	**Track B:** Visuospatial Cognition	**Track C:** Aesthetic Experience
	[Lecture Room 048]	[Lecture Room 012]	[Lecture Room 014]
	The Psychosomatics of the Judgment of Agency *Sarah Vogels*	Abduction in the Logic of Scientific Discovery *Anna Kiss-Pál*	Saliency Models Analysis for Paintings *Kristína Miklošová*
	Psychopathological Disturbances of Perception with Regard to the Phenomenology of the Body and Potential Neurobiological Explanations *Ela Praznik*	Explaining Away Occlusion in Visual Statistical Learning *Dominik Garber*	Phonaesthetics: A Pilot Investigation *Gašper Pesek*
	Amphetamine-Induced Dopamine Hypersensitivity and Its Effect on Reward-Based Learning in Healthy, Male Volunteers *Maike Lena Becker*	Learning Object Grasping in a Physical Robotic System *Timotej Jurášek*	Influence of Manipulation of Processing Fluency and Complexity on Liking in Aesthetic Experience *Marko Kvar*
17:00 – 18:00	TRANSFER TO VEGOVA 4		
18:00 – 19:00	Alumni Talk: **You That Read Wrong: The Story of Language, Brain and Language in the Brain** *Katarina Marjanovic* Student Initiative: **Visualized Historical Map of (the) Cognitive Science(s)** *Anna Riedl* [Vegova 4]		

Saturday, June 15, 2019

10:30 – 10:50	**Short Plenary Talk: Cognitive Processes in Creative Aha-Experiences** *Anna Berger* [Lecture Room 048]		
10:50 – 12:00	**Track A:** First Person Research	**Track B:** Linguistic Approaches	**Track C:** Physiological Perspectives
	[Lecture Room 048]	[Lecture Room 012]	[Lecture Room 014]
	Back to the Roots: Grounding the Apparent Inconsistency of Contemporary First-Person Research *Jaša Černe*	Novel Sound Learning through Philosophical Associations *Sarah Sheldon*	A Theoretical Study of the Hippocampal Microcircuitry *Nicole Vella*
	Comparison of Chosen First-Person Research Method's Horizons *Marko Božič*	Word Formation in Italian: Morphological Processing in Italian Native Speakers and Bilinguals *Roberta Chissich*	Electrophysiological Characteristics of Cortical Network Activity Related to Vulnerability for the Development of Depression and Anxiety *Jasna Kopac*
	Changing the Way We Make Sense of the World: An Enactive Approach to Profound Change *Daniel Meling*	Morphological Variation in the Slovene Lexicon of Word Forms Sloleks: A Corpus Approach *Dafne Marko*	Deception and Thermal Imagers *Ajda Centa*
12:00 – 12:20	**COFFEE BREAK**		
12:20 – 13:00	**Track A:** Investigating Mindfulness	**Track B:** Philosophy of Science	**Track C:** Decision Making
	[Lecture Room 048]	[Lecture Room 012]	[Lecture Room 014]
	Preschool Children and Mindfulness *Petra Plecity*	Philosophical Approaches to Scientific Representation *Raphael Gustavo Aybar*	What Is True and What to Do — Implications of the Computational Rationality Paradigm for Improving Human Decision-Making *Anna Riedl*
	The Effect of Short-Term Zen Meditation on Sustained Attention and Executive Function *Anže Ipavic*	Experience Sampling and Citizen Science *Barbi Seme*	Understanding a Consumer's Choice of Goods Made under Precarious Circumstances *Max Pohanka*

13:00 – 14:30	LUNCH BREAK		
14:30 - 15:40	**Track A:** Concept Formation	**Track B:** Methods in Affective Science	**Track C:** Neural Correlates of Memory
	[Lecture Room 048]	[Lecture Room 012]	[Lecture Room 014]
	The Effect of Referential Uncertainty on the Encoding of Novel Words *Bojana Trajkovic*	The Dynamics of Collective Emotions and the Spread of Emotional Information in Social Media: Sentiment Analysis in Online Discussion Forums *Raffael Andre*	Inverted Encoding Models: Reconstructing Stimulus Locations from Spatial Working Memory *Julian Moehlen*
	Cross-Lingual Approach to Abstractive Summarization *Aleš Žagar*	Recognizing and Imitating Emotions in a Robotic System *Oswaldo Macedo*	The Role of the Left Inferior Frontal Cortex in Semantic Retrieval: A tDCS Study *Ondrej Hadidom*
	How Can Computers Help Us Understand Text? Topic Modeling on Example of MeiCogSci Abstracts *Sara Jakša*	Neurophysiology of Emotion Transfer Between Professional Dancers and Viewers of Dance Using Near-Infrared Spectroscopy *Richard Leckéši*	The Role of Theta Oscillations in Prefrontal Cortex During Semantic Retrieval: tACS Study *Romana Umrianova*
15:40 - 16:00	COFFEE BREAK		
16:00 – 17:00	**Plenary Talk: Bridging the Gap(s)** *Grega Repovš* [Lecture Room 048]		
17:00	**Best Poster & Best Talk Award** **Conference Closing** [Lecture Room 048]		

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Invited Talks

Science in Slovenia - Main Characteristics and Challenges

Franci Demšar

Slovenian Quality Assurance Agency for Higher Education,
Ljubljana, Slovenia

Slovenian scientific achievements date back a few hundred years ago, but they are mostly connected to Slovenian scientists working abroad. This year the University of Ljubljana celebrates its one-hundred-year anniversary while the Jožef Stefan Institute, the country's biggest research institute, was established 70 years ago. Innovation characteristics of Slovenia show excellent scientific achievements of the small country, big investments in research and development in the Slovenian industry and several problems in the transfer of knowledge from academia to society. 30 years ago, Slovenia doubled its government investments in science, yet from that point, financial investments have been decreasing. Indicators of scientific excellence show that in last 15 years Slovenia has been very successful and has substantially overcome the EU average.

Cognitive Science and Technology

Bipin Indurkhya

AGH University of Science and Technology in Krakow,
Krakow, Poland
&
Institute of Philosophy,
Jagiellonian University,
Krakow, Poland

In recent years, many new technological developments are incorporating cognitive aspects. Wearable devices, self-driven cars, and social robots are but a few examples. In this talk, I will present two recent research projects we have done with industry to illustrate how cognitive science can be incorporated into emergent technology.

One project was a collaboration with Xerox on Cognitively Inspired Task Design to Improve User Performance on Crowdsourcing Platforms. The other one was a collaboration with Samsung on Towards Multimodal Affective Feedback : Interaction between Visual and Haptic Modalities. Towards the end of the talk, I will give a brief glimpse of some of my student projects in this area from the last year.

Bridging the Gap(s)

Grega Repovš

Department of Psychology,
University of Ljubljana,
Ljubljana, Slovenia

Human cognition, consciousness, the brain, the mind, neurons, neural circuits, neurotransmiters, personality, society. All to an extent different levels of observation of the selfsame complex phenomenon. And whereas we often focus on a single level of observation, to understand any of them fully, we have to diligently bridge the gaps between them. In this talk we will explore, why bridging the gaps is important and provide some—inevitably incomplete—examples and recent advancements in building bridges, with special focus on psychopathology and computational neuroscience.

Student Initiative

Visualized Historical Map of (the) Cognitive Science(s)

Anna Riedl

University of Vienna

Introduction

This map is macroscopic, historical, transdisciplinary introduction to (the) cognitive science(s). Moving from left to right, the map is read in a roughly historical fashion, but not literally, as we are compressing an n-dimensional intellectual space into a two-dimensional map grid. From top to bottom the map shows different disciplines and their intersections.

Intentions

Next to educating others, one goal was to sort out my own understanding of (the) cognitive science(s). Externally representing my current understanding enables fruitful discussions about where I am wrong, what parts I misrepresented and what my blind spots are, what I left out. I am eager to change my mind and adopt the visualization in the process based on feedback.

Methods

The historical visual map of (the) cognitive science(s) was created by an intensive literature review and compression, various design questions answered through drafting different ideas and finally using Adobe Illustrator to finish the first two versions. Main disciplines included are philosophy, psychology, neuroscience, computer science, and linguistics. Meta literature on (the) cognitive science(s) and the history as well as textbooks and papers on the different disciplines were used.[1][2][3]

Explanation

Unfortunately, there is no way to generate an educational map that has everyone and everything on it. As such, there is always someone who should be on the map who is not. The attempt of abstracting from reality always asks the question of (most) relevance, in this case primarily to a beginner audience and especially students of the MEi:CogSci programme.

References

[1] J. L. Bermudez, *Cognitive Science: An Introduction to the Science of the mind*. 2nd ed. Cambridge University Press, 2014.

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[3] G. A. Miller, “The cognitive revolution: A historical perspective,” *Trends in Cognitive Science*, vol. 7, no. 3, pp. 141-144, 2003.

Talks

The Dynamics of Collective Emotions and the Spread of Emotional Information in Social Media: Sentiment Analysis in Online Discussion Forums

Raffael Andre

University of Vienna

Collective emotions are emotional states shared and spread by a group of individuals [1]. With our thesis, we take a complex systems approach to understand the dynamics of collective emotions and the spread of emotional information. Using a social interactionist framework, we approach collective emotions as shared emotional states that emerge from the interactions of individuals. As such, they may be computationally modeled using agent-based modeling.

Upvote and downvote systems are implemented in social media for users to evaluate content and express their opinions. This can lead to visible polarization of posts and we aim to investigate the effects of this polarization on the emotional well-being of discussion participants, by applying quantitative text analysis and other linguistic methods. Using sentiment analysis, we may not only approximate the emotional state of an individual, but also draw inferences about the degree of cognitive complexity involved [2].

Dual-process theory assumes two distinct collections of cognitive processes, popularized as system 1 and 2. Our leading research questions are: if polarization and sentiment of online discussion posts affect the polarizations and sentiments of their responses; and if emotional and cognitive contents of posts provide useful information about the cognitive processes involved in their creation.

First, we conceptualize and implement an agent-based model that abstracts the spread of emotional information online and the dynamics of collective emotions. Second, using our model as a hypotheses generator, we test its predictions against real-world data by applying sentiment analysis on the "One Million Posts" corpus [3], a collection of posts originally published in the discussion forum of a news website. We expect to find correlations between polarizations of posts, their sentiment and degree of cognitive complexity, and developing discussion dynamics that validate our model. On the microscopic level, our findings are expected to highlight effects of upvotes and downvotes on the emotional well-being of discussion participants. On a mesoscopic level, our model could be further applied to analyze the spread of emotions in online discussions and collective emotion dynamics.

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Philosophical Approaches to Scientific Representation

Raphael Gustavo Aybar

University of Vienna

Representations are both an object of studies and elements of the conceptual framework of cognitive sciences. Cognitive scientists often explore cognitive phenomena by simulating them in computational models. Despite the primacy of these strategies, cognitive sciences are also highly influenced by enactive antirepresentational views. However, they provide unsatisfactory explanations of higher level forms of cognition such as scientific cognition. Considering recent analytic philosophy of science and Husserlian phenomenology of theoretical acts, this research explains the main characteristics of scientific representation that underlie the way cognitive scientists use them.

Analytic philosophers defend semantic or pragmatic views of scientific representations. The first asserts that models are currently the means of scientific representation, which is a relation of similarity and/or isomorphism between a source and a target system. However, the degrees, respects, and parameters of isomorphism and similarity are unsatisfactory justified. Pragmatists consider that representations are accomplishments of their users, and consider similarity and isomorphism only as scientific strategies for explaining how models stand for their target systems. Besides, the material ways in which models are constructed give them representational power. Finally, pragmatists believe that nothing substantial can define representations (deflationism) [1]. This stance remains too minimalist to assess the epistemic value of models, although it recognizes their intentionality in terms of directedness [2].

Husserlian phenomenology provides a more substantial account of this intentionality. It characterizes the theoretical attitude in terms of a function of knowledge that explicitly intends to apprehend its object by postulating its existence. This idea could lead to a realistic view of the relationship between sources and target systems. However, phenomenology recognizes that scientific acts and representations are grounded in intuitive presentations of things. Science, in contrast, is a mediated cognition that is fulfilled only in an inductive, fallible and approximate way. This, though, does not mean that is less true. Phenomenology bets for a continuity between scientific and non-scientific cognitions in which the firsts are considered privileged for having means of foundation that experiential knowledge lacks. In this sense, phenomenology – unlike enactivism– justify a continuity between abstract knowledge and the most basic forms of sensible intuition.

References

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Automaticity in the Context of Computer Technologies

Andras Balaton

Eötvös Loránd University

Accountability in engineering computer technologies requires transparency about their potential long-term effects on users. Such technologies may create automatic processes [1] in users without their awareness. The academic research in this area, however, lacks a comprehensive theoretical framework to model how and under what conditions automaticity may be established or discontinued in such contexts. The current talk aims to provide an interdisciplinary evaluation of relevant literature on automaticity and to identify possible research gaps that may lead to future research in the area.

The talk includes a critical analysis of literature on automaticity, its types and features from a context-specific perspective. I discuss recent computational modelling approaches that may provide an explanation for the development of automaticity and its differences in individuals. I also examine the relevance of specific attentional biases in automaticity that may challenge traditional assumptions that attentional control is the result of either goal-directed or stimulus-driven factors.

Challenges in researching automaticity in the context of computer technologies may stem from misattribution processes that may create a discrepancy between actual and perceived antecedents. The consequences of this mechanism are explored, and potential research directions are discussed. In addition, translational perspectives are presented in relation to health interventions that are predicated on automaticity and utilise prospective memory processes aided by computer technologies.

Most studies focus on observable context cues of automaticity, but it is possible that other factors, such as abstract representations and affective states may also generalise as cues, which may be of special relevance with regards to computer technologies. Exploring such factors may be a possible direction for future research, such as intervention programs that aim to focus on controlling context-dependent cues as a part of maintenance strategies.

References

[1] A. Moors and J. De Houwer, “Automaticity: A Theoretical and Conceptual Analysis,” *Psychological Bulletin*, vol. 132, no. 2, pp. 297–326, 2006.

Amphetamine-Induced Dopamine Hypersensitivity and Its Effect on Reward-Based Learning in Healthy, Male Volunteers

Maike Lena Becker, **Nace Mikus**

University of Vienna

Context

The mesolimbic dopamine (DA) system is pivotal for reward-based learning and motivational processes. The DA response to unpredicted reward occurrences (absence or presence) is thought to serve as a prediction error that is forwarded to other brain regions involved in reward processing, thereby facilitating learning and decision-making [1]. A dysregulated DA system is characteristic for many psychiatric disorders, especially schizophrenia. More recently, dysregulated extracellular DA levels in the striatum have been proposed as a potential neurobiological explanation for positive and negative symptoms in schizophrenia. Based on this view, aberrantly increased responses to neutral stimuli underlie positive symptoms whereas decreased dopaminergic responses to relevant stimuli underlie negative symptoms [2].

While many studies point to a link between schizophrenic symptoms and DA hypersensitivity, findings are usually correlational. This study aims at investigating the causal role of striatal DA hypersensitivity in the perception of neutral and relevant stimuli.

Method

To do so, the study adopts a blind, placebo-controlled, parallel group design. D-amphetamine (AMPH) is used to approximate a DA hypersensitivity as observed in schizophrenia [3]. 50 healthy volunteers are randomly assigned to the AMPH or control group (n = 25, each). Participants in the AMPH group repeatedly receive therapeutic doses of AMPH for sensitisation. Participants in the control receive placebos. Before and after sensitisation, participants complete a computer-based reinforcement learning task in which they have to predict rewards based on previous stimuli and differentiate between salient and non-salient stimuli. AMPH group participants complete the task always with AMPH; control group participants complete the task first without, then with AMPH challenge. Neural activity is recorded with fMRI in both sessions. Due to effects of sex on reward processing and DA levels, the study includes only male participants.

Hypotheses

Sensitised participants are expected to perform worse at distinguishing between salient and non-salient stimuli. Moreover, neural activity in their reward-processing brain regions are expected to differ from that of non-sensitised participants. Acute AMPH challenge is assumed to amplify these effects in both groups, with control group performance deteriorating between sessions.

References

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Comparison of Chosen First-Person Research Method's Horizons

Marko Božič

University of Ljubljana

Phenomenology is a field of study that studies the structure of experience and best ways that we can go about apprehending it. Over the years, different methods have tried to approach the observation and report of our experience in different ways. One of the main problems is the elimination or reduction of the influence we have on our experience when we go about observing it. Can we study our experience even though any reflection of it may change it? How can we determine to what extent a certain approach influences the experience and final results of the study and what is the best way to study it?

Phenomenological approaches differ in the way they epistemologically and methodologically approach collection of phenomenological data. Final results of the study can be influenced by the way we choose the participants and topic of the study, the way the interviewer and interviewee collaborate and how the collected data is analyzed. [2] There are also differences in the way methods conceptualize consciousness, as they don't agree whether pre-reflective dimension of experience is valid to be verbally reported and studied. [2] Instead of looking at observation as something that distorts the experience that is being observed, we can look at it as something that co-determines the final results and is an intrinsic characteristic of observation. [1] This way we can study the horizons of phenomenological approaches and determine how they co-create the final results. In order to empirically test such way of conceptualizing phenomenological research, meta-analysis of established phenomenological researches needs to be done first.

I will compare horizons of Hurlburt's Descriptive experience sampling method, Petitmengin's micro-phenomenology and Ericsson and Simon's Think-aloud protocol method, by comparing the theories of consciousness that the methods use, the way they methodologically go about collecting experiential data and the results they get from the studies using the methods.

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Deception and Thermal Imagers

Ajda Centa, **Blaž Počervina**, **Gregor Geršak**, **Igor Areh**

University of Ljubljana

The scientific widespread search for deception detection, in the sense of detecting deliberate attempts to mislead others, has long been and is still a present struggle of everyday life. It has been found that "lying is an extremely complex social behaviour that does not involve only one cognitive process, but rather a combination of several, such as working memory, inhibition and response monitoring [1]." The right indicators of deception can be revealed with specific verbal and nonverbal behaviour or more specific, with the help of physiological signals that can be measured with a vast variety of technologies. In our study, we are investigating deception detection while placing more emphasis on psychophysiological measures with the use of a non-invasive "thermal imaging technology, which can be used to detect stress levels in humans based on a thermal map of their face [2]." In the empirical part of the laboratory study, our goal is to evaluate the accuracy of the recognition of psychophysiological responses during the narration of true and untrue stories. The research protocol begins and ends with the conduct of a semi-structured interview to make participants more comfortable with the environment. Before measurement, the participant fills out the STAI-X1 (State-Trait Anxiety Inventory) questionnaire about the level of anxiety, followed by the central part of the survey. In the first part, there is the control measurement, when the participant answers a set of neutral and comparative questions. The second part follows the narration of a true and an untrue story where we use the technique of a stimulated cognitive load, as the participant has a maximum of two minutes for preparation. We assume that between stories there is a noticeable temperature difference on the narrator's face with regard to the selected regions of interest (ROI), and that the simultaneous use of various measuring instruments (a thermographic camera, an electrodermal activity (EDA) meter, a heart-rate, and a finger temperature meter) helps to identify the deceitfulness. Despite the possible unconvincing empirical results gathered with the designed study, we would also like to make an overview in the field of a psychophysiological assessment of misleading with a critical approach to the use of these measuring instruments.

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Back to the Roots: Grounding the Apparent Inconsistency of Contemporary First-Person Research

Jaša Černe

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There exists a disagreement regarding the epistemological status of first-person research. Whereas some argue that the field does not meet the essential requirements of scientific discipline (e.g. universally accepted method, repeatability and intersubjective validation), others claim that a novel view of first-person data should be adopted, which would put the field on par with some other scientific disciplines [1].

It seems that one reason for the scepticism lays in the question of the reliability of memory, which, in broad terms, refers to the question of whether an individual's memory is reliable enough so that it can be cultivated in the investigation of experience or is it too fallible and prone to confabulation? The question becomes interesting when we consider that some methods (e.g. Microphenomenology) assume that it is possible to investigate reflective, directly accessible, as well as pre-reflective experiences that occurred not only in a narrow time frame ("present experience"), but also in a more distant past ("memory of experience"). Recently, for example, Froese et al. [2] argued that while it is not that controversial to assume that by using certain expert techniques it is possible to investigate both, reflective and pre-reflective "present experience", it is, however, unclear whether the "memory of experience", especially in the pre-reflective field, can be brought to present and investigated.

I will try to further explore the above-mentioned the assumption by taking the bottom-up approach. First, I will explore the space of psychological and philosophical thought, focusing especially on the milestones that are credited as being influential for the development of first-person approaches (e.g. traditional phenomenology and introspectionism). Then, acquired insights will be used to test the assumption in terms of three contemporary first-person approaches: Microphenomenology practised by Claire Petitmengin, Max van Manen's method, and Descriptive Phenomenological Method practised by Amadeo Giorgi. By tracing and comparing the theoretical and methodological roots of these approaches, I will also try to evaluate the the current epistemological status of first-person research and compare it with other disciplines in cognitive science.

Since the nature of the research is set to be primarily exploratory, it is hard to predict any specific results. Notwithstanding, I roughly expect that the analysis will show that a part of the scepticism is not warranted. Making transparent the epistemological status of first-person research, as well as its theoretical roots, might not only help the field secure its place in the existing framework of sciences of the mind, but it can also prove useful for the sole progress of its methodology.

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Word Formation in Italian: Morphological Processing in Italian Native Speakers and Bilinguals

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Introduction

This study investigates the processing of derivational suffixes in the Italian language. In order to look at the recognition of linguistic structures below the level of the word, i.e. derivational morphemes and combinations thereof, it has to be assumed that words can be segmented in smaller parts. We based our hypotheses on two underlying assumptions. First, suffix order is handled as binary combinations of SUFF1-SUFF2 type (depending on their position to the root morpheme) [1, 2]. Second, although it seems that affixes are not organized in the same way throughout different languages, it is understood that SUFF1 relates to SUFF2 in a fixed or predictable way [1, 2, 3]. Fixed, if SUFF 1 can derive only one particular SUFF 2 within a major lexical category (noun, adjective, verb). Predictable, if there is more than one SUFF2, but one by default derives a majority of words.

Hypoteses and Method

Our two hypotheses about the native speakers' intuition on the derivational suffixes are that if SUFF1 is fixed, i.e. tends to combine with only one SUFF2 and thus their combination is unique, speakers should know them by heart. And if so, they should also differentiate with a higher accuracy between existing and non-existing combinations, and also between productive and unproductive combinations.

In order to examine this, native-speaking Italian participants were asked to categorize standalone SUFF1-SUFF2 type combinations as existing or non-existing. A psycholinguistic experiment using a lexical decision task was conducted with 34 native Italian participants. As in the previous study for the Slovenian language [2], 30 existing and 30 non-existing suffix combinations were selected for the testing. The accuracy of their categorization was examined according to the productivity and fixed status of the existing suffix combinations.

Results and Further Studies

By investigating native speakers' intrinsic knowledge on the existing and non-existing combinations, we expected that suffix combinations falling into the categories of fixed and productive would be the most accurately categorized. As the results showed, Italian native speakers could intuitively distinguish between existing and non-existing suffix combinations, and they were better at recognizing productive combinations, affirming the hypotheses.

In the next step, we will conduct the task also on Italian-Slovene bilinguals, and on Italian foreign learners to investigate whether the active use of a language is a key factor in this accuracy.

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Blink and You'll Miss It: Comparing Results of Removing Artifacts from EEG Recordings Using ICA Versus ASR

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One of the greatest challenges while conducting electroencephalography (EEG) research is that EEG recordings are regularly contaminated by artifacts such as sensor motion, eye movements and blinks as well as other muscle activities [1].

A well established method for artifact rejection is Independent Component Analysis (ICA), a blind source separation technique that aims to separate a set of independent signals from a set of mixed signals, allowing for extraction of signals contributing to the artifacts [2]. While removing artifacts is crucial, a downfall of such methods could be the inadvertent additional removal of salient signals which actually display neural activity.

The main added value of our research would be in utilizing another method, Artifact Subspace Reconstruction (ASR). ASR is an adaptive filtering approach which is designed to remove high-amplitude data components (eye blinks, muscle, sensor motion) while recovering EEG background activity that lies in the subspace spanned by the artifact components [3].

Methods

We will be using data from a study on cognitive control where partially the resting state network was being observed. We will preprocess the data in three different ways; without ICA, with ICA and with ASR. The results will then be statistically analyzed to discover any systematic differences between the three differently preprocessed groups of data.

Results

We expect the results from the different preprocess techniques to differ somewhat; the data preprocessed without ICA will still contain all ocular artifacts, whereas the ICA and ASR processed data will not. However, what we are curious about is whether the ASR method also removes relevant signal from the recordings alongside ocular and muscular artifacts.

Discussion

With our research, we wish to improve the preprocessing part of EEG analysis by comparing a new and emerging method of artifact reduction to a more established and wide-spread method utilized for the same task. If we were to discover that the ASR method is significantly more successful in artifact removal, that could lead to a wider spread of this method and hopefully to a more optimal preprocessing pipeline in EEG analysis throughout the field of neurological research.

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Dynamic Determination of Appropriate Training Instances Using Reinforcement Learning

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Introduction and Background

Human beings have a unique capability of monitoring one's progress and choosing appropriate samples to learn from. Our goal is highly motivated by this idea – we want to build a meta-model which is capable of choosing appropriate training instances depending on the progress of the base model. An important motivation behind our work is also the reduction of work needed for sample labelling, while also maintaining a comparable accuracy of the base model to more conventional training approaches.

In short, we want to build a meta-model that can learn what an appropriate learning instance for the base model is depending on its current knowledge. We are intending to do this using an active learning approach [1]. The approach is based on the learner taking an active part in the training process, usually in the form of providing feedback about its progress or appropriate training samples.

Past research (e.g. [2]) of incremental machine learning techniques showed that incremental learning can benefit the model in a form of faster convergence or higher final accuracy. The aforementioned article uses a metric of sample difficulty determined by researchers, while we are aiming to train a meta-model for that purpose.

Method

Combining previously mentioned and other approaches we are going to train 2 models. One will be called the base model and will have the task of solving the main (semi-supervised) problem, that is already well researched in machine learning (e.g. shape or object recognition, spatial relations, etc.). The second model, called meta-model, will have to solve the problem of determining the appropriateness of different training utterances depending on the base model's progress. This meta-model will be trained using reinforcement learning with the reward based on future improvement or deterioration of the base model classification accuracy. To remedy possible overfitting problems, we might use our meta-model together with other semi-supervised approaches described in [3].

Outlook

An important question that is still open are the types of attributes that our meta-model will use to represent past states of the base model. We want to make our meta-model as problem independent as possible, so it will have to be trained with that constraint in mind. It also remains to be seen what amount of labelled data will still be required to train the final model.

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Explaining Away Occlusion in Visual Statistical Learning

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Humans are constantly confronted with an abundance of visual information, the interpretation of which is critical for survival. A key challenge is determining if the pattern of co-occurrence of features of the visual scene is incidental or due to properties of an underlying structure. *Visual Statistical Learning* (VSL) is a proposed mechanism for dealing with this [1]. Using scenes constructed of simple shapes, it has been shown that participants become sensitive to shape frequencies and positions, as well as joint and conditional probabilities of shape co-occurrence. Importantly, this learning happens automatically, without participants becoming aware of the learned structures.

Scenes used in such studies neglect many aspects of the organization of natural scenes. One neglected aspect is occlusion. In natural scenes, objects do not simply align next to each other but are constantly occluding parts of each other. This leads to uncertainty about the underlying scene structure. How do humans make sense of such ambiguity? One possible answer is, that they apply representations built during VSL to the interpretation of such scenes. The objective of this Master's thesis is to provide a first step in investigating if this is a plausible answer, both on a theoretical and empirical level.

Theoretically, this project is influenced by work in the area of *probabilistic models*. It has been shown that a Bayesian learning algorithm outperforms alternative models in modeling human behavior in VSL tasks [2]. Building on this line of research, the representations built during VSL can be formally described as *Bayes Nets* [3]. In this formalism, *Explaining Away* is a mechanism which is potentially able to explain the interpretation of partially occluded scenes, based on previously learned regularities.

Empirically, this project advances experimental designs previously used in the study of VSL [1], by introducing an explicit occluder shape. The main hypothesis is that humans apply representations built during VSL to partially occluded scenes; i.e. the interpretation of a partially occluded object is influenced by the full representation of that object. Results in accordance with this hypothesis are of interest for the general question of abstraction in VSL. These results would support theories assuming that VSL builds chunk-like representations by combining features of the visual scene.

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Cognitive Control, Motivation and Affect — A Study of the Interrelations and a Proposal for a Joined Cognitive Model

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Background

The two-way relationships between cognitive control, motivation and affect (CC,M&A) have all been studied both in cognitive psychology and cognitive neuroscience [1]. *Cognitive control* is a set of higher-level tasks that encode and maintain a representation of the current task. *Motivation* is an adjusting factor of behaviour and cognition, which carries a representation of prospective reward or goal completion. *Affect* is an umbrella-term for internal states that involve valuation, or a "good-" vs. "bad-for-me" judgement. Recently, there has been a large amount of research investigating the relationships between CC,M&A, and a calling for a consistent combination of them that would serve as a pragmatic model for further examination [2].

The relationships between the three abilities are interesting for cognitive modelling, as they provide an explanation for the inner workings of the mind in relation to its ever-changing environment (processed via cognitive control and adjusted by motivation) and internal states (affective judgement) [3]. The combination of CC,M&A in a pragmatic cognitive model would serve as a basis for a number of applications requiring a level of human-like processing and behaviour.

Aims

My project is to, first, extensively review the current core behavioural and neuroscientific research of the interrelations between CC,M&A. Second, based on the existing scope of research, I will propose criteria for an evaluation of cognitive models that incorporate CC,M&A and their interrelations. The third aim of this project is to evaluate existing models that combine CC,M&A in line with the previously proposed criteria for evaluation.

Preliminary Results

The preliminary review of behavioural and neuroscientific research indicate that a cognitive model should include: cognitive conflict as initiator of control, motivational incentives as drivers of direction and intensity of control, and goal completion conflict as a trigger for affective judgement and dopamine release [1,2].

The first results of the research into cognitive models point to a need of modularity, adaptability, sequentiality, generalisationability and minimalism of the processes implemented into a model [3].

Summary

In summary, the project will be a review of behavioural and neuroscientific research about CC,M&A, an introduction of points for evaluation of cognitive models and architectures implementing the mechanisms, and an evaluation of existing models and architectures that employ the concepts in combination.

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The Role of the Left Inferior Frontal Cortex in Semantic Retrieval: A tDCS Study

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Introduction

Semantic memory stores conceptual knowledge about the world. In tasks on lexical-semantic retrieval from memory, we employ different retrieval mechanisms. Some representations are automatically retrieved by contextual cues. When contextual cues are insufficient or absent, controlled semantic retrieval is recruited. Suggested neural correlate for controlled semantic retrieval is left lateral inferior frontal cortex (LIFC), also crucial part of language brain network [1]. Transcranial direct current stimulation (tDCS) over LIFC modulates semantic processing [2], but it is not clear how tDCS affects subsequent pre and post-retrieval controlled mechanisms. Our aim is to apply anodal tDCS over LIFC in task distinguishing between aspects of controlled semantic retrieval from memory.

Method

In within subject design, participants were assessed in three session separated by least 5 days. On each session participants had lexical-semantic assessment in one of three conditions (tACS, tDCS, sham) and only two were used for this project (active anodal tDCS and sham). On each session participants were assessed in lexical-semantic task in three blocks (baseline, online, offline). First part of lexical-semantic task had 4 subtasks: category fluency, associative retrieval, dissociative retrieval, alternating associative-dissociative retrieval. Second part required associative, dissociative or random discrete response to prime words. Reaction times of responses were measured [3].

Findings

According to linear mixed model analysis, anodal tDCS over LIFC enhance controlled pre-retrieval and post-retrieval semantic processes. Substantially improved performance was observed in producing of words from given category (categoric fluency) and in generating of words without semantic relationships (dissociations). However, associative and random condition improved insignificantly.

Conclusion

Both improved conditions recruit different retrieval mechanisms. Categoric fluency requires automatic retrieval and dissociations require controlled retrieval, therefore we suggest their functional intersection. We propose that roughly in second half of categoric fluency task, automatically accessible resources are depleted, and controlled retrieval is employed. This suggestion explains intersection of lexical semantic subtasks and their enhancement by tDCS.

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Ontology Based Simulations of Socially Intelligent Agents in Bystander Effect Scenarios

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Simulations of humans inhabiting virtual worlds is a current and important research topic. Semantic virtual environments were introduced as an approach to both modelling the world but also as a better representation of agent-object and agent-agent interactions in the virtual environment.

Ontologies represent a promising tool to represent a world's knowledge base and introduce the semantic overview that helps with the sensorization of complex scenes containing interactive objects. Ontologies also help to define the social interaction between agents in the virtual environment, where these interactions are invaluable when modeling decisions as well as behaviour of agents in a socially acceptable and believable way.

The Bystander effect [2] is usually defined as a social psychological phenomenon where individuals are less likely to help a victim in need when other people are present, the effect being more pronounced with greater amount of bystanders present. To make things more complex, many other variables such as group size, group cohesiveness [1] and social norm adherence, individual personality traits and characteristics, subconscious perceptions of the victim (how similar and / or sympathetic the bystander feels towards the victim on a more personal level), and possibly others, are at play when faced with a difficult situation in which one is the bystander.

The simulation will be visualized in a simplified, two-dimensional environment from the top-down perspective implemented using Python.

The simulation will consist of a specified number of bystanders, with a specified parameters related to their personality (empathy, social norm adherence), as well as relationships among the agents to incorporate group cohesiveness into the model.

The victim will be represented as either being alone (no external threat to the bystanders) and requiring help, or with an attacker harassing the victim (external threat to the bystanders), where the harassment could be either verbal or physical, either unarmed or armed with a weapon.

The final product will be a simulation model of the bystander effect – a multi-agent system using ontologies to represent the social relationships among agents, as well as potential actions they can take in the virtual world.

The simulation will model the bystander effect according to empirically proven research, enabling students and researchers to have a controlled environment to experiment with other, possibly non-studied scenarios in the area, all in a morally and ethically non-concerning manner.

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The Effect of Short-Term Zen Meditation on Sustained Attention and Executive Function

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Context

Mindfulness meditations typically represent sustaining non-focused attention, but often also include a sort of concentrative form of meditations as a preparation for mindfulness [1]. The long term practice of mindfulness meditations increases the functioning of executive functions and the ability to sustain attention [2]. The immediate effects of mindfulness training may be related to increased meta-awareness, which improves the effectiveness of attention [2]. The meditator is training to detect mind-wandering, changes in attention or other signals non-judgementally, and return her attention to breath and bodily perceptions [2]. Studies have shown that improving mood can also reduce rumination and mind-wandering, which can also improve attention, since mind-wandering negatively affects cognitive performance by reducing control of goal-oriented attention [3].

Goal

In this research we are interested in the usefulness of sitting mindfulness meditation based on »zazen« as an independent training of higher cognitive functions (sustained attention, concentration, executive function) in a short period. The meditation exercise includes maintaining upright posture, focusing on the feeling of breath and non-judging acceptance of bodily feelings and thoughts. The research will answer the question whether unsupervised zen meditation (outside the religious-philosophical context of buddhism) can measurably impact executive functions of meditators, sustained attention and the ability to inhibit irrelevant signals in the period of a few weeks.

Method

During the study, the test group will perform a form of sitting mindfulness meditation of 30 minutes per day for two weeks. Participants will not be supervised and the successfulness of the meditation practice will not be measured or graded beyond the participants' reports. Flanker Test will be used to measure the participants' ability to inhibit irrelevant signals and the a dynamic typing task will be used to measure their ability to maintain concentrated attention and perform at a steady rate.

The research will show whether independent sitting Zen meditation can achieve an effect similar to other forms of mindfulness meditation, within a short period of time. This would mean that an individual has at their disposal a technique to control their own ability to sustain attention and higher cognitive functions, but can also achieve noticeable change in a short time.

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How Can Computers Help Us Understand Text? Topic Modeling on Example of MeiCogSci Abstracts

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Many methods for analyzing texts exist in cognitive science. Some of these stop working when the datasets become too big to read. Topic analysis can help with the exploratory analysis of these. Topic analysis is a method to find common topics in a group of documents. I used Latent Dirichlet Allocation [1], where each document can have multiple topics, represented as co-occurrence of words.

In this work, I will try to show the usefulness of topic analysis on the example of MeiCogSci abstracts.

I preprocessed all the abstracts for MeiCogSci conference from years 2008-2018. I kept only the first-year posters and second-year talks and removed duplicates based on cosine similarity. 744 abstracts were left. I removed the references and acknowledgments and kept only adjectives and nouns. I kept 50 articles for test set.

I used perplexity and coherence to arrive at 3 different models. I used interpretability to decide on the model with 21 topics based on word importance for specific topics. I confirmed the topics by the five abstracts with the highest values for this topic. The model was evaluated on test set. 61% of all found topics were clearly present.

The topics found are pitch (music), movement, categorization (art), modeling, society (socialization), decision making, abnormality (disease), neuroscience (brain imaging), constructivism (first-person research), health (sleep), perception (visual perception), learning (cognition), sound (mental states), language, reasoning (working memory), attention, rules (legal), tasks (games), TMS, neural network and reinforcement learning.

Out of found topics, the most popular is constructivism, which also includes first-person research and sense-making, followed by society and decision making. Constructivism has been the most popular topic since 2013. Before were perception (2012), neuroscience (2011) and modeling (2010).

The interdisciplinary overall is slowly increasing. Appearing together more than expected are neuroscience and TMS, constructivism and society, and tasks and decision making. Appearing together less frequently than expected are neuroscience and decision making, neuroscience and constructivism and, neuroscience and society.

I also analyzed the experiments with humans, which included about 50% abstracts. Word participants were used more by topics of decision making, constructivism, language, attention, and tasks, while topics of pitch, neuroscience, reasoning, TMS and neural network prefer to use the word subjects.

Topic modeling can be another analytical tool to help us get a better perspective over textual data, no matter the size of dataset.

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Education in the City: Planning Urban Enabling Spaces for Learning Activity

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Context

The conceptualization of 'Bildung' as learning activity emphasizes the processual character of Bildung - Aneignung (appropriation) [1]. "Bildung" refers to the formation of one's personality or of the self - a process of self-cultivation unfolding from within, which gives rise to one's own talents and potentials [2]. There are spaces that enable the phenomenon of learning activity and there are spaces that do so worse. Currently discussed with prominence under the notion of "educational landscapes" are potentials and possibilities to integrate and enable non-formal educational formats in the planning of cities and rural areas. This is the theoretical and practical discipline called planning theory. No research so far has attempted to integrate the concept of learning activity as an indicator for Bildung in the discourse of planning theory. Challenges in this process include questions on space, education and interaction. In my master thesis I want to use this open niche within planning theory by attempting a theoretical work on the process of planning enabling spaces for learning activity in the city [3].

Method

This master thesis follows my previous research projects' focus on the concept of enabling spaces within play-cities and universities. Play-cities are aesthetic action spaces for learning opportunities, in which children between 7 and 15 years are enabled to play, develop and mediate their own city, by taking on roles within urban establishments such as a bakery, post office, architecture bureau etc. The projects have employed grounded theory based on qualitative and quantitative data collection. The present thesis will go one step further to integrate previous findings in a theoretical attempt at situating enabling spaces for learning activity in planning theory.

Research Question

How can planning theory integrate the theme of enabling learning activity in the debate on educational landscapes?

Interdisciplinary Cognitive Science

The aim is an integration, interaction and exchange between various theoretical concepts from interdisciplinary fields to enter a debate within planning theory, which in itself again is the interdisciplinary field of architecture, sociology, philosophy, urban studies, and organizational theory.

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Learning Object Grasping in a Physical Robotic System

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Context

Intelligent object grasping is a continuing challenge for cognitive robotics. Due to long training times of reinforcement learning, it is common to start training in a virtual environment and then to transfer the model to the identical physical environment. However, due to inherently existing difference between the two worlds, the completion of the task requires additional effort (fine-tuning).

Purpose

In our approach this is done by dividing robotic grasping into several steps, namely robotic reaching, grasping, lifting, reaching to the desired position and releasing the object. Each of those steps consists of hundreds of operations in a learned system, which were ingrained by reinforcement learning. Transferring from simulated environment to physical environment poses many challenges.

Simulations tend to reduce the complexity of the world and account for a limited part of physical properties. For example, difference in friction can mean difference between successfully grasping and lifting an object or failing to do so.

Another amount of inaccuracy can stem from the fact that in simulated environment the position of the target object is fed to the robotic system. In contrast, the position of the target object has to be estimated in physical spaces using methods of computer vision, which increases the difficulty of successfully accomplishing the task. We try to improve the overall efficiency of the system by using the information about perceived error to retry an attempt.

Methods

We chose machine learning methods to implement our solution. Namely, reinforcement learning using Continuous Actor Critic Learning Automaton[1]. In this method, a robot learns from scratch in continuous state-action environments. Actor tries out different actions, while critic provides feedback that is used for learning. This allowed us to train the robotic grasping in a way that's biologically inspired, which makes our approach relevant for comparisons with human motoric learning.

Conclusion

The task of robotic gripping is by no means solved, what we're proposing is a solution that takes a low amount of resources compared to other approaches[2] and achieves satisfactory results. We also make a brief summary of currently used approaches in the field of cognitive robotics, namely in robotic gripping task.

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Abduction in the Logic of Scientific Discovery

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Context

After the philosophy of science broadened its perspective to include the analysis of how scientists actually reason, some theoretical approaches to central questions, such as scientific discoveries have been detached from formal logic. Consequently, some authors have argued that a narrowly construed logic of discovery exists, which can explain hypothesis generation as a rational process [1], others maintained that scientific creativity is part of the holistic cognitive experience of the scientists [2].

Purpose

The aim of the thesis is to use the interdisciplinary notion of abduction in order to elucidate how an alternative framework of the scientific methodology for discovery can be construed. Abduction is posited as 'reasoning towards explanation', consequently, such a position is committed to an explanatory view of science, meaning that the latter's aim is to provide for - usually deductively valid - explanations. It will be argued, that multiple formulations of abduction suggest that discovery can only be connected to models and scientific representations, as a process of abstraction. However, the cognitivist theories on scientific representations, which take this perspective cannot provide for a unified representational view to connect mental models and scientific conceptual change. My aim is to show that the scientific community is too specialized for its outcomes to be interpreted merely on the cognitive level, due to the lack of a comprehensive position in the latter orientation.

Results

It will be argued that abduction as a notion is more fruitful if it is connected to scientific reasoning practice as argumentation based on Toulmin's work [3]. Additionally, such a view can explain representational change in science from a comprehensive, cognitively relevant, but socially informed perspective.

Implication

By arguing against scientific discovery as merely happening on the cognitive level, the thesis also invites further research of social analysis into the cognitive science of discovery. Furthermore, the proposed perspective can enlighten creativity studies, as it proposes an argumentative, dynamic epistemology behind acquiring new knowledge. It also takes visualization to be central to not only science but the reasoning process of individuals as well, thereby suggesting that the abstraction of information of images follows the intersubjective practice of argumentation.

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Identifying Attribute Interactions by Interpreting Model Predictions: The Case of Grapevine Yellows Disease

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Introduction

The last decades gave rise to big volumes and many varieties of data, while at the same time computational processing has become faster and therefore made possible to analyze complex data and build accurate machine learning models. However predictions that these models generate are usually hard to interpret and tend to give us very little information about the nature of attribute interactions as well as the key attributes that played an important role in making the predictions [1].

Method

The ability to correctly interpret predictions of machine learning models is very important. There are many approaches that try to demystify a prediction model's output [2]. In our research we will focus on the following algorithms, LIME (*Local Interpretable Model-agnostic Explanations*) and SHAP (*Shapley Additive exPlanation*). The dataset has been provided by the National Institute of Biology in Ljubljana. It is part of their research on early detection of a grapevine yellows disease "bois noir". They have monitored a number of grape vines over a period of six years and measured expression of selected gene markers [3].

Goals and Results

In our research we will first compare interpretations of model's predictions given by LIME and SHAP, and later on focus on identifying gene interactions that might play an important role in detecting infected plants using SHAP and association rules. We hypothesize that the SHAP approach to interpreting model predictions will be more successful, because LIME builds an interpretable model locally around the prediction and is therefore prone to making errors when the local environment of a data point consists of different class predictions, while SHAP interpretations take into account all the instances in a dataset and gives a more informed explanation. We also hypothesize that the identified interactions will coincide with interactions known to be involved in plant defense mechanisms against bacterial infection.

Conclusion

Correct model interpretation provides us with key insights about important attributes as well as correlational or even causal interactions between them. They also give researchers ideas about testing various hypotheses which brings us closer to identifying important interactions in various complex datasets.

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Electrophysiological Characteristics of Cortical Network Activity Related to Vulnerability for the Development of Depression and Anxiety

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Context

Activity in the brain is modulated by rhythmic oscillations in different frequency bands. The oscillations influence many complex processes, including thinking, memory, attention, and mood [1]. If the cortical activity across different frequency bands is disturbed, functionality of the affected individual will be hindered, sometimes resulting in major depressive disorder. In those diagnosed with such a condition, similar patterns have been observed, namely increased synchronization in alpha and theta frequency bands. Another characteristic, frequently observed in depressed individuals, is mind-wandering. It is thought to correlate to the neural activity in default-mode network [2]. The latter is also associated with anxiety, and subsequently to lower levels of happiness in affected individuals.

Purpose

If I can confirm my hypothesis about correlation between increased alpha/theta synchronization and depressive states and between increased mind-wandering and lower levels of happiness, the treatment of depression and anxiety could take on more effective forms. For example, TMS therapy to reset the oscillatory activity and mindfulness to decrease default-mode network activity in resting state.

Method

I will analyze the publicly accessible Lemon dataset, provided by the Max Planck Institute. The dataset includes 228 healthy individuals, who performed various psychological and physiological tests during a two-day examination period per individual. I will use raw data and preprocess them with the help of my mentor, through time-frequency analysis of EEG parameters, searching for relevant correlations in the process.

Result

I expect to confirm my hypotheses, successfully correlating the increased oscillatory synchronization and bigger vulnerability for developing depression. Also, I expect to find the connection between mind-wandering in resting state and lower level of happiness, as opposed to a greater level of happiness in people practicing mindfulness.

Implications

Confirming the theory of increased synchronized rhythmic activity and mind-wandering in the depressed could improve the therapeutic approach to the illness. For example, a more individual-oriented transcranial magnetic stimulation (TMS) therapy or integrating the practice of mindfulness into the treatment process.

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Influence of Manipulation of Processing Fluency and Complexity on Liking in Aesthetic Experience

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The mechanisms and the purpose of aesthetic experience have baffled artists, philosophers, and psychologists since ancient times. In this work, the focus is on complexity and fluency of aesthetic experience. Research problem deals with Berlyne's arousal theory in connection to visual perception of abstract patterns, complexity, and fluency. Degrees of complexity and fluency are manipulated by adjusting the number of triangle elements in the stimuli, and exposure time, respectively. The hypothesis postulates that liking ratings awarded by participants descend as fluency increases with complexity kept at low levels.

The processing fluency theory states that the ease with which an object is processed, is accompanied by a subjective feeling of fluency, which serves as a basis for several kinds of judgements and evaluations [1]. In previous, typical, experiments on processing fluency, the presentation of stimuli was manipulated in order to lessen or increase the ease of processing, i.e. processing fluency. Variations in presentation duration [1] are commonly used.

The stimuli used were taken from a previous experiment [2] and modified in order to manipulate complexity and fluency by controlling the number of triangle elements comprising the stimuli and presentation duration, respectively. The experiment required 30 participants. Prior to the experiment, the participants were tested in colour vision and visual acuity using standardised tests. The measures of liking ratings were taken using a five-point Likert scale, ranging from least liked to most liked.

Repeated measures design was used. To avoid stimulus repetition, which could result in mere exposure effects, every pattern was presented only once to each participant. Presentation durations were 100 ms, 300 ms, and 500 ms. This variation was based on previous studies showing reliable fluency effects in this time range [2]. Each trial started with a fixation cross (approx. 2000 ms), followed by a stimulus and a white noise mask (approx. 400 – 600 ms). After the mask, the participants provided their responses. Across participants, presentation durations for each complexity group were systematically permuted.

The obtained data were statistically analysed and assessed in terms of accuracy. Analysis of the results shows that with increasing presentation duration from 100 ms to 300 ms, the liking ratings decreased by 11.12%. On the other hand, with increased presentation duration to 500 ms, the liking ratings increased by 3.36%. Therefore, the results agree only partly with my hypothesis.

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The City as a Playground: Influence of Practicing Parkour on Divergent Thinking

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Background

According to the theory of extended cognition [1], cognition does not only emerge from an organism itself, but rather arises from an interaction between the organism and its environment. Hence, affordances, which are possible ways of interactions, offered by the surroundings to a person, should not be neglected in cognitive research. They also play a crucial role in urban design, as most structures are designed for specific use, providing just a few affordances. However, so-called *loose spaces* which are characterized by offering a large variety of affordances to their users, are perceived as more vivid in comparison to monofunctional *tight spaces* [2]. A type of sport having potential to change the attitude towards space is parkour: Its practitioners, so-called *traceurs*, exercise the ability to *loosen up* space by searching for additional affordances in monofunctional spaces, and accepting them as they use urban structures unconventionally [2].

Aim

Our aim is to connect the issue of monofunctionality to the theory of extended cognition and explore their relation in an empirical field study to approach a cross-disciplinary understanding of the importance of human-environment interactions. The influence of parkour training on divergent thinking (DT) as an aspect of cognition will be investigated. DT describes the ability to generate a range of diverse ideas as possible solutions to a problem. Traceurs might undergo a similar process as they develop a variety of affordances for a given urban structure.

Methods

The „Alternative uses test“ and the „Title generation task“ for assessing divergent production will be presented to traceurs before and after 30 minutes of training in a previously unknown environment. As a control, gymnasts will do the same tasks but before and after training on gymnastics apparatuses. Gymnastic exercises are restricted in variety in contrast to parkour exercises while they are comparably physically demanding. Performance in divergent production before and after the training sessions will be compared within each group, and we will test for differences between the groups.

Results and Discussion

Traceurs are expected to show greater improvement in DT after their training as this activity requires to continuously develop new affordances. In contrast, gymnasts might not show any need to use DT during their training due to their constrained variety of exercises. The proposed study's main limitation is the comparability between traceurs and gymnasts, who might differ in some aspects that are hard to control for. The project's purpose is to establish a new paradigm to investigate how physical activity and interaction with the environment affect cognitive abilities.

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Neurophysiology of Emotion Transfer Between Professional Dancers and Viewers of Dance Using Near-Infrared Spectroscopy

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Introduction

One can argue that dance might be the most clear and direct way of, nonverbally, transmitting one´s emotions, although there has been little empirical data gathered on this topic. 15 years of neuroscientific research has shown that there are various brain networks associated with processing of aesthetic experiences. Activations in the dorsolateral prefrontal areas which are believed to be responsible for higher executive functions were found [1] as well as orbitofrontal cortex and reward brain areas [2] and frontomedian brain areas associated with social judgement [3]. Based on lack of empirical data concerning the performers point of view we ask this question: Does making a dance to express a specific emotion which is easier to guess by the observer or is more expressive show different brain activation patterns in the dancer?

Methods

The experiment consists of two phases. In the first phase professional dancers are asked to perform a specific emotion by movement. While performing, the participants brain activations were being recorded by the near infra-red spectroscopy, specifically the medial prefrontal cortex, right inferior frontal gyrus and temporo-parietal junction bilaterally. After each performance the participants were asked a series of questions about their performance. In the second phase of the experiment non-dancer participants were seated before a computer and shown a series of 30 second black and white videos without sound (for minimisation of factors affecting emotion state) of the performers from the first phase. After each video the participants were asked a series of questions concerning the performance and the communicated emotion.

Results

Results show that there seem to be no correlations between the evaluation of the observers and the brain activation of the dancers. They do show, however, that there are correlations between activations of each of the brain areas that we have been focusing on suggesting that they are, on some level, connected in processing emotion transfer, aesthetic evaluation and nonverbal communication. Furthermore, there are also correlations between the evaluations of the dances themselves. The more confidence the observers had while guessing what emotion was performed on the video the more expressive they ranked the performance and overall likability of the dance showing that more expressive dance results in clearer communication of emotion and higher pleasure of the performance.

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Core Cognitive Processes in Human Evolution: An Interdisciplinary Analysis of the Human Mind

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Introduction

Evolutionary biology has significantly contributed to our understanding of human cognition. Indeed, the concept of cognition has developed in tight association to our understanding of the phenomenon of living. Considering this, the present research aims to explore the phenomenon of human cognitive evolution through the analysis of core-conserved processes (CCPs), as described by the theory of *Facilitated Variation* [1]. CPPs are defined as evolutionary mechanisms enabling a system´s replication and self-maintenance while allowing further adaptive change. We propose that the comprehensive study of the biological principles underlying CPPs can also contribute to the analysis of human cognitive and cultural evolution.

Method

A theoretical analysis of the theory of *Facilitated Variation* [1], the theory of the *Origins of the Human Modern Mind* [2] and the *Scaffolding* approach [3], within the fields of evolutionary biology, psychology and biocultural studies will be implemented. First, the standpoints of each perspective, regarding CCPs, will be established. Second, a systematic comparison of each model´s approach to CCPs will be presented. Finally, an integral conceptual framework of human cognitive evolution, in the light of the concept of CCPs, will be proposed.

Preliminary Findings

At a cellular-based level, CCPs developed in biological systems of increasing complexity (i.e., prokaryote cell, eukaryote cell, multicellular animals). Nevertheless, once established, though CCPs facilitate phenotypic variation, they themselves are resilient to selective change [1]. Concordantly, human cognition appears as evolving in complexity from basic cognitive architectures (i.e., mimetic, mythic and theoretic). Each configuration was based on previous representational phases that were preserved within the following emergent phase [2]. At a cultural level, CCPs are understood as innate inferential mechanisms, that while constraining certain cultural expressions, act as cornerstones for additional developmental change [3].

Discussion

From a theoretical perspective, human cognitive evolution can be approached as a series of CCPs that manifest at a biological, psychological and cultural level [1]-[3]. This study proposes that CCPs enable evolutionary variation without undermining the continuity of their structural and functional cores. Our findings might contribute to the development of novel interdisciplinary frameworks on the evolution of the human mind.

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Recognizing and Imitating Emotions in a Robotic System

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Interest in emotion recognition by artificial intelligence is growing steeply, especially because of improvements in the processing capabilities of computers and the creation of new algorithms, substantially improving the accuracy of the task. Currently, emotion recognition through facial expressions can achieve close to 73% accuracy on the dataset FER2013 in state-of-the-art implementations [1].

This thesis consists of two main parts: first, the emotion recognition system which has an artificial neural network that is trained with static images of faces with expressions of 6 basic emotions (sadness, happiness, anger, fear, disgust, surprise) and a neutral expression; and second, a robotic system that will be trained with the results of the emotion recognition system and will try to imitate the facial expressions of new images.

The thesis aims to combine state-of-the-art level facial expression recognition implementations with a robotic system to produce a human-robot interactive system capable of perceiving and imitating human emotions through facial expressions. For this purpose, I will test neural network models and train them with static images of faces from public datasets, modifying the structure of the models, according to the requirements for emotion recognition. Also, train the robotic system with associative learning, with the information gained from the best previously trained neural network.

The main question I want to answer with my research is if the robot will learn to recognize and imitate emotions accurately, and secondly, how changes in lighting will affect the accuracy of the system. Three hypotheses were formulated from these questions; first, the emotion recognition system will be as performant as state-of-the-art implementations; second, the robot will be able to imitate emotions through associative learning; and third, changes in lighting conditions will affect the accuracy of the system depending on the brightness and contrast.

The two main concepts considered in this research are universality of emotions [2] (concept researched extensively by psychologist Paul Ekman), and the adaptation of brain structures like neurons and synapses into artificial structures that resemble their connections and operation, which make this research interdisciplinary, connecting artificial intelligence, neuroscience, and psychology together.

With the help of this research, I expect that we will be able to better understand what architectures fit best for emotion recognition, and if it is plausible to teach robots to recognize emotions through associative learning.

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Morphological Variation in the Slovene Lexicon of Word Forms Sloleks: A Corpus Approach

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This research deals with the morphological variation in the Slovene lexicon of word forms Sloleks. We define the morphological variation as two or more interchangeable variants on the level of word forms, e.g. "študenti" and "študentje" both meaning "students" in plural nominative form. In the Sloleks lexicon, variability is represented inconsistently and heterogeneously, which proves to be problematic since Sloleks is frequently used both by different language users and researchers. Sloleks proves to be a valuable source for building language tools and technologies and since it is a strong candidate to be used in the compilation of a new dictionary of contemporary Slovene [1], a consistent and detailed representation of linguistic phenomena, including morphological variation, is much needed.

Since large collections of texts are available for linguistic research, we use a corpus approach to obtain empirical data based on real language use. Our two main research questions are: 1) how does the data obtained from corpora differ from the morphological variation represented in the language manuals (dictionaries, grammars, etc.) and 2) can some solutions regarding morphological variation (specific paradigms) be ascribed to a group of lemmas systematically.

A comprehensive list of problematic lemmas from Sloleks regarding morphological variation have already been presented in [2] and arranged into 8 categories. However, morphological patterns were extracted automatically from the lexicon and need additional analyses. We use the biggest corpus for Slovene, Gigafida 2.0 [3], to further examine this language phenomenon and provide a systematic representation of morphological variation. We compare the results to other language manuals as well and decide whether a specific variant should be included in the lexicon or not; what are the criteria for including them; and whether some specific tags for marked word forms should be added.

Along with the information on specific morphological variants based on corpora, we will present a demo of an improved entry in the Sloleks lexicon. Using corpus linguistics and providing objective data on this language phenomenon, we believe we will contribute to a more consistent and detailed description of morphological variation in Slovene.

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Changing the Way We Make Sense of the World: An Enactive Approach to Profound Change

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Context and Purpose

In recent years, the enactive approach gained increasing influence in cognitive science. More than any other paradigm in this field, it emphasizes the relation between cognition and life. The enactive approach combines several old and new ideas in the context of cognition. Few of its key ideas are the following: a living system is organized as an *autonomous system*. In autonomous systems, the constituent processes recursively depend on each other, constitute the system as a unity, and determine the domain of possible interactions with the environment [1].

Thereby, some of these interactions with the environment may support the self-production of the living system, some of them may endanger it. Hence, the autonomous system gains a perspective on its environment. It attributes value to aspects of the environment regarding its self-production. Accordingly, what the system experiences as its environment is the sense it makes of it. Therefore, significance and valence do not pre-exist but are enacted by a living being. This enaction of a world is what the enactive approach refers to as cognition or *sense-making* [1], [2].

But how do living systems *change* the way they make sense of the world? Guided by that research question, this thesis aims at opening up the enactive approach to questions of cognitive and existential change.

Method

Based on a review of enactivist ideas, this thesis develops an enactive account for the processes that constitute changes in sense-making. These findings are translated into implications for two recent change frameworks, the U-theory and triple-loop learning [3].

Findings

Building on the ideas of (1) autonomous organization, (2) co-emergence, and (3) the enactive reframing of the mind-body problem, the two-way causal relation between consciousness and embodiment is emphasized. This enables two conceptual moves. First, the global-to-local determination from consciousness to the body (including the neural system) allows for an account of a change in sense-making as triggered by experiential acts. Second, the enactive non-dualist and non-reductionist approach to the mind-body relation allows for drawing systemic links between those acts of consciousness (experiential gestures) and those bodily acts (embodied gestures) which may constitute changes of sense-making. On this basis, a detailed model of processes that constitute changes of sense-making is presented and discussed.

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Saliency Models Analysis for Paintings

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Processing visual information in real time is a difficult task. Therefore we process visual data by selecting some stimuli and ignoring other. Which stimuli will be selected is determined by top-down factors that are driven by a task, and bottom-up factors that highlight regions in a visual scene that are different from their surroundings – often referred to as visual saliency. In this thesis we will test computational saliency models and analyze them in terms of their performance and applicability in visual art. There is a continuous effort in computer science to create systems that would help with understanding art concepts, but also on the other side - art expertise is benefiting from computational methods which aid the analysis, and give new insights into the research. More specifically we will test saliency models, and asses their accuracy against previously acquired ground truth data – eye fixations of people looking at digitalized paintings. By running saliency model on these paintings, we will get their corresponding saliency maps. Saliency map is a topographic representation of saliency. While the saliency map retrieved from a model just estimates salient locations (what attracts our gaze), true eye fixations can be acquired by an eye tracking technology. Using various comparison metrics (see [1] for a review) we can then asses how well models predicted salient locations. Since paintings often portray natural scenes different from the reality, and are vulnerable to many elements like painting skills, painting materials, and techniques, we think this data may be challenging and pose a space for further improvements. Considering to date only few studies have focused on this topic (for example [2]), by studying saliency models in the context of paintings, we would like to benefit not only the field of visual saliency modeling, but also the field of art.

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Immersion – An Altered Conscious State in Live Action Role-Playing and Other Fields?

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Context

My master thesis is focused on a psychological phenomenon called *immersion* in Live Action Role-Playing, theatre, and psychodrama. Immersion in LARPing is defined as *"Immersion as a state (she was Immersed in the character) means the subjective experience of being someone else in an alternative, diegetic reality."* [1] (text in brackets is added). LARPers often report experiencing this phenomenon during sessions. LARP-ing has many similarities with theatre and psychodrama, therefore it is reasonable to assume that something similar occurs in psychodrama and theatre. I begin my work from a LARP perspective on immersion and a comparison of descriptions of similar phenomenon between LARP, theatre, and psychodrama. I've been working in the field of LARPs for the past two years, which is why I chose the LARP perspective as a starting point.

Purpose

Descriptions of similar phenomenon can be found in the theatre. [2] describes it as an altered conscious state, but the terminology used is vastly different. Also, there is no well-known concept that could describe this occurrence for all fields at once I am planning on examining each of these fields separately, to see whether they describe the similar phenomenon or even the same one but using different terms. Having a clear understanding of the phenomenon and relevant terminology allows for interdisciplinary work across the fields.

Method

I will attempt to do this by performing a comparative analysis of the concept *immersion*. I start out with an overview of immersion in LARP. I will then gather descriptions of a similar phenomenon in theatre and psychodrama. After gaining an adequate understanding of the phenomenon in each of the fields, I will compare the concepts with one another. I will look for similarities, differences and anything out of the ordinary.

Expected Results

I expect to understand the phenomenon in each of the fields and I hope then to be able to form a concept of *immersion* that can be used in all three fields. I will also review if the phrase *immersion* is an adequate term, and then I might be able to bring about an option that will better reflect the essence of the phenomenon.

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Inverted Encoding Models: Reconstructing Stimulus Locations from Spatial Working Memory

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Can the patterns of neural activity reveal, how working memory operates? Empirically, this question can be addressed through stimulus reconstruction techniques applied to fMRI data. One such technique is Inverted Encoding Modelling (IEM) [1]. IEM reproduces stimulus features from neural data based on a hypothetical neural encoding of those features.

In an fMRI experiment, 40 healthy participants (all students, 23 female, 21±3 years of age) memorised the location of a small, circular stimulus, held it in working memory over a 10 second blank delay and freely recalled it by moving a probe to the remembered location using a joystick.

After preprocessing the neural data, the IEM analysis proceeds as follows:

First, a neural encoding model for spatial location is built by designing a set of spatial filters which act as information channels for the stimuli. Second, the encoding model is trained on a subset of the fMRI data by estimating the weight matrix which best fits the responses in the information channels to the neural signal in terms of a general linear model. Third, the weight matrix is inverted, in order to allow backward calculation from the fMRI data to the channel responses. Finally, the inverted encoding model is tested on the remaining subset of the data by predicting the presented stimulus location from the neural signal.

The steps described above will be repeated within (i) a cross-validation procedure, which shuffles the training and test data sets to increase the validity of the results, and within (ii) a searchlight analysis, which identifies the brain areas most suitable for reconstructing the spatial stimulus location.

Based on previous research [1], we expect to find that …

- IEMs can recover the spatial location of presented stimuli in a visual working memory task.
- the fidelity and location of the reconstructions predict the behavioural mnemonic performance.
- the fidelity of the reconstructions is higher for stimulus presentation compared to delay phases.

Expanding previous research [1], we expect to find that …

- IEMs based on 2D polar spatial filters are superior to IEMs based on Cartesian or 1D directional spatial filters.

This research could have implications for our understanding of the mechanisms governing spatial working memory. For instance, it may reveal, which kind of coordinate encoding is most likely to underly spatial working memory: polar or Cartesian? Additionally, it may hint at the brain areas, which are likely involved in handling latent working memory representations.

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The Role of Auditory Feedback in Singing

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Singing is a special type of vocalization, used to produce music. In contrast to speech, where precision in vocalization has to be just sufficient enough for the message to be transmitted to the listener, in singing a much higher emphasis is put on the precise control over different parameters in vocalization. An important part in this control is played by auditory perception, which provides auditory feedback (AF) [1]. A speaker/singer may use his auditory system to listen to his output vocal signal and make appropriate muscular adjustment, resulting in the desired vocal output. The greater the emphasis on the precise form of vocal output, the bigger the role of AF may be. Since the interaction between vocal production and perception is directly mediated by cognitive processes, the study of AF in singing can be an useful approach in studying cognitive mechanisms, involved in the control over the vocal production. In addition, insight into physiological and cognitive mechanisms underlying vocal control in singing can provide novel ideas in pedagogical approaches to vocal development.

The aim of the study is to investigate the role of AF in singing using a theoretical and an empirical approach. The goal of the theoretical part is to review the existing literature, including an overview of the experimental approaches in studying AF and their findings, the developed psychological models used to explain the empirical data, and the identified neurological correlates. In addition, an attempt will be made to investigate how the existing knowledge on AF can be framed within some of the paradigms in cognitive science, especially predictive coding.

The goal of the empirical part is to investigate the role of vocal training on the control over pitch through AF. Professional and nonprofessional singers will be tested in an experimental design using a modified AF. The task of the participants will be to utter a vowel at a constant pitch. Their acoustic signal will be recorded and played back in real time with a shifted pitch. Electroglottography [2] will be used to record direct changes in the vibration frequency of the vocal folds in response to the altered feedback. Based on previous similar studies, we expect that the subjects will automatically compensate for the pitch-shifted AF by adjusting their pitch in the opposite direction. Previous studies have also suggested that professional singers increasingly rely through training on their somatosensory feedback [1]. Based on that we predict that the pitch-shifted AF will modify the pitch response in professional singers to a lesser degree in comparison to nonprofessional singers.

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Phonaesthetics: A Pilot Investigation

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In popular discourse, certain natural languages (e.g., Italian and French) are considered to be more mellisonant than others (e.g., German and Arabic). In spite of this observation, only limited scientific research can be found on this topic (e.g., the controversial field of *phonaesthetics* – which is primarily concerned with "the aesthetic properties of sound" [1, p. 361] – has not received much scientific attention). The only systematic analysis seems to have been conducted by Crystal [2], who examined a list of allegedly beautiful English words in an attempt to identify the phonaesthetic patterns found within.

In the field of sociolinguistics, on the other hand, two opposing theories regarding the aesthetics of a language's sound have been discussed: the 'inherent value hypothesis', which states that certain languages are inherently more beautiful than others, and the 'social connotations hypothesis', which argues that languages are perceived as beautiful because of the social connotations they carry [3].

To test the two hypotheses empirically, we plan to design and carry out a series of psycholinguistic pilot experiments, all of which are part of a larger research framework. The experiments shall employ a set of auditory stimuli (each language represented by its own stimulus), whereby the stimuli themselves shall consist of native-speaker readings of Aesop's fable *The North Wind and the Sun*. As all stimuli represent translations of the same text, we hope to ensure semantic inter-comparability between the stimuli, reducing the possibility of aesthetically preferential ratings based solely on differences in meaning.

Participants shall be asked to rate each auditory stimulus using the Semantic Differential scale, employing a yet-to-be-determined set of opposite qualitative terms. Factors such as a participant's language background shall be considered in the ultimate statistical analyses. To control for potential influences of prosody and voice quality associated with each stimulus, the participants shall additionally be asked to rate each speaker's voice.

Preliminary results for the first in the series of pilot experiments, carried out with 16 European languages and 24 participants, have revealed an aesthetic preference (in descending order) for English, French, Spanish, Catalan, and Croatian (with Welsh and German appearing at the bottom). The favorable attitude towards Romance languages and the aesthetic aversion to languages such as German largely coincide with prevalent cultural stereotypes about language beauty, inviting cautious interpretations in the analyses to come.

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Preschool Children and Mindfulness

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Purpose

Being able to regulate attention, emotion and having self-regulatory skills, are the main factors for school readiness. Children who have shown more self-regulatory skills in their childhood are predicted to be healthier, to show better academic performance and an increase in pro-social behavior [1], [2].

Research Questions

Are children practicing mindfulness capable to substitute their dominant response over a subdominant response?

Do children behave differently in their home environment after practicing mindfulness?

What do educators think about practicing mindfulness and their observations on behavioral changes in children?

Participants

Two groups of preschool children will participate in the research, all attending a public state kindergarten. Educators from the kindergarten will also be participating in the research. Educators in the intervention group will not need to have prior knowledge of practicing mindfulness. They will follow a specially prepared program, which will include mindfulness exercises for preschool children. The children in the intervention group will practice mindfulness for about 400 minutes within the eight weeks of the survey, on average ten minutes a day, from Monday to Friday. The practice will take place during their stay in kindergarten, when they take a rest, after lunch. The control group will practice their rest time as usual, by reading fairy-tales or playing quietly.

Measuring Instruments

The first part of my research will represent a test called Toy wrap/ Toy wait [3]. I will be measuring the latency of peeking and touching a gift before, and after practicing mindfulness. The second part of the study will represent a questionnaire about children's behavior at home, answered by their parents. Last, the third part will contain statements from educators on their experience about practicing mindfulness with preschool children and their observations on possible behavioral changes in children.

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Understanding a Consumer's Choice of Goods Made under Precarious Circumstances

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Consumption has become a primary tool for individual identity creation. It is one central element of our economic system and part of every citizen's daily life. In the recent history, especially the textile industry was shaken by various scandals regarding slave like working conditions and child labor. Still, little effort from the producer's side is needed to convince the consumer to buy again, just shortly after the outcry. This paper aims to understand, which mental and cognitive processes within the consumer take place that lead to the decision to overlook these scandals and keep buying the goods that are still precarious.

Purpose

This thesis will be about the consumer's choice in consumer capitalism, assuming that in this economic system, consumption is the major economic force, perpetuating the very system. The aim of the paper is to find out if and why the chosen interviewees of the Global North buy goods, especially textile ones that have shown to be from precarious working conditions in the Global South. This work shall be seen within the field of Cognitive Economics [1].

Method

To research the underlying motivation and processes, the author decided to conduct a series of four interviews with four different individuals from the 'Sinus-Milieus' of 'Expeditive' and 'Adaptiv-Pragmatische' coming from the Global North. These interviews attempt to focus on two different levels of experience and questions: What is the individual's narrative concerning consumption of precarious goods? What is the subjective experience when buying goods coming from precarious working conditions?

The author aims to take a qualitative approach such as Objective Hermeneutics. With the help of two scientists from Cognitive Science related fields, gathered data will be analyzed to understand the constructed reality of the subjects to identify overlapping inter-subjective patterns. In a second step, the subjective experience in the second person shall be described, to take a look at the cognitive processes taking place within the individuals [2].

Results

Three major concepts are currently considered as hypothesis-giving for the analysis: 'cognitive limitation' [3], 'cognitive dissonance' and 'imperialism'. It is expected that during the analysis, one of these concepts will be understood as conceptual core of the hypothesis. After the 'hypothesis verification' the author aims to interconnect the conceptual core and the gathered data to build a conclusive interpretation about the interviewee's narrative and mental processes.

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Psychopathological Disturbances of Perception with Regard to the Phenomenology of the Body and Potential Neurobiological Explanations

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Research Problem

In recent years we are witnessing a resurgence of phenomenological approaches to psychopathology, rooted in the philosophical traditions of the 20th century and a systemic effort to find common ground between phenomenological and neurobiological understandings of disturbances of consciousness [1] [2] [3]. Following this trend, the goal of this thesis is to come to a theoretical understanding of the philosophical roots underlying the phenomenological approach to psychopathology of the perception of the body and with such an understanding elucidate a concrete examination of such disturbances in schizophrenia patients, integrating a phenomenological approach as well as experimental neurobiological data.

Method

The proposed method consists firstly of an analysis of relevant phenomenological texts, focusing on the phenomenology of the body (e.g. the difference between the *subject-body* and the *object-body* [1]), and research of proposed neurobiological bases for perception disturbances in schizophrenia. This is to be followed by obtaining subjective reports from schizophrenic patients using semi-structured interviews EAWE (Examination of Anomalous World Experience) and EASE (Examination of Anomalous Self-Experience), the first standardized measures of subjective experiences developed primarily for the use in schizophrenia populations. In this way we would gather both abnormal perceptual experiences and accounts of an altered sense of self, potentially linking the two [2]. Finally, the reports are to be integrated with the phenomenological context and neurobiological hypotheses.

Implications

Such an analysis has several potential benefits. First, it sheds light on the phenomenological conceptual framework from which many new researchers draw upon, making certain assumptions explicit and open to critical evaluation. Second, it proposes a better differentiation of schizophrenia subtypes, potentially enabling better classification and diagnostics. And finally, although most authors stay agnostic with regard to the question of causality [1] [2], if we accept the notion that changes in the form of perception are connected to neurobiological changes, it can serve as a guiding structure for further research and propositions in both phenomenological and neurobiological research.

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The Study of Dance as an Art Form in Cognitive Science - A Paradigmatic Turn?

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Traditionally, the study of dance as art form has been neglected in the humanities. In philosophy, especially in aesthetics, it is considered as under-represented, and dance research as a scientific discipline in its own right has only been established at the end of the last century. However, over the last decades the scientific interest in dance is increasing [1].

In cognitive science, dance has entered the scene in interestingly diverse ways. Firstly, the perception of dance is studied the field of neuroaesthetics, in which the neural bases of aesthetic experiences are investigated. Secondly, it is used by various philosophers as a metaphor for thinking, supporting embodied and enactivist approaches of cognition. Thirdly, the growing number of researchers with a dual background (dance and science) as well as recent collaborations between scientists and dance artists show that the interest is mutual, and the encounters are enriching.

According to Brandstetter [1], these developments can be understood as a profound challenge to our understanding of scientific knowledge: Dance – studied as a phenomenon – subverts a binary mode of thinking that poses body versus mind, emotionality versus rationality, and theory versus practice. By doing so, dance ultimately questions our notion of science, and therefore might have the potential to evoke a paradigm shift.

In my master thesis, I will - from the perspective of theory of science - argue that the interdisciplinary investigations on dance within the field of cognitive science can bridge the gap between the humanities and exact sciences. I aim to substantiate this hypothesis by analyzing current scholarly investigations on dance in cognitive science and focusing on their research paradigms and its implicit assumptions about knowledge. By drawing on theories of cognitive science (neurophenomenology, enactivism), I will hypothesize that the study of dance might cause a paradigm shift by revisiting the corporeal turn – but this time including the human body not merely in terms of theory.

For my endeavor, I will first have to clarify concepts concerning knowledge, epistemic cultures, and paradigm shift theory to establish a theoretical and a methodological framework regarding dance as a practice and dance as a research object. Secondly, I will discuss selected research projects from the fields of philosophy and neuroaesthetics. Finally, I will lay out my hypothesis and propose a view in which an interdisciplinary scholarly focus on dance implies a paradigm shift that, in the long run, may result in a reconceptualization of the relationship between the humanities and the exact sciences.

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Bayesian Modelling in Cognitive Science: An Inceptive Psychologist's Reflection Informed by a Little Hands-On Experience

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Computational cognitive modelling (CCM) "explores the essence of cognition (including motivation, emotion, perception, etc.) … through developing detailed, process-based understanding by specifying corresponding computational models (…) of representations, mechanisms, and processes" [1] (p.3).

Marr proposed a seminal multi-level approach to CCM, suggesting three presumably *necessary*, but not necessarily *sufficient*, particular *levels* at and across which to study cognitive phenomena: At the *Computational Level*, the problem faced by the mind and how it is solved is to be characterised in *functional* terms; at the *Algorithmic Level*, the particular *processes* the mind executes to solve the problem stated at the computational level are to be described in terms of specific *algorithms* and *representations*; contributions at the *Hardware Level* should explicate how these processes could be *instantiated* in the *brain*.

Bayesian Modelling (BM) provides a flexible and principled framework for relating cognitive models to behavioural data [2]. The defining feature of the Bayesian approach is the use of *probability distributions* to represent uncertainty. *Bayes' rule* maps *Prior probabilities* over *models* and their *parameters* to *posterior probabilities*, based on the *evidence* provided by *data*. Bayesian methods allow to draw inferences about parameters and models, and to describe and predict data.

I investigate the application of Bayesian Modelling under the guidance of Marr's approach in a psychological case study of *social learning* in a Probabilistic Reversal Learning task (PRL) [3]: Each of the five participants of a study group has to learn the dynamic reward probabilities associated with different stimuli while playing against their four opponents. Bayesian Modelling is to be used to quantify the *latent* mechanisms employed by the participants, thereby explicating how participants might integrate normative and informational influences in their decision-making process at the computational level.

The purpose of this study is to allow me to *experience* the practical value of "BM–in–Cognitive Science", which then in turn should support my development of genuine reflections on this *type* of modelling: What are its signature mechanisms, limitations, and underlying assumptions, and what are its offerings to Cognitive Science?

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What Is True and What to Do - Implications of the Computational Rationality Paradigm for Improving Human Decision-Making

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Introduction

The questions of what is true and what to do are interesting in theory and relevant to practical every day situations. After the concept of reason was used to answer them for millennia, a strong notion of rationality has formed in cognitive science. The normative concepts of rationality splits into two parts, namely epistemic rationality, how to form beliefs about the world that map its real structure, and instrumental rationality, how an agent can reach its goals. They stem from economic theory and propose axioms that optimal reasoning and decision-making have to follow. A vast amount of research in the heuristics and biases literature from psychology and behavioural economics has shown, that humans deviate systematically from this normative model. The formalized models of rationality also gain new relevance for artificial intelligence.

Research Question

In the psychological attempt to study rationality and its improvements, two schools have formed: one based on the research by Kahneman and Tversky [3] and one based on the work of Gigerenzer [2]. While they fundamentally rest on similar assumptions, they make different claims about whether or not humans are rational and how rationality could be improved. Their main disagreement resting on the question of the optimality of human heuristics. Taking concepts from artificial intelligence into account, the paradigm of computational rationality was formalized by Tenenbaum, Gershman, and Horvitz [1]. This paradigm includes the cost of computation and opportunity costs of an embodied agent in its environment into account when maximizing expected utility. Does this paradigm (fully) formalize and unify the different psychological schools of rationality, is this desirable or possible at all, and what are the implications for rationality enhancement?

Method

This work is based on intensive literature review, analysis of empirical findings as well as conceptual analysis, a comparison and discussion.

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The Value of Friendship

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Scope

"Without friends," Aristotle noted in his Nicomachean Ethics, "no one would choose to live, though he possessed all the other goods" [1]. Friendship seems to be valuable for human life in at least two ways. Firstly, a rich network of good friends makes nearly all matters of daily life much easier. Stable friendship typically involves reciprocal sharing of resources and mutual support. As such, the willingness to cooperate combined with strong intersubjective interest may present an adaptive "success formula" for attaining nearly any material, mental and emotional care that humans need for a fulfilling existence. Secondly, becoming and being a friend seems to be of intrinsic purposiveness to humans. That is, we may regularly go to extreme efforts and even put ourselves in danger in service of our friendships. Such survival risks can hardly be explained by the expectation for reciprocity.

The purpose of this project is to review the relevant literature within social cognition and evolutionary anthropology to evaluate friendship's effect on human fitness as well as the intrinsic purposiveness of this universal phenomenon.

Material

The highly cooperative, egalitarian and intersubjectively-focused life style of the "Original Affluent Society" – anatomically modern hunter-gatherers – was distinct in adopting "generalized reciprocity," a culture of sharing, as their mode of existence [2]. Since such trust- and intimacy-based societies survived very successfully for millennia, their analysis should provide insight as to how and under what conditions friendship enables a selective advantage rather than promote between-group enmity or nepotism.

Regarding cognitive aspects, I will turn to developmental literature. The central role of social interactions within peer environments and friendships for the acquisition of a wide range of skills, attitudes, and experiences in the growing-up of a human has been well documented by now [3]. Among these, one of the most valuable skills may be the ability to procure and maintain healthy, mutually beneficial friendships out of one's social environment.

Profit

The value and ubiquity of friendship seems intuitively obvious. Yet, it is a highly underrated and understudied phenomenon within the cognitive sciences. As the admission of a correct-as-possible understanding of human nature is of fundamental importance for productive analysis of human cognition, I'm hoping to contribute a puzzle piece to said understanding.

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Experience Sampling and Citizen Science

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Experience sampling method (ESM) is a way of empirically estimating characteristics of the human experience. This is done by collecting samples of lived experiences over a certain period of time. ESM is designed as a questionnaire presented to a person, usually on their mobile devices. The person is prompted to answer the questions about their experiential and situational context [1]. These answers provide data for representing the general experiential landscape of the person or the insight into the phenomena of interest.

ESM has an advantage of large data sets, minimisation of memory bias, and high ecological validity [1]. Hence, there is a growing number of research designs using ESM. However, in our review of the studies, we detected oversimplifications and ambiguous representations of different lived phenomena in various designs. For example, the use of the inappropriate scales for representing certain feelings or asking too general questions that miss important information about the experiential states. ESM is also presented with a challenge of participant burden (i.e. disruption of daily activities for a longer period of time) and their lack of motivation. This translates into inconsistent data collection as well as participants providing quick and shallow answers. Our suggestion for addressing this challenge is to conduct the research in the form of a citizen science (CS) project. Citizen scientists are actively involved and considered co-researchers who provide their expertise and perform tasks necessary for the research [2]. This is a clear parallel to how empirical phenomenology considers participants as co-researchers and the only real experts on their own experience [3].

In our project we are designing ESM for representing general experiential landscapes. We are implementing the design as a mobile application. In order to overcome the methodological shortcomings, we are considering the principles of empirical phenomenology, human-computer interaction, and probabilistic modelling. Alongside we are designing CS framework for inclusion of the co-researchers and the grounds for building the community. Iterative development of the the application will be followed by a CS pilot project on researching the experiential landscapes.

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Novel Sound Learning through Philosophical Associations

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Purpose

Second Language Acquisition Learners have to navigate novel sounds through the bias of their mother-tongue efficient ears, muscular control and development in producing these sounds, psychological pressures and fears associated with learning, novelty, society and self—which arise from philosophical features of sound, speech, society, and identity. I hope to explore the personal development and process of novel sound processing and producing new sounds by interviews.

Background

The first main aspect of speech development is the biological fundamentals or biomechanics of speech. Secondly is the psychological connection with speech. The second aspect is psychological. This could include feelings and emotions identified with muscle control, process of change and learning, hearing novel sounds, association with one's own body in creating the novel sounds in speech. The final category is the philosophical area of sound, which would discuss and analyze certain thoughts or mental states in association with novel sounds and speech production of those novel sounds to the individual.

Methods

One experiment would be to record sound and sight of non-native speakers producing a novel sound and a second language sound. Then have them watch a video of native speakers both in slow motion and real time, of the same sound. Then repeat copying this sound and asked to imitate the facial movements and expressions.

The second experiment would be to have an interview with non-native speakers and discuss the most difficult sounds in foreign language. Questions would include what seems the most novel to them, any associations positive or negative, and mental states or ideas they have of those particular sounds. A further interview would be made of comparison with associations of familiar sounds in their mother tongue in contrast to the foreign tongue.

Implications

I hope to create a kind of approach using this theory in helping adult Second Language Learners to hear new sounds more accurately, self-evaluate and compare foreign or novel sounds, psychological and philosophical exploration of sound and self, and enjoyment of the learning process.

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Influence of Working Memory Load and Task Importance on Prospective Memory Performance

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Context

Prospective memory can be described as memory oriented to execution of intention in the future or "remember to remember" [1]. There is solid evidence for good working memory to facilitate prospective memory performance and working memory load to reduce prospective memory performance in experimental setting [2]. High prospective memory task importance increases the performance, especially social importance of prospective memory task [3].

Purpose

Those two factors mentioned above have never been put together in one experiment, so we decided to do so. The purpose of our study was to examine role of working memory load and task importance manipulation in prospective memory performance. We were not satisfied with classical prospective memory paradigm, since it resembles multitasking. Because of that, we differ from the classical paradigm, in order to have more ecologically valid results.

Methods

We designed 2x2 factors experiment, where we manipulated cognitive load (high or low) and task importance (social or no importance). We recruited and tested 55 participants. Our performance measure in experiment was naturalistic and simple.

Results

We found no significant differences between groups in prospective memory performance. However, there was trend of groups with social importance to have better success/fail ratio. Positive outcome is, that our paradigm seems to be practical in prospective memory assessment.

Discussion

Our results came out to be not significant, but we still see the trend in the data. For next research in this area we suggest to use even more pronounced difference in working memory load and task importance manipulation in order to have more clear results.

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The Effect of Referential Uncertainty on the Encoding of Novel Words

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Introduction

Learning a new word relies on processes that work at multiple time scales - learners need to identify a speaker's referent in-the-moment, encode a mapping between the label and the referent, recall multiple labeling events and integrate across them, and use their learned mappings to identify the object in novel contexts [1]. In the last decades, numerous studies have addressed the question of word-to-world mappings and the mechanisms responsible for the development of reference [2]. However, to date, no study has investigated whether and how referential certainty (i.e. how much the learner is certain about the meaning of the novel word) influences learning and memory encoding process. Therefore, the aim of this project is to extend the existing knowledge about word learning by investigating whether and how referential certainty might influence encoding processes during the acquisition of novel words. In particular, we are going to test whether subjects' certainty about the meaning of a novel word would have an impact on the depth of encoding.

Method

In order to investigate this question, we recorded short object naming episodes where each time a person provides a novel word in the presence of two unfamiliar objects. Subjects' certainty about the meaning of the novel words was modulated by variations of two factors: 1) object identity (by using two identical or two different unfamiliar objects) 2) use of the referential cues (with having the speaker pointing at one of the objects or not during the labeling). After participating in the learning sessions, the encoding of the novel words will be assessed. The test phase will consist of a recognition memory task and word-object association test.

Hypothesis

Our main hypothesis is that different levels of certainty about the meaning of the novel word will influence the depth of encoding. Specifically, we assume that the least uncertainty is about the interpretation of the novel word, the better the encoding will be.

Implications

The results of this study will enrich our current understanding of those factors that can have an impact on the depth of encoding novel words at a very early stage of word learning, when encoding of the meaning does not necessarily occur yet. Furthermore, we also believe that this project provides an opportunity to test in general the relationship between memory encoding and certainty about the meaning of incoming information.

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The Role of Theta Oscillations in Prefrontal Cortex During Semantic Retrieval: tACS Study

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Neural oscillations are crucially involved in neuronal communication and computations that are necessary for the complex cognitive functions and adaptive behaviour. Semantic cognition is a fundamental system that enables complex process of semantic retrieval of information. Recent studies have demonstrated that neuronal theta oscillations in prefrontal perisylvian brain regions may play a pivotal role in binding of semantic representations. However, theta oscillations have been also associated with the involvement of cognitive control and working memory functioning which putatively support controlled semantic processing. Thus, the functional role of theta oscillations in semantic retrieval remains poorly understood. The causal role of theta oscillations in semantic retrieval requires a systematic modulation of the endogenous brain oscillations. For this purpose, transcranial alternating current stimulation, an external frequency-specific modulator of endogenous cortical fluctuations, represents suitable approach. In the present study, we applied active and sham tACS over the left inferior frontal cortex and the contralateral supraorbitary region to evoke modulate prefrontal theta oscillations at 6Hz (θ-tACS) over the inferior frontal cortex in n=27 healthy participants. The tACS conditions were delivered in separate sessions using a pseudo-randomized and properly balanced cross-over experimental design. Participants completed tasks assessing automatic and controlled retrieval performance in three blocks within each session before, during and immediately after the stimulation. Our findings indicate that θ-tACS significantly facilitated retrieval tasks involving automatic processes (i.e., delivering free and unconstrained associations) but impaired controlled retrieval that required cognitive control (i.e., the inhibition of habitual responses and switching between semantic sets). Our study provides an important experimental evidence indicating that neuronal theta oscillation may constitute a neurocognitive mechanism for semantic binding, rather than cognitive control. We conclude that theta oscillations over the left prefrontal cortex may support well-established semantic connections or strengthen their metastable activation, which enhances fluent retrieval. These conclusions should be supported by further empirical research.

A Theoretical Study of the Hippocampal Microcircuitry

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The brain is a very complex organ whose emergent functions cannot be deduced by simply unravelling the mysteries of its constituent cells. The function of the brain emerges due to its intricate circuitry, the connections and the modification of those connections. Access to and modification of such cellular components and circuitry is no easy task. Hence, data-driven computational and simulation neurosciences were developed to create the possibility to conduct such research on virtual models built from existing experimental findings. Available data, however, is often sparse, unstandardized and difficult to visualize. It is therefore the scope of the first part of this thesis to focus on data mining and detailed literature review to create an adequate knowledge base of the microcircuitry of the area of the brain mainly responsible for episodic memory encoding and retrieval – the hippocampus proper. The data will be graphically represented in a schematic interactive diagram including both connectome details and plasticity potential and mechanisms. As a secondary aim of this project, incomplete data will be highlighted, possibly motivating the filling of those knowledge gaps through further experimental research.

Visually, the schematics will be represented in superimposed layers, each shedding light on varying levels of information including anatomical layers, neuron locations, densities, morphologies and electrophysiological and synaptic properties. Special focus will be placed on the CA1, CA2 and CA3 areas and on the main hippocampal pathways of the mouse brain while ensuring that the origin of the data is clearly stated and properly referenced within the schematic diagram. The theoretical research and graphical implementation are still in progress.

In the final part of the project, the above-mentioned diagram will be tentatively utilized to investigate further how plasticity in the hippocampus plays a role in episodic memory encoding. Computational models of the hippocampus such as the *Sparse large-scale nonlinear dynamical model* by Song and colleagues [1], have already shown great potential for their integration within memory prosthesis. In a brief theoretical study, we wish to gain more insight on how well plasticity is represented in such models and what could be the repercussions of having misrepresented or unrepresented plasticity in memory prosthesis. Both neuroscientific and psychological perspectives will be considered.

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The Psychosomatics of the Judgment of Agency

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Context

Agency, as the ability to act, is an essential component of being. However, the concept has been undergoing much controversy in literature. Additionally, most research has focused primarily on the sensorimotor and physical aspects of agency, while the higher-order level, the "judgment of agency" (JoA) has been barely acknowledged. This acknowledgement, however may not only occur on a cognitive level but could also involve a bodily influence [2]. A context where agency is consciously tackled, often lacking but worked on to be increased, is psychotherapy. And yet, psychotherapeutic settings are mostly conversation-based and operated in bodily stillness, e.g. sitting. Intercultural theories from e.g. Patanjali, suggest that body awareness (BA) is a crucial component of the sense of agency and that it may be supported through movement therapies.

Purpose

These theories give reason to believe that a body in movement has a profound connection to cognition not only on a posterior level, i.e. when working with symptoms but also as a causal factor. This thesis will therefore investigate what the connection between body awareness and judgment of agency is, if the body is moving and acting. The research question will therefore be: How is the level of bodily awareness connected to the judgment of agency?

Method

Patients of a Psychosomatic Clinic will receive two questionnaires before and immediately after a body therapy session: A JoA and a BA Scale. The repeated measures method design is intended to reveal a change in either JoA and/or BA within and potentially between subjects. Moreover, answers are compared with the quantity of body therapy session subjects have engaged in already at this clinic. Furthermore, all subjects have to estimate the personal value of the experience and state whether this is the first experience with bodily practices or if not, which other they have participated in prior to their stay at the clinic. Based on these differentiations, participant's data will be statistically revised.

Results

It is expected that if people will score higher on BA, they will likewise score higher on their JoA. In case other correlations between the participant's data and the controlling variables will be found, alternative conclusions will have to be drawn and our hypothesis would decrease in validity.

In addition to the novel understanding of the JoA, the expected insights could consolidate the growing demand and acknowledgement for the involvement of the enacted body in science and would further urge the exigency of involving the body in psychotherapy.

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Cross-Lingual Approach to Abstractive Summarization

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Introduction

Automatic text summarization is a process of extracting important information from the text and presenting that information in the form of a summary. Summarization approaches can be abstractive or extractive. The former is a productive process and can generate novel words and sentences, whereas the latter copies the most representative ones. Cross-lingual summarization can help us do that task for languages without adequate training set using model transfer from another language.

Research Problems and Hypothesis

Abstractive summarization approaches were improved significantly with deep neural networks but the results can still be repetitive and absurd, can misrepresent facts and be misleading in various ways. Our hypothesis is that cross-lingual word embeddings and language models enable the transfer of deep learning text summarization models between languages.

Method

We will use the pre-trained summarization model with cross-lingual embedding at the input and language model [1] in the target language at the output. The pre-trained state-of-the-art summarization model [2] combines extractive and abstractive techniques and follows a two-step approach: first it selects important phrases and then it paraphrases them. MUSE library [3] includes two ways to obtain cross-lingual word embeddings. The supervised method uses a bilingual dictionary to learn a mapping from the source to the target space using (iterative) Procrustes alignment. The unsupervised method learns a mapping from the source to the target space using adversarial training and (iterative) Procrustes refinement. Results will be evaluated automatically with ROUGE metric and for a small set of summaries we will also use human evaluation of accuracy and coherence.

Interdisciplinarity

It seems that word embeddings approach corresponds to the idea that the meaning of a word is determined by its use in the language and confirms that words primarily get their meaning from the contexts in which they are used. A common vector space seems to confirm the assumption of universal concepts, possibly also language. Neural approaches seem to refute the assumption that mental representations are a necessary condition for solving natural language tasks such as translation or summarization.

Expected Results

We will implement the cross-lingual model for text summarization. The results may have important implications for problems in linguistics and philosophy.

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Posters

The Influence of Music Listening on Heart Rate Variability

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Context

Music has beneficial effects on human psychophysiology and health [1]. The emotional response during music listening affects heart rate, breathing rate, blood pressure, and muscle tension [2]. However, mechanisms involving both the parasympathetic and the sympathetic autonomic system are still under investigation.

Purpose

Our study aims to deepen understanding of how music elicits the activation of the parasympathetic nervous system that is responsible for relieving stress from the body and thus might accelerate recovery from medical emergencies such as brain stroke. The balance between the parasympathetic and the sympathetic nervous system activity can be measured with heart rate variability (HRV).

Method

In this pilot study undergraduate students with different levels of musical background will be included. We will collect participants' demographic and medical data, using a questionnaire centered around the participant's music listening habits. Participants will lie in supine position and listen to music through headphones, while we record their interbeat intervals (IBIs). The IBIs will be recorded into a computer, using ECG. Each participant will listen to two musical protocols. Each protocol will begin with a 10 min period of quiet rest and then continue with either four 5 minute long musical pieces of self-selected music or four 5 minute pre-selected music excerpts that were previously shown to be beneficial for physiological well-being: a Gregorian chant, a baroque composition by Bach, a classical composition by Mozart, and one composition of relaxing ambient music. Musical pieces will be separated by a 30 s pause and both musical protocols will end with 10 minutes of quite rest. Both protocols will be compared to control comprised of quite rest of the same overall length as a musical protocol.

Data will be analyzed using an open source analysis package RHRV, which extracts HRV parameters from the recording. We expect modulation of the autonomic nervous system in the direction of improved sympaticovagal balance and correlation with the emotional response to different music styles.

Implications

Study will add knowledge about how music listening affects the HRV metric, and could help music therapy gain recognition as a viable non-pharmacological medical practice.

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Improving Digital Privacy Management with the Support of Intelligent Systems

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The collection and processing of personal data has become ubiquitous. Governments, companies, public organizations are all benefiting from this "valuable resource" as we leave more and more digital traces with our activities online. While there are recent regulations that aim to increase data protection, management of personal privacy is still largely an individual task.

Individuals are tasked with managing what data they share with the digital services they use. This is an effortful task: keeping track of every privacy policy we ever accepted is time consuming, end users are not legal experts on how the data can be rightfully used, our decision-making is restricted by the lack of relevant information [1]. For example, many services keep track of our online behavior such as clicking across different platforms but we usually don't know how our consent for one service carries on to another one. This is a classical problem of bounded rationality [2].

One solution that can reduce the burden on individuals trying to manage their privacy is to introduce consent intermediaries. A support structure that can provide relevant information when making privacy choices can help users overcome some of their cognitive limitations. Therefore, we argue that users will benefit from privacy assistants which would allow users to select which information they share, keep track of their data and re-negotiate consent where it is necessary. Our research goal is to provide information on how to design effective privacy management tools.

We will use mixed methods to collect data on individual privacy management techniques. First, we will conduct a survey to categorize user attitudes. This survey includes questions about users' familiarity with virtual personal assistants, their attitudes in regards to the protection of their data and their trust in privacy policies. Then, we will interview end users and experts to learn what they would expect from a personal privacy assistant. We will use grounded theory to identify the issues that different types of users face.

We believe that intelligent, personalized privacy assistants will empower users and help them overcome problems related to bounded rationality. As we rely increasingly on sociotechnical infrastructures to provide us with personalized information or services, exploring how people interact with virtual assistants will create a good opportunity to discuss how distributed cognition systems [3] could shape decision-making processes.

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Would a Warm Cup Make Your Heart Warmer?

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Introduction

Williams and Bargh showed that merely holding a warm cup for about 20 seconds makes participants judge another person's personality as warmer [1]. Furthermore, in their second study they found that after holding a hot pack, people had a higher tendency to a warm-hearted behavior, measured by deciding to give a reward to one's friend instead of keeping it for oneself. This phenomenon is known as body priming effect. However, body priming experiments sometimes have inconsistent results. Several studies with the similar objective found no effect in the experimental groups [2]. Therefore, our aim was to contribute to this discussion by conducting a replication study, which is highly important yet often undermined practice in the field of psychology. Our hypothesis was that the mere tactile experience of physical warmth will activate concepts or feelings of interpersonal warmth. In other words, does holding a warm cup make us judge other people as warmer?

Methods

We used the same method as in the original research [1]. The research sample consisted of 20 participants. Half of the participants were manipulated to hold a warm cup, while the other half held a cold cup, with the excuse to help the experimenter while he writes something down. After 15 seconds, the participants were asked to rate a person on the laptop screen based on the 10 adjectives. On the screen, there was a picture of a woman with a neutral expression together with a short description. Half of the adjectives were related to warm-hearted features (such as social vs antisocial) and the other half are related to a neutral feature (such as weak vs strong). Based on the original research, we expected a difference in the ratings or warm-related adjectives depending on the experimental manipulation.

Results

Our results showed no statistically significant difference between the two groups in the case of both warm-hearted adjectives and neutral adjectives (warm cup group: M=4.3, SD=0.64, cold cup group: M=4.36 SD=0.54; p=0.88).

Discussion

Previous research showed that the brain areas related to perceiving physical and interpersonal warmth overlap [3]. It is possible that there was no effect observed in our research since the exposure time might have been too short. Another limitation is the small sample size. However, our results suggest that the priming effect of mere tactile experiences of physical warmth is not so strong as the original research suggested.

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Predicted Markers of Attention Biased Towards Regularities in Eye Movements

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Context

Statistical learning is the ability of extracting statistical regularities from our environment. It makes us perceive events in our surroundings and react to them more efficiently. There are several findings indicating that visually perceived temporal structures are implicitly learned and influence visual attentional processes. The capability of statistical learning seems to be present from a very young age: an experiment has shown that after looking at temporally structured visual stimuli, infants as young as 2 months-old could discriminate between novel and familiar sequences [1]. Investigating the relationship between attention and statistical learning, it has already been shown that, in a noisy environment, visual data with structural regularities will receive attentional priority. Regularities also bias feature attention: the colour or weight of a stimuli captures more attention when it shares the common feature of the sequence [2]. We can also find evidence that being exposed to sequences of structured visual cues helps us to predict future cues, without explicitly realising the structure. [3]

Method & Expected Outcome

The research will be conducted with an eye-tracker device with about 30 test participants. Participants will look at a screen where simultaneously two streams of images (simple shapes) will show: one stream with temporal structure in its elements, the other one without it. After a learning period, a search task (deciding the direction of a *T* that appears somewhere on the screen) will interrupt the stream. During the experiment, eye-movement behaviour and reaction time will be measured. According to our expectations, eye-movement behaviour will be influenced by the structured stream. More gazing time will be spent on that stream compared to the other one. When the searching task appears in the stream with structure, reaction time is expected to be faster, compared to cases when the searching task appears elsewhere on the screen.

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Exploring Brain Dynamics with Simultaneous EEG-fMRI

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Introduction

Recent advances in understanding that mental processes are based on the functioning of brain systems that involve spatially dispersed areas has shifted the focus of research to studying the integration of brain activity and the functional interactions of brain networks. Several studies have revealed that neurological and psychiatric diseases are often characterised by alterations in multiple functional networks and indicated how functional brain networks are associated with various cognitive processes and intellectual abilities [1]. In order to better understand the spatial and temporal properties of brain networks, there is a need for the use of multimodal methods. A promising technique of brain imaging is the simultaneous use of EEG and fMRI, which allows us to have an excellent temporal resolution of the EEG combined with the high spatial precision of fMRI [2].

The aim of this study is to explore the nature of functional connectivity of brain networks using simultaneous EEG and fMRI recording. Specifically, we aim to explore longitudinal time-space variability of brain networks and how brain dynamics relate to individual differences, such as personality traits and cognitive abilities.

Method

So far 40 healthy subjects (23 female, 21±3 years) participated in the study. Subjects underwent behavioural testing as well as neuroimaging sessions that combined EEG and fMRI methods on three occasions, approximately 2-3 weeks apart. Behavioural testing included a battery of questionnaires and tasks that tested individual's cognitive abilities (intelligence, attention, cognitive inhibition and working memory) and personality traits. The imaging protocols consisted of structural images (T1- and T2- weighted, DWI) and four functional BOLD images (two task-based and two resting-state, eyes open and eyes closed). BOLD images will be preprocessed using HCP minimal preprocessing pipeline [3]. Further analyses will include regressive, multivariate, correlational and other statistical analyses.

Results

The study is ongoing, so no results are available.

Significance

We expect that the combination of EEG and fMRI will give us a better insight into the nature of brain dynamics. Additionally, finding links between a person's personality trait, cognitive ability or psychopathology and functional connectivity within the brain would allow us to develop new methods to diagnose different disorders of interest.

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The Effects Of Loneliness On Trust

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This experiment investigates the effects of loneliness on trust, examining both behavioral data and fMRI data. We hypothesize that subjects' scores on a revised UCLA loneliness scale will correlate to behavioral differences in performance during a Trust Game, as well as to differences in brain activity. The data have already been collected by the Social, Cognitive, and Affective Neuroscience Unit of the University Vienna. The analysis of these data is still underway.

Some investigations have already been conducted on how loneliness affects trust. Researchers found that subjects who measured high on a loneliness scale were less likely to act in a trusting manner during a Prisoner's Dilemma game [1]. Our study provides a different paradigm, using a Trust Game, and incorporates neuroimaging data, which has not been used in previous studies.

In this experiment's modified Trust Game, participants in a 3T MRI scanner (the "investor") choose what amount of money to give to another participant (the "trustee"). The trustee then chooses how much money is returned to the investor, and this process continues for several rounds. The trustee's behavior is an independent variable. One "trustworthy" group returned generous amount to the investor, while another "untrustworthy" group returned small amounts. We can then examine how subjects respond to breaches of trust. The most likely hypothesis is that lonely individuals will be quicker to break reciprocity and reduce the amount of money they give to the trustee.

We will also investigate how any behavioral changes are instantiated in neural activity. From past studies of the neuroscience of the trust game, we can identify key regions responsible for the intention to trust, breach of trust, and fear of betrayal during the Trust Game. These include the prefrontal cortex, cingulate cortex, caudate nucleus, amygdala, and insula [2].

Some of these areas will be examined for Region of Interest analysis. If significant activity is shown, these areas will be chosen as seed regions for psychophysiological interaction analysis. This will allow us to model functional connectivity in the brain and how it is modulated by the Trust Game task. Other ANOVAs will be conducted for variables such as the participants' age.

This study will provide a more complete picture of the neuroscience of trust and loneliness. We may see how complex social situations can alter behavior and become manifest in the brain, and the wide reach that social contact (or lack thereof) can have over other cognitive domains.

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Effects of Perceptual Deprivation (Ganzfeld Effect) on Academic Procrastination: A Pilot Study

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Introduction

The ganzfeld effect is a form of perceptual deprivation where, through being exposed to unstructured, uniform visual and auditory stimuli, the participant experiences an altered state of consciousness (ASC) [1]. Following research that has been done on therapy with psychedelics which uses ASC to treat psychological issues, we predicted that ASC induced through the perceptual deprivation experience (PDE) may have a similar effect regarding dealing with a specific problem; in our case, academic procrastination. We aim to find out whether perceptual deprivation is comparable to the induction of ASC through a psychedelic experience, and whether we can utilize it so that individuals can gain motivation to avoid procrastination. We expect that, after the PDE, the participants will procrastinate less, and that the participants with a history of psychedelic use will be more successful at reducing their procrastination, as they may be able to better control the induced ASC due to their previous experience with it.

Method

The study includes 11 participants who consider themselves academic procrastinators. 6 of them have experienced an ASC through a psychedelic experience before. We made sure the participants fit the inclusion and exclusion criteria, the latter including epilepsy and mental disorders. Positive effects of the PDE include a relaxed mood; negative effects may include fatigue. Before the induction of the PDE, a group meeting was held to discuss the participants' reasons for procrastination and to discuss additional solutions to end procrastination. During the PDE, the EEG was used to measure brain connectivity. The participants completed the questionnaire PANAS-SF (used for affect assessment) [2] immediately before and after the PDE. They completed the PASS (used for procrastination assessment for students) [3] before the PDE and three weeks after it.

Results

The results from the questionnaires suggest that the participants' procrastination has decreased, but we are currently still collecting the data. The brain connectivity analysis will also be conducted in the future.

Discussion

As far as we are aware, ours is the first study to focus on perceptual deprivation and its practical applications on gaining a new perspective on a specific problem. With our study, we will broaden the current body of knowledge regarding the beneficial effects of PDE.

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Finding the Best Position to Relax in Patients with Parkinsonian and Patients with Essential Tremor

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Introduction

Tremor is the most common movement disorder, presented as involuntary rhythmic movement of a body part. It can occur at rest, which is typical for Parkinson's disease, or during voluntary muscle activation, as characteristic for essential tremor (ET). In clinical practice there is a common diagnostic dilemma, whether a patient has Parkinsonian tremor (PT) or ET. Almost a fifth of individuals with ET also have a tremor at rest, which could be partly due to the patient's failure to relax. Classical PT depends on the position of limbs during the examination and other factors, such as cognitive effort which increases the tremor's amplitude [1]. Notably, the occurrence of tremor is affected by patient's position and his state of relaxation. There is no data in the literature on what is the best position to achieve relaxation, particularly in sitting position, which the most common scenario in clinical practice. In this study we will compare different sitting positions and recumbent position in order to define the best sitting position with full relaxation of the upper limb muscles.

Methods

30 participants will be included: 10 healthy individuals, 10 PT patients, and 10 ET patients who also have tremor at rest. Muscle activity will be measured with EMG surface electrodes adhered to following muscles: trapezius, deltoideus, biceps brachii, triceps brachii, extensor and flexor carpi radialis, and abductor pollicis brevis on one hand. We will simultaneously collect data on tremor's frequency and amplitude, using an accelerometer. For each individual, EMG measurements will be performed in six positions for two minutes: standing, arms hanging along the body; lying on the back, arms along the body in supination; sitting, arms resting on thighs in supination; sitting, arms resting on thighs in position between pronation and supination; sitting, arms supported on chair arms, hands hanging in pronation; sitting, arms hanging along the body.

The participants will have to subtract from 100 by one for 30 seconds in the third position.

Expected Results

We expect to find a sitting position in healthy participants, in which it is possible to achieve (almost) complete relaxation of the upper limb muscles. Additionally, we expect in this position PT will be the most prominent, while the rest tremor component of ET will vanish or become less notable.

Conclusions

These findings are important for clinical practice when dealing with patients with tremor, as they would reduce the influence of external factors, such as the way of sitting and arm holding on the tremor occurrence. This would also allow a more reliable differentiation between patients with PT and ET, which is currently possible only with expensive functional imaging.

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The Label Effect - Investigating the Art Experience With and Without Contextual Information

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Introduction

Museums are symbolic cultural spaces that foster unique æsthetic experiences, reason why numerous studies have analysed the display effect on viewing behaviour. Labels are textual additions that accompany artworks, providing information about the cultural background of each creation, facts about the artist or depicted subject. Very few studies focus on the time spent on labels [1] and even fewer on how labels influence art appreciation [2]. The present research analyses the label effect by exploring its implications on artwork perception, while aiming to determine whether the addition of labels enhances the experience or acts as a restriction to the imaginative processes otherwise engaged.

Method

The Austrian Gallery Belvedere offered unique research conditions by displaying the same artworks from the years around 1900 in two different museological settings. Thirteen artworks by artists such as Gustav Klimt, Vincent van Gogh and Auguste Rodin were displayed in both settings, out of which four had additional labels. Data has been collected in a mixed method approach combining mobile eye tracking, a quantitative survey and a subjective mapping (drawing task in conjunction with an open interview, providing *a posteriori* personal insight). Mobile eye tracking allows precise recording of the viewing time with a high degree of ecological validity [3]. Our data sample consists of 30 participants for each exhibition/exhibiting condition.

Findings

Our results show that participants a) spend consistently more time looking at artworks that have additional labels (21.25s as opposed to 14.24s), b) explicitly refer to the labels' content and report how it facilitates the artwork understanding and c) appreciate having contextual information as they are able to relate more with the artwork.

Impact

The usage of mixed methods allows a particularly comprehensive overview of the visitors' æsthetic experiences and makes ground for a better understanding of the cognitive processes involved. Our findings support the theory that contextual information enhances the æsthetic experience and positively influences the viewing behavior. The study could potentially influence museum display decisions by providing an argument in favour of using labels to increase the viewers engagement in the art appreciation experience.

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The Effects of Negative Art on Emotion Regulation

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Emotion regulation refers to the ability of effectively responding to emotions, shaping the expression and experience of those emotions. This project investigates the effects that the way people look at art could have on this process.

It is hypothesized that focusing on the positive aspects of negative art leads to be able to better deal with emotional events occurring shortly after viewing the art, through an implicit regulation strategy called reappraisal. By "negative art" we mean art which elicits an increase of the negativity of the mood. By "focusing on the positive aspects" we refer to paying more attention to the artistic features of the paintings, for example, instead of to their content.

Previous studies have proven that focusing on the positive aspects of art allows people to be less affected by the negativity of it, but so far it has not been tested whether this phenomenon of reappraisal is also implicitly extended to conditions that come after seeing the negative art.

Therefore, we propose that this influence on the process of emotion regulation could not only take place while one is looking at it, but also afterwards, during events that follow.

The subjects are presented with a series of paintings with negative content which are supposed to induce negative mood. All the subjects have to rate how much they like each painting. The control group is instructed to only look at them and the experimental group is asked to focus on their positive aspects. Hereafter, all the subjects are shown a short sad movie clip, which simulates a hypothetical following event. Throughout the whole experiment we are measuring brain activity with EEG (late positive potentials) and fNIRS (activation of prefrontal areas). Subjects fill out a mood scale (PANAS) at the start of the experiment, after viewing the art and after viewing the movie clip. We are particularly interested in the differences between the first and the last sets of measurements: we expect that the experimental group will be able to better regulate emotions while watching the clip than the control group, showing that the reappraisal strategy is still implicitly active also then.

In particular, we expect the experimental group to show an attenuated LPP and/or increased frontal alpha wave asynchrony in the EEG and higher prefrontal activity corresponding to the OFC with the fNIRS.

If our hypothesis turns out to be correct, it implies that the same process involved in learning how to focus on the positive aspects of negative art could be adapted to help people to better deal with negative emotions in daily life. In the future this might also be used to help people with problems in emotion regulation (e.g. patients with anxiety or mood disorders and autistic patients).

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Visual Representations in Working Memory

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The longitudinal research project Visual Representation in Working Memory (ARRS grant WM.VR) is conducted by Observatory and Mind and Brain Lab of the University of Ljubljana. In the earlier phases of the study the investigators have developed a grounded theory that the co-researchers' use of strategy for performance of a visual span task is greatly dependent upon their background feelings, their attitude towards the task itself, etc. In order to test this theory, two research questions were formed: 1) What kind of strategies do the co-researchers use while solving a visual span task; and 2) what are the co-researchers background feelings in relation to the task? Co-researchers solved a visual span task where the report procedure was varied. The first report procedure consisted of choosing the test stimulus from four options. In the second report procedure, the co-researchers had to reconstruct the stimulus on a blank matrix. The difficulty of the task gradually increased. After a random example the solving was stopped and an empirical phenomenological interview was conducted. In the interview, co-researchers reported on their lived experience during the last sample. 18 people participated, each giving multiple reports which ensured 64 samples of experience (32 for each task condition). The research is currently in the phase of inductive coding according to the principles of qualitative analysis. What follows is detailed analysis, formulation of results, and validation which is in our case especially important. In line with the principles of first-person research, researchers ought to strive to be theoretically naïve (i.e. start from raw data, rather than theoretical preconceptions), which in this case is impossible, because the study was designed with the intention of evaluating a specific grounded theory. To ensure the validity of the results, a number of validity criteria described by Petitmengin et al. [1] will be used: 1) Debriefing interview of the phenomenological interview itself (based on criteria described in detail by Kordeš & Demšar [2]); 2) Consensual validation; 3) Independent replication of formed categories; 4) Neurophenomenological confirmation. Validated results will lead to further development of the grounded theory. Possible confirmation of the theory would have great implications for future investigation of visual working memory as well as related psychological phenomena such as meta-cognitive awareness. The study also indicates that in future research more detailed description of inner experience ought to be included even if the experience itself is not directly the object of investigation.

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Fine-Tuning a Multilingual BERT Model on English and German for Sentiment Analysis

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Introduction

Recently, the BERT model (Bidirectional Encoder Representations from Transformers) has combined a number of advances in natural language processing (bidirectional models, semi-supervised learning and deep learning) and achieved state-of-the-art performance by fine-tuning the model across different language tasks (e.g. part-of speech tagging, sentiment analysis) [1]. This paper is in line with other attempts to transfer language specific and often English-based resources to languages, for which there are fewer extensive data collections. We examined the impact of using a pre-trained multilingual BERT model fine-tuned on either English or German texts on sentiment classification performance in the two languages.

Methods

We gathered 5,000 English and 3,000 German Amazon product reviews of various editions of the game TES 5: Skyrim. The product ratings were binarized into negative (rating < 3) and positive (rating > 3). Classifiers were either trained and tested on the same language or trained and tested on a different language. An English dataset of 3,000 comments was also created to control for the smaller size of the German dataset. In all cases, stratified sampling was used. A baseline model was calculated using the zero-rule algorithm. Each classifier was trained 10 times and the average measures are reported below. Specificity was used as the main evaluation metric since only 18% of the reviews in the datasets were negative and the zero-rule classifier already has high accuracy (0.816).

Results

The highest specificity was achieved by training and testing in English (specificity: 0.603; accuracy: 0.874). In comparison, the classifier trained and tested on German reviews performed worse (specificity: 0.331; accuracy: 0.84), even when compared to the classifier trained and tested on a smaller English dataset (specificity: 0.512: accuracy: 0.86). The classifier trained on English performed better on the German test set than the German-trained classifier (specificity: 0.623; accuracy: 0.735). However, the classifier trained on German and tested on English performed worse than the English-trained classifier (specificity: 0.223; accuracy 0.841).

Conclusions

Considerably high performance can be achieved by fine-tuning the BERT model on a specific task in English and then testing it on German texts. Further work should examine factors of this success in detail (the effect of dataset sizes, text normalization procedures and the tokenizers used).

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It's About What You Say and How You Say It – The Impact of Toxicity In Language on the Participation Of Female Users in Stack Overflow

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Introduction

Stack Overflow (SO) is an online community for software developers to ask programming questions and receive answers from other members. This "knowledge marketplace" could potentially democratize knowledge and mitigate existing inequalities. Yet, specifically in the field of gender disparity it seemed to have failed: Contribution rates of women in such open-source programming communities are even lower than their overall presence in the IT labor market. Considering the type of contribution, female users are more likely to ask questions, whereas male users provide more answers and cast more evaluative feedback for both, answers and questions [1]. Low active participation rates of female users are problematic, because SO has a big impact on how newcomers perceive norms and culture of coding and thus perceive it as only-male. Besides that, headhunting in the IT-sector uses SO reputation rankings, in which women due to their low participation are underrepresented immensely. Thus, the real-world underrepresentation of women in the IT-sector and participation barriers could probably worsen.

Aim

Until now, most researches done on low participation rates of female users suggested the toxic atmosphere in SO-forums to be an essential barrier, but no further examinations on that topic were made. The aim of this project is to evaluate the degree of toxicity in a sample of answers and comments given in these forums. Furthermore, I will draw implications on the exact impact on participation of female users.

Method

For this purpose, I use a dataset consisting of 100.000 gender-identified SO-profiles, resulting from a former published research of May et al. [1], in order to assign questions, answers and comments stated to a male or female user base. Subsequently, I will determine the degree of toxicity in those Q&A-forum-entries with the help of the *R statistical language* and the *Perspective API*. The API uses machine learning models to score the perceived impact on the degree of toxicity in a discussion.

Moreover, I will accumulate toxicity degrees belonging to entries of specific threads to calculate the average toxicity of SO forum threads. In addition, I will examine the impact of factors such as female vs. male users stating a question, answer or comment on expressed toxicity.

Results

This project is a continuation of former studies by May et al. [1] and the analysis will proof empirically that the communication in Stack Overflow is specifically toxic towards female users.

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Associations Between Dog and Owner Personality Traits and Dogs' Aggressive Behaviour

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Aggression is one of the most common and dangerous behavioral problems in dogs. It is generally expressed as biting or threatening behavior and can be influenced by a variety of factors, including individual personality profile. Since dogs are in daily contact with humans and other animals, the aim of this study was to assess the connection between dogs' and owners' personality, and dog aggression towards different targets, using a combination of questionnaires and behavioral testing. Forty Slovenian owners and dogs of different breeds and behavioral history (non-aggressive dogs, dogs aggressive towards humans and dogs aggressive towards animals) participated in the study. Data on dogs' behavioral history was obtained using parts of the Canine Behavioral Assessment and Research Questionnaire related to owner-, stranger-, dog-directed aggression and chasing [1]. Owners' personality was assessed with the Big Five Inventory Questionnaire [2] while personality in dogs was assigned to each dog using a behavioral test called Dog Mentality Assessment (DMA) [3]. DMA was performed outdoors, with dogs being exposed to nine different tasks in a company with their owners. Behavior responses were recorded and later analyzed using a pre-prepared ethogram. Based on dogs' reactions to various stimuli, low or high scores for five personality traits called "Openness", "Conscientiousness", "Extroversion", "Agreeableness" and "Neuroticism", and one personality dimension "Shyness/boldness" were given to each dog. We expect to find differences in dogs' and owner's personality traits between aggressive and non-aggressive dogs.

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Evaluation and Biases of Word Embeddings

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Introduction

Embeddia is an EU project that aims to contribute to the multilingual future internet, as today, despite the diversity of 37 languages that exist in the EU, most of its content is in English. Multilingualism could be achieved through research in computational linguistics and development of new tools that could produce automatic transformations between languages. During the three year time span of the project, the project aims to develop novel tools for smaller languages and test them in media and news contexts [1].

Modern language tools use word embeddings - representations of words with vectors that preserve the linguistic relationships between words [2]. Word embeddings can be produced using different machine learning methods; the most popular are Word2vec [2] and BERT [3]. Word2vec uses shallow neural networks, while Bert uses deep bidirectional neural networks and and can generate several embeddings for each word depending on the context [2, 3]. The first goal of our project is to assess the workings and biases of word embedding.

For small language communities, including Slovene, the lack of language-specific tools is especially problematic [1]. This motivates the second goal of our project to create evaluation methods for Slovene word embeddings in order to assess and compare them. We have chosen two precomputed embeddings publicly available: CLARIN.si and fastText, which were both trained using the Word2vec algorithm.

Method and Expected results

We are going to assess the gender bias of Word2vec and BERT embeddings for professional occupations, measuring the distance between gender (male or female) and occupation. As BERT takes context into account, we expect it to provide more reliable results about the bias.

We are going to evaluate Slovene word embeddings by implementing two well-known evaluation methods, word analogies (WA) and synonym detection (SD) [2]. The CLARIN.si embeddings have been trained specifically for the Slovene language and have used many corpora (including movie subtitles and book recipes) [2]. The fastText embeddings only use texts from the Wikipedia and Common Crawl data and incorporate several languages [2], which is why we expect that the CLARIN.si embeddings will achieve higher scores in both WA and SD tasks.

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Cognitive Control in People with Depression

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Introduction

The cognitive control system is a frontoparietal system that coordinates goal pursuit. It consists of flexible hubs that regulate brain processes. The system promotes optimal behavioural outcomes by supporting goal-directed processes and reducing goal-disrupting ones which can manifest as symptoms of mental illness [1]. Depression as a prevailing mental health problem has yet to meet a refined diagnosis. Major depressive disorder consists of multiple different symptoms that occur in many possible combinations. Sharpley and Bitsika [2] offer four basic subtypes of depression based on the differences in neurobiological pathways and accordingly suggest distinct treatment approaches. Proposed subtypes include anhedonia, somatic, cognitive, and mood depression. While previous studies have shown declined cognitive control abilities in people suffering with mental illness, more research is needed to better understand the importance of cognitive control for mental health. This project aims to confirm differences in cognitive control between healthy people and people with depression, as well as to observe distinct types of depression reflected in the cognitive control results.

Method

Healthy controls and people with diagnosed depression are currently being recruited for this study.

The research consists of two parts. The first part involves several cognitive psychological tests, such as Stroop interference and Word fluency. Additionally, participants with depression are asked to complete some diagnostic measures.

The second part is a Cognitive Control Challenge Task (CCCT) that was developed in the Laboratory for Cognitive Neuroscience in Faculty of Arts. The CCCT measures stable maintenance of goal representations and flexible switching between them.

Results and Discussion

The project is still in the process of data collection. Therefore, the analysis has yet to be performed. Nevertheless, it is expected that people with depression will exhibit lower scores on CCCT and thus have lower cognitive control. Furthermore, the results of CCCT taken together with diagnostic measures are predicted to differentiate among types of depression.

Such results would confirm and add to the literature on cognitive control malfunctions in mental illness as well as aid in improving diagnostic tools and treatment.

Acknowledgements

We would like to thank our mentor, Ana Vida Politakis for her excellent supervision and guidance.

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The Rhythms of the Brain. Utilizing Brain Wave Behavior in BCI Assisted Neurorehabilitation

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Using brain activity to control external devices is increasingly integrated into health care. Brain-computer interfaces (BCIs) can assist disabled patients in daily life or improve the recovery of neural functions in rehabilitation therapy [1].

The presented work is part of a broader project aiming to study the effectiveness of motor training methods in patients with chronic movement disabilities due to stroke [2].

Scalp electroencephalogram (EEG) data has been collected during the use of a motor rehabilitation training system called RoboArm, which uses a robotic splint for bending the subject's wrist. The splint is controlled by a brain-computer interface (BCI) protocol which reacts to Mu-rhythm desynchronization during motor imagery.

We analyzed seven identified EEG oscillatory sensorimotor rhythms of two stroke patients. The objective is to investigate the behavior of the rhythms in time and find potential patterns of (de-)synchronization comparing motor imagery and rest periods. Obtained knowledge will lead to the design of alternative training protocols with the aim to improve the motor rehabilitation process of stroke patients.

Methods

EEG data of 40 training trials was manually checked for artifacts. Using the MATLAB software, the seven EEG oscillatory rhythms Theta, Mu, Alpha, SMR, Beta 1, Beta 2 and High Beta were extracted separately for every training day. An average representation of each rhythm was constructed. The behavior of the extracted rhythms over time and their relation to motor training events was analyzed. In MATLAB, statistical testing (z-scores) was performed on time series representations of the rhythms.

Findings

The measured oscillatory rhythms of both patients showed similar patterns. More lateralization and stronger differences between the participants were observable for Beta rhythms. Lower frequency rhythms showed a stronger tendency towards scalp symmetry. Two lateralized left and right SMR rhythms were observed.

The focus was on finding event-related synchronization and desynchronization [3] in Theta, Alpha, SMR and Beta rhythms simultaneous to Mu-desynchronization.

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End-User Empowerment: A Multilevel Approach

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Information systems are increasingly being used in almost every personal and social aspect of human life. End-user Empowerment can be considered a useful concept to ensure that users make appropriate decisions according to their contextual personal needs and values (or the needs and values of the society) while interacting with information systems. However, understanding the concept of empowerment is a complex task, since comprehending on the one hand human needs and values as underlying concepts of empowerment is a matter of vast disagreement and on the other hand, various disciplines have conceptualized the concept of empowerment from very different vantage points. As a result, while many researchers are using the term "empowerment", the use of the concept remains unclear. To address this issue we report our systematic literature research conducted on the concept of empowerment in this paper, which aims to provide an overview regarding 1) the usage of the term in different contexts and disciplines, 2) the underlying and enabling concepts, 3) different approaches for the realization of user-empowering information systems, and 4) the implication of different approaches in computational cognitive modeling towards empowering of end-users.

Empowerment can be classified in a multilevel approach focusing on individual end-user empowerment and the social context of the end-user. Individual empowerment refers to the psychological process of fostering motivation, goal orientation, reflection upon the impact of actions and self-efficacy. The social context of the end-user relates to the access to digital technology, the capabilities and the knowledge to use them [1]. Accountability, fairness, controllability and transparency are identified as enablers for the empowered use of information systems, which are crucial for empowering information systems. Moreover, literature shows that empowerment should be considered a fundamental design principle of information systems [2]. Finally, considering the emerging application of cognitive computing, we also discuss how empowerment can be conceptualized and implemented based on the different approaches to computational cognitive modelling.

This paper presents a possibility of applying concepts of end-user empowerment in the context of information systems. It contributes to research on end-user empowerment by identifying crucial facilitators and applying a multidisciplinary approach, which could bring forward the discussion on the concept of end-user empowerment and its enablers.

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Online Experimental Paradigm to Investigate Scarcity and Economy Inequality

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Purpose

People who are economically less-privileged often tend to engage in actions which reinforce their monetary disadvantages. For instance, it is believed among scholars that low-income individuals borrow too much and save too little [1]. Despite their general agreements, scholars have different ideas about the origin of these (mis)behaviors; Some claim that the cause lies in the personal characteristics of the aforementioned people, while others consider environmental circumstances such as health, educational and political situations, and living conditions of the poor people to be the source. A. K. Shah et al. promote a broader reason: "Resource scarcity creates its own mindset, changing how people look at problems and make decisions." [1] They claim scarcity shifts poor people's attention to solve the related problems; thus (mis)behaviors like overborrowing is explainable. Building on Shah et al.'s research, my project aims to examine the subjective scarcity compared with objective scarcity in participants' performance.

Method

Data will be collected online via a web-based game and is similar to Angry Birds. The participants, who are students at ELTE, will receive a link to the game and complete the task on their own at their convenience. After reading and accepting the informed consent form, the participants will be introduced to the game. The game starts with an initial number of berries which should be used to shoot at randomized distributed targets on the screen. Participants are randomly divided into two groups of rich and poor who start the game with respectively 150 and 30 total berries. The main change of the game compared to Shah et al.'s research is an added story in the introduction section of the game which describes an imaginary society to the participants perceive themselves in a different economic situation compare to others.

Results and Findings

For the aim of this research, the points gathered by each person per level, per shooting and in total, and the reaction times will be analyzed. Inspecting the points will reveal the differences in the participants' performances under dissimilar conditions. Reaction times of participants will indicate their deliberation in several situations. The early analysis indicates that people with scarce resources spend more time on each shooting on average. Moreover, by studying the dynamicity of participants' points during the game, (mis)behaviors can be explained over time.

Conclusion

As a conclusion, this study tends to stand on the shoulders of previous studies of poverty and decision making. It aims to shed light on new aspects of human decision making and gain more insights into people's performance in objective resource scarcity and subjective scarcity circumstances.

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The Terror Management Theory (TMT) under the Perspective of Professions That Deal with Death on a Daily Basis

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The Terror Management Theory (TMT) states that human awareness of the inevitability of death has cognitive, emotional and behavioural consequences. In this regard, one's knowledge of the fact that one will someday die and that death can come at any time for any number of unpredictable reasons is the *terror* in people's minds that is managed unconsciously [1].

In order to buffer death anxiety, people cling to their cultural worldviews (e.g. their religion, families, species, or countries) and live up to the standards of value that are part of them. Unfortunately, once people invest their deepest existential concerns into a world view, the presence of other world view constructs may be experienced as a threat. People tend to become self-serving and less tolerant.

A large body of research has shown that reminders of death (mortality salience, MS) increase one's need for defending and protecting one's own worldview. More recent findings of cultural differences in some aspects of responses to death-related thoughts have shown that different ways of construing death have different consequences.

There are three known groups of people that do not display the commonly found TMT-effects on world view defence: (a) older adults, (b) religious people (existential believers), and (c) people on an existential quest who have not yet decided on a certain world-view, but remain open to and intend on finding one.

This research project takes up these findings and aims to expand these three groups by one more: people who are constantly reminded of their own mortality in their everyday working life. The consideration behind this is that - similar to older adults - also people who are constantly reminded of death (e.g. undertakers and cemetery gardeners) may not show the typical MS-effects described by TMT, because death is saliently present in their lives.

The research design consists of two conditions: (a) participants reminded of death and (b) participants confronted with something else (i.e. pain). A questionnaire will be done by 40 people who are confronted with death in their profession frequently and it is also done by a control group consisting of 40 people.

Those people who are constantly reminded of their mortality through their work environment are expected to show less MS-effects compared to the control group. This outcome would have significant consequences in broadening the scope of TMT. It could show that those people who deal with death in their everyday working life transcend the anxiety-buffering system of their culture and develop a different way of dealing with the problem of death.

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The Experience of Grammaticality Judgments

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Grammaticality Judgments

Grammaticality judgments are reports of speaker intuition about the grammaticality of sentences. They form the empirical basis for a large amount of linguistic research. Roughly, such research is conducted as follows: based on previous findings, linguists construct a hypothesized grammar that predicts which sentences are grammatical and which are not. The linguist then asks a native speaker of that language whether, based on intuition, those predictions are accurate. The ability to make grammaticality judgments is often implicitly assumed to be a universal linguistic ability that reflects an aspect of cognition of language.

Problems with Grammaticality Judgments

The use of grammaticality judgments has been criticized on various bases. For example, linguists often use their own intuitions as data at the risk of introducing bias, use small sample sizes, or do not note inter- and intra-participant variability. Confounding factors, such as context or political attitude, have been difficult to control for. Syntacticians responded by developing standardized questionnaires and introducing reporting conventions.

Additionally, some consider intuitions necessarily unsuitable for scientific inquiry, or have noted that non-linguists often donâ€™t understand request for grammatical judgments, and some report not having them at all, indicating grammaticality judgments are not a universal basic ability. (See [1] for an overview of criticism and responses.)

Our Proposal

Although grammaticality judgments have been researched using methods from cognitive psychology, to the best of our knowledge no one has systematically investigated the phenomenon of linguistics intuitions from the point of view of experience. We propose to use phenomenological interviewing techniques [2] in an exploratory investigation into the experience of making grammaticality judgments. Over two sessions, we will ask native speakers of English to report their grammaticality judgments on a set of sentences with increasingly subtle violations of various types. They are asked to report their experience while making judgments, with particular focus on the differences between types and gradations of violations.

We hope to contribute to a clearer understanding of, and/or deconstruction of the intuition that underlies grammaticality judgments. Such a contribution is relevant to theoretical linguistics because it may help refine models of language cognition and methodological tools, and to researchers who reject the use of grammaticality judgments but are interested in speakers' experience of language.

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Organisms as Unities are Gestalts of Biological Perception

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It is often taken for granted that the process of scientific inquiry involves extracting facts from the natural world. The common view is one of scientists observing the world from a position of detachment, developing theories and testing them with evidence to deduce truth. This rendering is, of course, oversimplified. In reality, the process is not a simple linear progression from observation to fact.

One complication that is often not obvious to non-scientists is the inherently social nature of scientific work - in order for research to proceed, there must be consensus amongst a group of practitioners regarding standards, foci and methods. Furthermore, the fundamental view of the world held by scientists in one community must be aligned - basic metaphysical components and kinds of things are agreed. In other words, an ontology and a style of perception are created [1,2]. In this view of scientific practice, science changes from a practice of observation and recording to one of collective fact construction.

In order to make the best use of science, we must account for scientific perception - what does the world look like to a given scientist and why? What informs their understanding of nature?

In my thesis, I am developing the idea that organisms as unities are gestalts of biological perception. There are a number of instances in which the common view that one organism = one body is not sufficient to explain various phenomena. I will, therefore, develop the notion of organisms existing in multiplicity, embedded in their environments [3]. This view goes against the notion of organisms as pre-existing objects, ready to be discovered by natural scientists in one given form. It is rather the idea that we construct them in various forms according to our thought style [2].

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A Picture Is Worth 13/9 Words – Effect of Visual Format on Short Term Memory

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Learning styles (further in the text just LS) are very widely used in general education. However, there is some criticism [2][3] focused on the problem of valid determination of the specific learning style of an individual and its benefits for teaching.

We tried to overcome this validity problem by using *triangulation of data*, with the use of more questionnaires (VARK-learn.com, VVQ: Visualizer - Verbalizer [1]) and self-reporting.

The aim of this research is to examine whether the information presented in Visual format is easier to memorize compared to Audio format, regardless of the preferred LS of an individual [1].

We divided participants $N(22)$ into 2 experimental groups – Audio and Visual. In each group were half of the participants with their preferred LS correlating with an experimental group and others having it as the least preferred LS, e.g. for Audio group 4 participants having preferred Audio LS and 5 participants having preferred Visual or Kinesthetic LS and its combinations. After assigning to groups their task was to do a short-term memory test (15 B&W everyday objects) provided in the Audio format for the Audio group and Visual format for Visual group.

The participants in Visual group ($N = 11$, $Mdn = 13$, $SD = 1.55$) had higher scores in short – term memory test compared to Audio group ($N = 11$, $Mdn = 9$, $SD = 2.28$). Interestingly, Levene's test showed that two groups had approximately homogenous variances ($F(1,20) = 1.78$, $p = .19$). The difference between these scores was also statistically significant, with large effect size ($t(20) = -3.28$, $p = .004$, $d = -1.4$.)

We have not found any significant difference in the memory score between participants with the information presented in their preferred LS or not. However, using visual aid in teaching could be beneficial. The difference between the two groups could be caused also by the technique of remembering. Participants in Visual group used mostly creating a story or a scene. Participants in the Audio group mostly repeated words in their head. There are some studies [1] showing the importance of visual aid in many areas of life. Our results showed that it doesn't matter which learning style a person has, but when they receive information in a visual format, it helps them to remember it more at least for a short time.

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Resting-State Connectivity and Emotion Regulation

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Emotion regulation (ER) is the ability to regulate one's own emotion. For instance, when prompted with the image of a car accident, one can imagine it to be merely a movie set and therefore modulate his or her emotional experience and response. The networks involved in ER are still being researched and identifying them could greatly benefit clinical research as ER can affect both mental and physical health [1]. Resting state fMRI (rs-fMRI) provides an insight into the intrinsic functional connectivity of the human brain. In this study we explore the relationship between rs-fMRI networks and ER. We also evaluate the stability of these networks by comparing the results from 3 different sessions.

In this study we aim to answer the following three research questions:

Q1: Are the regions implicated in ER also co-activated during rs-fMRI?

Q2: Are these networks stable over the course of three sessions?

Q3: Does rs-fMRI networks of ER correlate with ER success?

Rs-fMRI was recorded from 22 participants (18 females, age: M=22.7 ± 3.2) as part of a project on the reproducibility of ER networks. This study consisted of a one-hour fMRI scanning session, in which 4 runs of a well-established ER task measuring brain activation as well as ER success were assessed.

Each session was repeated three times separated by one week using the CMMR multiband EPI sequence (TR=1.4s; TE=23ms; 78 slices; voxel size=1.5x1.5x1.2mm3) at ultra-high field (7 Tesla). 258 rs-fMRI volumes were acquired for each participant in each session. The data was pre-processed using the SPM toolbox (motion correction, slice time correction, realignment, normalisation and spatial smoothing with a FWHM=6mm). Rs-fMRI data will be analysed using the CONN toolbox [2].

The following analysis will be performed to address the research questions:

Q1: We will use functionally defined seed regions related to ER (Amygdala, dlPFC, vlPFC) for a seed-to-voxel analysis.

Q2: Using the networks identified in Q1, we will compare the stability of the networks between sessions and identify significant differences.

Q3: We will use the obtained networks and relate them to ER success using a correlational approach.

We predict that regions involved in ER will be co-activated during rs-fMRI (Q1). These ER networks are also expected to be stable over the course of the 3 sessions (Q2). Finally, we predict these obtained networks to be correlated with ER success (Q3).

Our results could provide evidence for highly replicable and robust ER networks across sessions which would offer a promising biomarker candidate for ER ability.

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Morphologically Defined Phonotactic Sequences in English: Recognition in Native and Non-Native Speakers

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Many linguists have sought to determine the exact nature of the rules regarding affix ordering in the structure of a word, but there remains little consensus on their definition. Nevertheless, these rules tend to be strictly followed by all speakers of a language, even without having learned them explicitly, and certainly without the metalinguistic knowledge of why the rules are thus [1, 2].

A majority of theories of morphology assert that affixes have little to no significance in the mental lexicon—except with regard to the lexical bases with which they are associated—dismissing any inherently-used rules as merely word-specific associations. However, recent psycholinguistic research suggests that affixes are in fact recognizable and accessible in isolation, with no connection to a lexical base or other semantic context. This article presents one in a recent series of studies that looks at this phenomenon in native speakers of particular languages. In this study, participants are given a list of suffix combinations presented in isolation (i.e. without a lexical base), some of which exist in the language and some of which do not. They are then asked to identify which of the combinations exist and do not exist in their language.

The test languages of these studies thus far include Polish, Italian, and Slovene, with similar results in each iteration showing that overall the participants recognize the existing suffix combinations without the help of semantic context or metalinguistic knowledge. As of yet, however, English is not among the languages that have been tested. The primary goal of this study is therefore to examine this phenomenon using English as the test language. Though the results are currently being analyzed, it is expected that native speakers of English will show similar abilities in this domain, joining the evidence from the other studies in suggesting that not only words but also standalone derivational morphemes—as well as structures between morphemes and words, such as these suffix combinations—exist in the mental lexicon regardless of the morphological nature of the language.

Moreover, the widespread international use of English presents an ideal opportunity to test this ability in non-native speakers of a language, which has yet to be considered in this series of studies. Thus, this study also uses the same method to examine this phenomenon in non-native English speakers at various levels of fluency. This additional element provides insight into the nature of affixation in the mental lexicon of non-native speakers of a language, and could be a helpful step toward determining if, when, and to what extent this inherent sense of morphological rules takes hold within an individual's linguistic development.

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Electrophysiological Characteristics of Mind-Wandering in Relation to Vulnerability for Development of Depression

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Introduction

We are witnessing a growing number of findings based on recent developments in EEG quantitative analysis, which help us better understand the electrophysiological correlates of symptoms present in different brain disorders, e.g. Major Depressive Disorder (MDD). MDD is characterized by a persistent resonance of rhythmic thalamocortical activity in the waking state. It is possible to observe the increase in the alpha band power, which could be best described as an indicator for a broadly distributed, shifting state of brain dysregulation [1]. Furthermore, fMRI studies have shown increases in functional connectivity in the default mode network in MDD. Such activity is associated with increased mind wandering, a phenomenon observed in MDD. This could be related to the increase in synchronization in the alpha oscillatory activity. Leuchter et al. [1] posit that such activity could present a trait, not state phenomenon.

Method

We will examine the LEMON database [2] enabling the exploration of individual variance across cognitive faculties and emotional phenotypes in relation to the functional architecture of the brain in subjects without a major psychiatric history. The open-source database consists of data gathered from 228 healthy participants. It is useful to further delve into general personality characteristics and subclinical symptoms of depression as well to observe mind wandering determined with different scales as a trait phenomenon. The aim of our data analysis is to focus on the identification of biomarkers related to depression in healthy people (e.g. high neuroticism), such as correlations between changes in the EEG oscillatory activity and increased mind wandering. We will use the open-source programme ORANGE [3] for data visualization and perform the time-frequency analysis on the raw EEG data that would first be preprocessed. Furthermore, the data will be prepared for possible machine learning algorithms, such as linear regression and deep learning.

Future Research

Restoration of normal oscillatory patterns is associated with effective treatment of MDD. Future studies should focus on developing techniques crucial for the normalisation of oscillatory activity. Until now, the most prominent approach appears to be non-invasive brain stimulation.

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Good vs Bad Readers: An Eye Tracker Study

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Context

Our mission, as scientists of the new age, has now become not to just simply observe behavior, but perhaps use information obtained from said observations to help others and influence their behavior for the better. This particular work will inspect the reading comprehension of students, assess the eye-movement patterns they employ and attempt to find specific patterns that are used by more comprehensive readers.

Purpose

The goal of this project is to discover particular eye-movement patterns used by those who have better reading comprehension skills than others. According to studies done in the past, students who've displayed better reading comprehension skills seemed to have employed eye-movement patterns during reading that those with lesser skills didn't use at all [1]. The hope for this project is to find those distinct patterns that are used more often than others, as well as particular areas of interest they are focused on. The driving factor of this research is the assumption that more skilled readers exert less chaotic, more ordered, and succinct eye-movement patterns than do readers of a lower comprehension level.

Method

Since this is a pilot study around 10 students (aged 18-30) will receive a control test for the language efficiency. Further on, each student will be placed in front of the Tobii eye tracker and instructed to read a text and answer the questions that follow. These questions will investigate how well the students understood particular aspects of the text such as grammar, vocabulary, and the general meaning. Each question will be displayed alongside the part of text it is referencing, which will allow us to investigate particular eye-movements associated with particular tasks. After which, the eye-tracking data will be sequentially analyzed in the hope of isolating distinct patterns in more skilled readers and less skilled readers.

Implications

If this project finds evident patterns in skilled and less skilled readers this could lay a great stepping stone for further investigation into the behaviors of reading as well as studying. Perhaps such information could be employed in a computerized "study-buddy" and prompt less successful readers to use the same patterns that more comprehensive readers use.

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Understanding Effective Connectivity in Major Depression: Dynamic Causal Modelling of Transcranial Magnetic Stimulation for Depression Treatment

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Transcranial Magnetic Stimulation (TMS) is a brain stimulation technique used for treating depression by external application of a magnetic field to the skull of a patient. The repetition of short pulses induces a current in the targeted brain area and locally modulates brain activity. In major depression therapy, repetitive TMS of the left dorsolateral prefrontal cortex (DLPFC) has proved to be successful and is FDA-approved, even though the underlying mechanism is poorly understood [1]. The recent development of simultaneous stimulation and imaging of neuronal activity by combining TMS and functional magnetic resonance imaging (fMRI) can be used to directly trace the effect of depression therapy on brain activation [2]. In my work, I will study the treatment mechanism by analysing TMS/fMRI resting state data of DLPFC stimulation with dynamic causal modelling (DCM) to understand its effect on other brain areas. Usual functional connectivity measures such as the General Linear Model (GLM) only describe correlations. DCM allows to test different causal models of neuronal connections by Bayesian model comparison and takes into account the interactions of brain regions. In contrast to GLM, DCM allows neuroscientists to derive the effective connectivity that describes how different brain regions are dynamically coupled [3]. By fitting different connection models, I hope to get insight into activation and inhibition behaviour between coupled areas and how neuronal stimulation is transmitted through the brain. It has been shown that stimulating the left DLPFC modulates activity of the anterior cingulate cortex (ACC), which is associated with major depression. A better understanding of effective connectivity of the ACC and the DLPFC with adjacent areas could highlight the underlying mechanism of TMS depression treatment and help to improve current therapy methods by refining stimulation targets.

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Is Your Man More Attractive than a Single One? Female Preference for Single Versus Partnered Males

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Context

Mate selection is a complex process, that is largely affected by physical attraction.[1] However, an extensive amount of research has proven that, there are also cyclical shifts in female preferences for certain physical and behavioral male traits based on their hormonal changes. Hormonal discharge occurring during the menstrual cycle enables women to take into account different traits and availability of potential partners. However it is not just availability of considered men which is important in mate selection, but also marital status of the female subject under question.

Purpose

The reason of conducting this study is to determine whether the man's label of marital status, changes perceived attractiveness among the single and the partnered women. At the same time we want to prove that the partnered women search for different traits during the cycle compared to the single women, which could be explained by the different attitude towards motherhood. Eventually we believe that outcomes will contribute to the existing findings and will allow us to understand the factors which affect decision making of women.

Method

In this study we examine a variety of real male faces with the randomly assigned labels of their partner status. Female respondents evaluate five male traits - attractiveness, trustworthiness, masculinity, kindness, intelligence - of the displayed men. Data from respondents are compared between single and partnered respondents taking into account their fertility phase. Therefore our variables are the marital status of woman and man, fertility phase of women and rate of questioned traits.

Results

We expect the results to show that women in the phase of high fertility consider men with the "single" label as more attractive than the partnered ones, meanwhile during the phase of low fertility their preferences are more likely to be inclined towards the men with the "partnered" label. Greater difference in preference during the cycle stages is expected among partnered women as compared to single ones. [2]

Implications

Results can be interpreted as, that women's preferences are unintentionally affected by the chance of conception. Greater preference of single men during the phase of higher conception risk could be influenced by need to select a partner who is available to conceive a child.

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Lucid Dreaming: Can Anyone Learn to Fly?

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Introduction

Originally a concept of philosophical debate, lucid dreaming is now known to be a hybrid state of consciousness–sleep with conscious awareness. Compared to regular dreaming, there is increased frontal activity, especially in gamma wave frequency, and increased coherence between different areas of the brain [3]. Lucid dreams are characterized by higher level thinking, insight, and access to waking memory. Current studies suggest that lucid dreaming may be useful in therapy, for nightmare prevention, as stress relief, and other areas of cognitive control. It has been demonstrated to be a learnable skill and to have correlations with certain personality traits and characteristics. This study aims to test whether lucid dreaming is learnable for people with non- or negatively correlative personality traits.

Method

Thirty participants were given a basic introduction to the concept and surveyed regarding their stress, quality of life, personality, and dreaming experiences. They spent a baseline week keeping a dream journal while learning the mnemonic technique for lucid dream induction [1]. The technique is four steps, dream journaling, reality checks, dream visualization, and self-suggestion. They continued to train for four weeks while reporting the lucidity of their dreams using two validated lucidity scales [2]. To conclude they answered follow-up questions regarding the study and their stress and quality of life.

Results & Discussion

Of the thirty participants, fifteen achieved some measure of lucidity according to the dream lucidity questions of Schredl et al while twenty experienced increased insight and memory according to the lucidity and consciousness scale developed by Voss et al. No significant negative correlation was found between neuroticism or agreeableness and lucid dreaming, but a slight correlation between openness and lucidity was present. Those who participated in training had higher lucidity than the control group, suggesting that attention to dreams and dream journaling is not enough to induce lucidity. Although one in three did not achieve lucidity, this may prove to be insignificant depending on the follow-up questions regarding the frequency of training. A future study should be conducted with a larger sample size to verify the significance of the results.

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Understanding Multimedia Exposure and Improving Its Assessment

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Introduction

Research of Multimedia exposure (MME) as a process of understanding the behavior of multimedia (MM) consumers, fulfilling their needs and requirements, is widespread. It uses different methodologies with the aim of helping companies to better understand their target group and consequently increase sales and growth of the company. Furthermore, MME research measures how and to what extent people are exposed to and influenced by multimedia. Until recently, researchers in this field mainly used "third-person" methods, such as questionnaires or focus groups, and did not recognize enough the importance and usability of "first-person" methods, such as phenomenological research of one's experience. The goal of our study is to compare data obtained from the self-report questionnaire with data obtained using the Descriptive experience sampling (DES) method. Its purpose is to find possible differences and consequently designing an improved MME Model that companies could use to meet their goals more efficiently.

Methods

In the first phase of research, we decided to test three participants who first need to be trained in how to observe and report their experience. According to the Descriptive Experience Sampling method [1], we will use a mobile application that will beep at random times during the two days of training. After each beep, the participants will be asked to write down what they were experiencing at the moment right before the beep. Within 24 hours, the researcher will conduct an interview with each participant, helping them explore their experience in greater detail.

In the next phase, participants will enter the "living lab" individually in order to watch various television content with different ads. While watching, a semi-randomized beep will prompt them to write down their experience. The salient aspects of their TV-watching experience in the living lab will be explored in depth during the expositional interview. Acquired data will be analyzed according to the principles of qualitative research. We aim to use this data to improve existing questionnaires regarding multimedia content, or – if our findings digress considerably – construct a new one.

Expectations and Conclusion

In the research, we expect to find considerable differences in data obtained by self-report and DES method. There is a strong need to include "first-person" approach, in our case DES method, in improving the MME Model, since, based on previous studies, these methods are bound to give more insight into a person's inner world. The obtained data will be used in modeling exposure using non-intrusive sensors.

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State-Dependent Modulation of Social Reward

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Across species, social interactions and behaviours constitute a major part of the living activities of animals. This striking social motivation can be partly explained by the rewarding function of interpersonal interactions: Social interactions can make us feel good, they satisfy primary needs and they promote affiliation which guarantees well-being and adaptation. In humans, nevertheless, the cognitive, affective and neural processes that underly the pursuit of *social rewards* aren't well understood. We report a behavioural study that tackles this issue by investigating how peoples *motivational state* modulates social reward processing. A recently proposed neurobiological model of social motivation suggests, that differences in affiliative behaviours of animals can be explained by their current state [1]: In an aversive motivational state, social contact-seeking mainly serves the function of coping with distress, whereas in an appetitive motivational state, social contact-seeking mainly acts as a mean to establish joy and pleasure, yielding different behavioural consequences. We expand these recent findings from animal research by testing the proposed model on human subjects. Therefore, we investigate how the induction of aversive and appetitive motivational states effects *wanting* (motivation to gain a reward) and *liking* (affective reaction of receiving a reward) components of social reward processing. To manipulate their motivational state, participants undergo different modified versions of the Trier Social Stress Task [2]. Subsequently, participants perform a newly developed social reward task in which they receive *social touch* on their forearm, seemingly delivered by an affiliated friend. We assess wanting and liking of the delivered touch with self-reports, effort-measures and by recording participants facial activity. It is hypothesized, that in an aversive motivational state, participants use the delivered touch primary as a mean to cope with distress, which would be reflected in higher wanting of social touch compared to a control group. Participants in an appetitive motivational state are expected to use the touch primary as a source to gain joy and pleasure, which would be likewise reflected in higher wanting of social touch compared to a control group, but also in higher liking of the social touch compared to the aversive state group. The proposed study would close a neglected gap between animal and human research on social reward processing and may foster our understanding of its underlying cognitive and affective processes.

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Natural Love Potion: How St. John's Wort Affects the Feelings of Love and Devotion in People in a Relationship

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St. John's wort (SJW) is an herb that is known for its various positive effects, nowadays people mostly use it to reduce everyday stress and to increase mental well-being [1]. The origin of these positive effects is not yet fully understood but available research assumes that hypericin and hyperforin contained in the herb are the main active substances [2]. Research showed that SJW capsules may have similar healing effect on mild and moderate depression as standard antidepressants [1], [2]. SJW can evoke side effects and cause contradiction with other medicines, and therefore it should always be treated with caution.

Purpose

Anecdotal evidence says that SJW has another effect that was not proven nor investigated in the past studies. It claims that SJW can evoke a strong feeling of romantic love and devotion towards a close person. This study tries to examine this assumption in people, who are in a relationship, and investigates if participants' feelings for their partners will change after SJW treatment.

Method

Twenty participants received 15 concentrated capsules of SJW and were instructed to take one pill (300 mg) per day. Inclusion of participants was made on a voluntary basis, all participants met research criteria (being in a relationship, not taking any medications) and were informed about the process of the study and possible side effects of the treatment. Instructions also contained a false information that half of the participants received placebo capsules instead of SJW capsules. This step provided a prevention of placebo effects. We used the between-subject design with pre/post questionnaire to detect how SJW treatment changed participants' feelings towards their partners. The questionnaire contains six parts with distractive function in order to confuse the participants about the aim of the research. Three relevant parts focus on participants' feelings towards their partners, couple satisfaction and dependency on partner.

Results

We expect to find an increase in romantic feelings and devotion to participants' significant others indicated by responses in the pre- and post- questionnaire.

Conclusion

Many herbs have healing effects that are known for centuries, but some have never been studied before. This paper presents a theory based on an anecdotal evidence that SJW strongly affects emotional life, specifically romantic feelings. Positive findings would suggest new important facts about previously unknown effects of SJW. In that case, the next research should focus on examining the interaction of SJW with body hormones like oxytocin and serotonin in humans.

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The Effects of Emotional Intensity and Individual Differences on Emotion Regulation Ability

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Introduction

Implementation of emotion regulation strategies in response to stressful events varies as a function of contextual demands. For instance, reappraisal (i.e. reinterpretation of the meaning of the emotional stimulus), is preferred in situations related to low compared to high emotional intensity [1]. Although this strategy has been extensively investigated in the past decade, it remains unknown whether 1) reappraisal ability can be trained, 2) whether it is modulated by arousal and 3) how it is related to individual differences. The present study set out to address these gaps in the literature.

Method

Twenty-three participants (19 female, age: M = 22.7 years) took part in the study. During an emotion regulation task participants were instructed to either down-regulate (Decrease) or maintain their emotions (Look) in response to an aversive image. The pictures were selected from standardized picture databases and divided into two types of differing intensity based on normative ratings of arousal (low: M = 5.77 SD = 0.29; high: M = 6.90, SD = 0.31). An event-related design was used (instruction 2s, regulation 8s, and emotional state rating 4s). Participants completed 3 testing sessions separated by one week. Each session consisted of 4 runs and a total of 80 trials. Participants rated all presented images on valence and arousal. Additionally, participants filled in a set of questionnaires on personality traits and emotion regulation ability.

Analysis

Statistical analyses will be performed using the computing environment R. A series of repeated measure ANOVAs will be conducted to assess the interaction between regulation instruction (Decrease/Look), arousal (High/Low) and session (First/Second/Third) on ratings of emotional state. In addition, regression analysis will be performed to evaluate the effect of personality characteristics on emotion regulation success. We expect that 1) emotion regulation ability will remain stable over time, 2) arousal intensity will have an effect on regulation success and 3) individual differences in personality and emotion regulation ability will predict emotion regulation success and emotion processing.

Impact

Findings from this study will contribute to our understanding of factors influencing emotion regulation success and could inform prevention programs and therapies directed at improving regulatory abilities and thereby emotional well-being.

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The Exclusiveness of Words: A Comparative Language Study of Arabic and English Idioms in the WWW

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Introduction

Idiomatic expressions are a fascinating linguistic phenomenon. Idiom defined as a group of words in a fixed order that have a particular meaning that is different from the meaning of each word on its own. They are expressions closer to the way people communicate, feel, and interact within their culture. They act as conceptual shortcuts to express meaning. Thus, learning idioms and phrases in a new language can be a big challenge. It is safe to assume that all languages rely on idioms to some extent. In this study, the frequency and the exclusive use of Arabic and English idioms are examined in a quantitative comparative approach using the World Wide Web (WWW) as corpus.

Purpose

In a pioneer study by Berger (2019), [1] the world-wide-web was searched for idiomatic expressions in three living and one extinct language: 1102 English, 1183 German, 1138 French, and 1128 Latin phrases distributed into three categories, with high, middle and low frequencies. The WWW offers a colossal amount of heterogeneous collection of all sorts of texts, from high arts and literature down to the most trivial gossip. My goal is to extend the original study to the case of Arabic.

Method

The queries search, with Google's search engine, is targeted at combined word group (n >= 3). The best way to use the exact match search operator, i.e., search for a word group between quotation marks (“ ”). As some kind of normalization, I also will search for the same group of words without the quotation marks. The latter search will usually result in much more hits. By dividing the first by the second number, generally resulting in a ratio <<1 (the author in [1]) call this ratio 'exclusiveness'). Theoretically, if the exclusiveness = 1 means the particular phrase is always used in that order (i.e., exclusive use of the idiom). All searches will be repeated within a relatively short period (within a couple of weeks). The mean of the two results will be accepted if they differ by less than 25%. If they vary by more, a third search will be conducted, hoping that this third result will differ from one of the two by less than 25%. If all three results differ from each other by more than 25%, I conclude that this is a very unstable phrase. In parallel, also phrases in English will be examined in the same procedure.

Implications

The Implication of this work is threefold: firstly, to provide a source for the frequencies and the exclusive use of idioms, especially for teaching and learning purposes of a language. Secondly, to compare the results among languages. Thirdly, to illustrate the advantage of using the Internet as a tool to explore and better understand the use of phrases, and in this case of idioms, in a given language.

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Comparison of Emotional and Behavioral Problems in Children with Type 1 Diabetes and Their Healthy Peers

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Over the last couple of decades research has been trying to gain a better insight into which major factors can cause development of diabetes 1. This project is a part of a bigger study, which aims to find whether stress can cause the development of diabetes type 1 through psychological and genetic factors. Previous literature has shown evidence that emotional and behavioural problems could be important factors [1]. Therefore, we are aiming to determine whether children with diabetes type 1 have more emotional and behavioural problems than their peers. We used Achenbach System of Empirically Based Assessment (ASEBA), Child behaviour checklist for ages 6-18 (CBCL) questionnaire for parent [2].

Methods

In our project 194 children (94 with diabetes 1, 100 healthy peers) between the ages of 8 and 15 (M = 11,7;M(diabetes) = 11,7;M(control) = 11,6) were included. The CBCL questionnaire was completed by the children's parents. We were interested in parent's answers regarding emotional and behavioural problems of their children. Data was first checked for normality. Since the preliminary analysis of each group separately showed that the data was not distributed normally, the data was analysed with the Mann Whitney U test and statistical significance was quoted at the 5% level.

Results

Independent – Samples Mann-Whitney U Test did not show any statistically significant difference in emotional and behavioural problems between children with diabetes type 1 and their healthy peers. There were higher values for all variables in favour of children with diabetes and the biggest trends were found in aggressive behaviour (M(diabetes) = 3,7; M(control) = 3,0; M-W coefficient = 4119; p = 0,132) and withdrawal, depressive mood (M(diabetes) = 2,8;M(control) = 2,3; M-W coefficient = 4235; p = 0,215) measures. Even though these results are not statistically important, they suggest a possible importance of the two factors.

Conclusion

Our hypothesis was not confirmed, due to the data of CBCL ASEBA questionnaire not showing significant differences between children with type 1 diabetes and their healthy peers in emotional and behavioural problem based on the parents' evaluations. However, it is important to note the parent's evaluations might have presented a biased measure. Moreover, results of other review articles suggest that children with diabetes are at bigger risk for developing emotional and behavioural problems. Nevertheless, the article from 2012 shows that they are at bigger risk only for depression, anxiety and psychological distress [1].

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Exploring Fine Restrictions in the Derivation of Subject Nominalizations in Slovenian

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Introduction

In the past, a lot of research on morphological processing has been done. However, the studies so far have been conducted only on a few languages. Previous research on English [1] and Greek [2] confirmed Full Decomposition model, which suggests that all visually presented complex words are decomposed into morphemes (e.g. *teach+er*). In the present study, we want to examine the cross-linguistic validity of the above findings in Slovene. The study from 2016 [3] examined morphological processing in Slovenian native speakers with Mild Cognitive Impairment (MCI). In an attempt to tease apart the types of information that are being processed, pseudo-words violating the syntactic category of the base (e.g. črkilec *'letterer'), the thematic specifications (e.g.* _umiralec_ 'die-er'), and the aspectual specifications (e.g. **preplavalec* from *preplavati* 'to swim-pf') of the verbal stem were created. Patients had to decide whether or not the presented words were part of their language. The results showed that MCI patients were much slower at lexical decision task than the control group, especially with thematic and aspectual violations.

Method

We extended the stimuli list from 2016 [3] with pseudo-words violating aspect. Our goal is to further delineate aspectual violations into more fine-grained categories and add more words to each category to have a more balanced list. The variables we took into consideration are the following: change of meaning (e.g. prepisalec *from* pisati *'to write'* – prepisati *'to copy-pf'), no change of meaning (e.g.* _preplavalec_), aktionsart (e.g. zaigralec *from* zaigrati *'start playing-pf'), or suffix (e.g.* _dvignilec_ from *dvigniti* 'to lift once').

Future Research

Our aim is to carry out two tasks: an offline grammaticality judgment task and an online lexical decision task to obtain behavioral results. Insofar as we discover important differences in processing between different violations, we will conduct an MEG study, following [2], to examine neurobiological correlates of morphological processing. We want to confirm the role of different brain regions involved in various steps of complex morphological processing and to examine their time course. We expect to find higher acceptance rates and longer RTs in aspectual and thematic violations, as well as to cross-linguistically validate the results and thus confirm Full decomposition model in Slovene.

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Partisan Bias Research: An Overview of a Controversy

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Introduction

Healthy functioning of a democracy depends on the accuracy of knowledge and the level of ideological polarization. Partisanship is associated with both. Underlying it is a multilayered phenomenon of partisan bias. Political psychology has gathered an extensive body of evidence that suggests partisan bias is present at both sides of the political spectrum. However, there is a controversy that permeates the research of partisan bias. The controversy relates to the question of whether conservatives and liberals are symmetrically or asymmetrically biased. Three different research traditions are trying to answer this question.

Goals

Our aim was to summarise and compare the main findings, concepts, and characteristics of the three research traditions that bring empirical evidence to the debate of whether partisan bias is symmetrical or asymmetrical across the political divide.

Key Findings

The first research tradition is the research on the cognitive style of conservatives and liberals. This tradition is researching motivational proclivities of conservatives and liberals based on their different cognitive style. Meta-analytic findings of this research are suggesting there is a big asymmetry between conservatives and liberals concerning bias [1]. The second research tradition is the research on selective exposure to information. This research tradition is researching bias manifesting itself in exposure and non-exposure to congenial and non-congenial political information. The findings of this research tradition are very diverse suggesting both symmetry [2] and asymmetry in the bias of conservatives and liberals. The third research tradition is the research of bias in the evaluation of information. This research tradition is researching bias in the evaluation of identical politically relevant information which is framed differently. Meta-analytic findings of this research suggest the bias of conservatives and liberals is symmetrically distributed [3].

Conclusion

Given the multilayered nature of partisan bias, some seemingly contradictory findings of the three research traditions might be compatible.

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Surface-Based Searchlight Analysis

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Multi-voxel pattern analysis has proven to be an effective statistical tool for assessing how information about cognitive processes is encoded in sets of voxels considered jointly. A difficulty in applying multivariate methods to fMRI data is the large number of variables and a relatively small amount of samples, which are typically available in neuroimaging experiments. The searchlight method [1] presents one of the ways to deal with the 'curse of dimensionality' of fMRI data, by searching through the brain, as if with a searchlight, to find local patterns of neuronal activity, which are informative about a certain experimental condition.

The standard, volume-based searchlight method analyses spherical neighborhoods, centered around each voxel. The resulting statistic of each multivariate analysis is then assigned to the center voxel, creating an information-based brain map, which allows us to locate informative regions. A surface-based approach has shown to improve the spatial specificity of the searchlight analysis, by taking into account the folded nature of the cerebral cortex [2]. The cortical surface can be reconstructed using high resolution structural images, which allows us to project the functional data onto a surface representation of the cortex. Surface-based searchlight analysis then defines circular areas on this surface and analyses the voxels corresponding to these areas.

The results of the searchlight analysis can be significantly influenced by the choice of parameters of the voxel selection method, such as the radius of the searchlight [3]. Surface-based methods introduce additional parameters such as the depth and width of the cortical surface, as well as different methods for measuring the geodesic distance. Left unexamined, the effects of these parameters may lead to incorrect interpretation of the analysis results.

To gain a better understanding of the method, we will implement a volume- and surface-based searchlight algorithm in Matlab and systematically analyze how various parameters influence its functionality, using both simulated and experimental fMRI data.

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Meaning of Meditation for Long-Term Meditators: A Phenomenological Study

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Context

The practice of meditation has become widely present in our society. Also, numerous studies of psychological effects and neural correlates of meditation have been conducted over the years. Nevertheless, only a few phenomenological studies of the experience of meditation have been conducted [1].

Purpose

In our exploratory study we will try to find out what motivates long-term meditators to insist in everyday practice of meditation. Our hypothesis is that long-term meditators find meaning of their practice also in the experience of meditation itself and not only in its effects such as achieving psychological balance. We are also interested in the structure of experience of meditative states [2], states which are meaningful to meditators.

Method

We will do semi-structured interviews with five participants who meditate for at least 3 years on daily basis. Meditators will be of different age, gender, religion and will be practicing various meditation techniques. In the first part of the interview we will obtain information about their personal history of meditation practice, general information about their meditation practice and meditation technique. After the first part, an interviewer and an interviewee will do approximately 15 minutes long meditation to be better able to recall meditative experience. In the main part of the interview they will be asked why they meditate, what meditation means to them and which are those states during meditation which give meaning to their practice.

Conclusion

This exploratory study will give us a better understanding of the meaning of meditation practice for long-term meditators from phenomenological perspective. From there on it would be interesting to further investigate what is the connection between experience of meditative states and insight into one's own mind.

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Embodiment after Direct Trauma

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Embodiment as a concept derives from philosophy, but today is considered a psychological, as well as important psychiatric construct. It is explained as living, experiencing, sensing, and being connected with and through one's body to oneself and to others in relational contexts [1]. Following the previous research that implies how traumatized individuals often experience their body-mind connection differently then non-traumatized individuals, they also might have different embodiment experience from the general population, which is in its quality closely related to the nature of their trauma.

Purpose

It is important to give embodiment less mystified explanations and to connect it more with kinesiological experience of our bodies and their functions. Also to gain more insight into a mind-body connection after traumatic events. This research puts in focus mentioned connections, after some kind of direct trauma experience, where direct trauma is taken as an event that person personally experienced, and it takes into a count all kinds of traumatic events, from psychological to physical and sexual [2]. We try to explore the aftermath of such events in a traumatized population, in embodiment context defined by 5 factors: body awareness, body responsiveness, sense of agency and ownership, body-mind connection, and detachment occurrence.

Method

The embodiment is examined from a standpoint of constructs that underlie how one feels its own body, how connected to it he or she feels, how strong connection between mind and body is, and how much in control of its own body actions he or she is. A questionnaire was created, as a compilation of four existing and provenly reliable questionnaires that measure mentioned constructs: BRQ, EEES, SBC, BCQ.

Findings

Results show that traumatized individuals experience a connection to their body differently than the general population and report higher tendency to dissociation and loss of sense of agency. There are differences found in different factors between individuals who suffered emotional trauma and ones who experienced sexual, where individuals who went through sexual trauma feel more disconnected from their bodies.

Conclusion

Embodiment shows as an important construct in trauma research. Results showed that traumatized individuals experience this concept differently than general population which implies that embodiment can be taken as a concept of slightly profound and specific nature in trauma context, and might be qualitatively separated construct from general embodiment. Further research in this direction is needed.

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Student Reflection in an Intercultural Higher-Education Context

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Context

Due to the worldwide increase of mobility and migration of students, educational institutions are becoming a microcosm of society where intercultural interaction could be a challenge. Nevertheless, they are also a place to develop skills to succeed and respond properly to the demands of our globalized society. In this line, the capacity of reflection is often presented as a crucial skill in developing students' awareness of their own cultures assumptions and openness towards other cultures and thereby, the development of intercultural competence, which requires affective (attitudes), cognitive (knowledge) and behavioral (skills) elements [1]. The concept of reflection has not an agreed definition since it has many approaches at least from constructivist, enactivist and learning theories views; however, they agree in recognizing that reflection (1) requires active engagement on the part of the individual; (2) is triggered by an unusual or perplexing situation or experience; (3) involves examining one's responses, beliefs and premises in light of the situation at hand; and (4) supports the integration of new understanding into one's experience [2]. However, the role of reflection in educational contexts has not been empirically assessed thoroughly and lacks critical analysis.

Purpose

The present research aims to identify and analyze the mentioned characteristics of reflection in a higher-education context and their correspondences to the development of intercultural competence.

Method

The purpose will be reached from a qualitative approach by analyzing 16 semi-structured interviews which contain reflective and descriptive questions. The process will be as follows [3]: (1) the discovery phase consists of reading the data, searching for reflective processes, developing typologies and a history guide; (2) the coding phase consists on the codification and categorization of the data concerning reflection. Finally, (3) the relativization phase consists of interpreting the data considering the context in which they were collected.

Implications

A better understanding of the role of reflection to the development of intercultural competence could support the implementation of intercultural strategies into educational curriculums which allow students to develop skills to communicate effectively and appropriately in intercultural situations.

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The Role of Metacognitive Self-Evaluation In The Process of Learning

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Introduction

We live in an era in which the required knowledge and the overall burden on students are immense. Additionally, students usually have a finite amount of time to dedicate to learning [1]. Thus, the essential capacity of a learner is to accurately assess whether the studied topic requires more time to be spent on or a learner can proceed further with another task [2].The aim of our study is to explore whether a learner can benefit from studying a topic coming from different sources of information. The advantage of learning from various sources is based on the theories of memory and learning that put their focus on the depth of processing [3]. It is assumed that the greater the variety and a need for processing, the deeper the processing of information, the more efficient saving of information into semantic networks, the better the understanding; hence, the more accurate self-reflection.

Method

The participants were divided into four groups. Three textbook articles from different authors dealing with the topic of dual-system theories of thinking were used. The participants encountered the text exactly 3 times according to rule described below. Group 1 read only one of the three articles three times. Group 2 read all three articles, but each article could be viewed just once. After each studying session, there was a metacognitive task reflecting one's self-evaluation of comprehension of particular text. The very next day, participants were tested on the given topic through a series of open-ended questions. In addition, the participants were also asked to answer metacognitive questions about their performance on the test.

Results

We expect that the group which encounters all three texts will score better on the learning test, due to having more structured knowledge about the topic. Moreover, it is expected that the same group will have more accurate metacognitive self-evaluation of their performance.

Implications

The result of the research might shed light on the efficiency of learning processes. Students usually have tendency to read the materials multiple times over during studying. However, the opposite might be more beneficial to the learning process. If our hypothesis is confirmed, this learning strategy might help students who seek for efficient ways to approach the study material.

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The Effects of Different Types of Gender Expression on Information Processing in the Slovene Language

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How the choice of words with regard to gender and gender inclusivity affects our thinking has been extensively studied on major European languages, however this type of research has not yet been conducted on the Slovene language. Studies that research gender bias in language are mainly focused on the effect of role typicality on processing person information and show a consistent neural response when expectations (based on gender stereotypes) are violated. Our study (based on recent studies[1][2]) focuses on the effect of different word forms with regard to gender. The research design is adjusted to the rules of Slovene grammar; instead of using nominal anaphora to refer to the noun (i.e. **she**), the connection (and gender) is expressed by the verb. The aim of this study is to test the neural responses to the use of generic plural male nouns referring to professions (i.e. **the mechanics**) in contrast to parallel use of male and female plural noun forms (i.e. **the authors and the authoresses**) when combined with verbs expressing either masculine or feminine gender properties.

The experimental part will include 30 participants (students of both genders from the human resources and management department). They will be asked to read semantically connected pairs of sentences, broken down into compounds (up to 7 syllables) from a screen, while their neural response will be measured by an electroencephalograph. They will be required to answer "Is the second sentence a logical continuation of the first one?" by pressing a YES/NO button.

We expect that a measurable deviation in the EEG signal will be present in cases where a masculine plural noun form is followed by a verb expressing feminine gender. No deviation is expected with congruents pairings, i.e. where the masculine plural noun form will be followed by a verb expressing masculine properties and in examples where the noun form is expressed by parallel noun forms, regardless of the verb form that follows. We anticipate the signal deviation to correspond to the N400 component. The results of the study will not provide information about the cause of the neural response (whether it violates either gender bias or stylistic rules).

As the research has not yet been conducted, it is impossible to anticipate further advances. The special design of the study provides us with an opportunity to explore new possibilities for the research of Slavic languages.

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The Framework of Physiological and Developmental Adaptation As a Means to Integrate the Concepts of Illness and Health

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Context

The processes of *physiological and developmental adaptation* have been described as sustaining specific physiological parameters around either fixed (homeostasis) or shiftable (allostasis) set points and developmental trajectories (homeorhesis) which may be diverted by environmental perturbances.

How can we apply these key principles to the *etiology and course of disease*? By using a framework that incorporates the mathematical formalisation of the mechanisms of physiological and developmental adaption, namely *network and chaos theory*, one can get a holistic and interdisciplinary understanding of seemingly pathological states. The comprehensiveness of this approach is facilitated by the circumstance that

"*(…) the basic operational rules of living systems follow some relatively simple mathematical principles, which apply to all levels of the biosphere, ranging from genetic blueprints to protein–protein interactions to social networks (…).*" [1, pp.51].

Therefore, the framework allows for the unification of not only behavioural, physiological and neurobiological factors but also social, genetic and evolutionary ones as well as the depiction of interactions amongst them.

Broad bodies of existing experimental literature can be newly interpreted highlighting the adaptive function of seemingly pathological reactions to *stress* – i.e. events that are threatening the integrity of the organism and elicit physiological and behavioural responses.

Purpose

The aim of this project is to apply the ideas outlined above to the concrete example of *depressive disorders* by integrating literature on the structural and functional changes in the central nervous system (CNS) with studies on social and genetic risk factors, as well as theories focusing on problems with reward learning and sensitivity or flexible decision making. The focus hereby lies on the CNS's core function of efficient energy regulation which seems to be severely impaired in depressive disorders. Particular attention is paid to the role of primary mediators of allostasis such as hormones of the hypothalamo-pituitary-adrenal axis, catecholamines and cytokines.

Implications

While the research is purely theoretical, explaining underlying mechanisms within this framework will yield a more comprehensive and yet detailed and individualistic model of depressive disorders which can be readily applied to identify more targeted treatment options. Moreover, the project further expands the set of diseases which have been described in terms of physiological and developmental adaptation and might therefore contribute to a less pathologizing and symptoms-based view of disease towards a more adaptive and mechanistic one.

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Computational Exploration of Self-Organizing Map with Lateral Connections

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Computational modeling and simulation of cognitive phenomena play an important role in neuroscience research [1]. Self-Organizing Maps are based on simulated networks of neurons with afferent connections coming from the external world. Their modification in form of the Laterally Interconnected Synergetically Self-Organizing Map (LISSOM) [2] also integrates reciprocal lateral connections within the neural network. Each neuron in the map influences and is influenced by the rest of neurons by excitatory short-range and inhibitory long-range connections. LISSOM is considered a suitable way for simulating the development of the neocortex and was used for studying primary visual cortex [1] (e.g. ocular dominance, cortical plasticity, tilt aftereffect, etc.).

The map's reaction to input consists of three steps. Firstly, LISSOM network reacts on input considering only similarity of the input to the afferent weight vector what leads to the initial responses of neurons. Secondly, repeated local cooperation and competition through lateral connections evolve this response into an activity. Thirdly, after the activity in map settles into stable pattern (activity does not change significantly in next iterations) all connection weights are updated. For analyzing dynamics of LISSOM it is needed to combine knowledge from cognitive neuroscience and computational modeling.

The goals of this research are to: implement the LISSOM, conduct experiments on visual inputs and describe changes in activity and weights. The main interest is if learned information (visual patterns) can have influence on settling activity when new visual pattern is presented to map in early stages of training. The LISSOM was implemented using the Python programming language. Visual inputs are bitmap representations of ten Arabic numerals. Experiments were conducted on personal computer.

Pilot training of LISSOM confirmed that activity settles in stable pattern in 10 iterations what is in accordance with [2]. Therefore the following experiments will compare settling dynamics as response to different inputs during 10 settling iterations per input including change of weights. I am not aware of similar experiments were already conducted. The ten different inputs in basic and reverse orders will be presented to untrained LISSOM. Information about changes in activity will be recorded together with visualization of reconstructed input, afferent weights of all neurons and lateral weights for neuron from center of map. For future research the LISSOM will be fully trained on server provided by Comenius University and similar experiments will be executed.

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Computational Simulation of Simultaneous LTP and LTD in Hippocampus

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Long-term potentiation (LTP) and long-term depression (LTD) play a crucial role in learning and memory. LTP and LTD occur in the hipppocampus as a result of the sequences of coincident pre- and postsynaptic spiking. This type of synaptic plasticity is called spike-timing dependent synaptic plasticity (STDP). Benuskova and Abraham modified the original STDP rule to include metaplasticity, which means that the previous average activity of a neuron affects the result of STDP [1].

Purpose

The purpose of this study is to investigate whether the Benuskova and Abraham rule applies to the model of CA1 hippocampal cell. We attempt to simulate the experiments of Dong et al. in freely moving rats [2]. When the spikes in the Schaffer input consistently come before the commisural input spikes, the Schaffer synapses exhibit LTP whereas the commisural synapses exhibit LTD. Simulating experiments in the hippocampus using computational modelling may help us to understand mechanisms responsible for memory formation.

Method

We simulate a single CA1 neuron using the Izhikevich spiking neuron model [3]. The simulated cell has two inputs representing two major excitatory inputs: the Schaffer collateral pathway and commisural pathway. We simulate the ongoing spontaneous spiking in the inputs by Poisson homogeneous spiking process. According to the work of Dong et al., Schaffer and commisural synapses are stimulated by 600 spikes at 5 Hz. These protocol spikes come to Schaffer synapse < 40 ms before the commisural synapse. We implement synaptic plasticity according to Benuskova and Abraham [1].

Results

We present the results of simulations of how the input synapses evolve their weights when they are subjected to the spontanous activity only. They are suppossed to stay more or less stable. Then we present the results of Dong et al. stimulation protocol, which should induce LTP/LTD simultaneously in afferent hippocampal pathways.

Conclusion

Computational simulations may help us to better understand how flexibility and stability contribute to processes underlying memory. These processes include simultaneous LTP and LTD caused by coincident activity in afferent hippocampal pathways. When one input gets stronger, then the other input should get weaker in order to balance the increase in one input‘s influence upon the postsynaptic cell.

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Twitter Activity Analysis of Users Diagnosed with Bipolar Disorder

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Bipolar disorder (BD) is associated with significant functional, cognitive, and social impairment [1]. It is severe and sometimes underestimated disease. Up to 15% of patients commit suicide, and about half of them make at least one suicide attempt in their lifetime [2]. Nevertheless, 70% of people with this disease still are initially misdiagnosed [3].

Purpose

The main goal of this project is to find significant correlations in BD users' behavior in the social network (Twitter) with the comparison to the control group (not diagnosed BD users) that may promote more detailed research of the disease in social networks and help to monitor bipolar disorder indications in the future.

Method

Unlike depression, bipolar disorder is not so broadly researched with the methods of data analysis. Partially, it may be explained by the complicated structure and multifaceted symptoms of the disease. Symptoms vary depending on the phase of the illness (mania/hypomania, (major) depression) and its type (I, II, Cyclothymic, etc.). In this project, I concentrate my research on sentiment and behavior analysis of bipolar users. Twitter was chosen as most text-oriented social network compared to other platforms. Sentiment analysis includes finding interrelations in mood swings as well as defining changes in arousal score. For this purpose, I use the software package Natural Language Toolkit. Main characteristics of behavior analysis are tweeting frequency and their (in)stability, average number of tweets per period and time of posting. All bipolar users' metrics will be compared with the control group. I assume that bipolar users will have more significant ups and downs in arousal scores and tweeting frequency, plus we may expect late night posting. The hypothesis is based on medical literature (e.g., the Diagnostic and Statistical Manual of Mental Disorders) and research paper review of BD symptoms.

Research Phase

At this stage, data from 2200 bipolar users and 5000 control group users were prepared for analysis (it means collection, cleaning, converting and producing datasets).

Implications

In the era of Big Data, quantitative methods take a significant part of scientific research. It helps us to find new angles for the problem and prove challenging hypotheses. Thus, I expect that this research project may contribute to more precise recognizing of psychiatric diseases or even find new patterns of the illness and give a boost to future research.

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Jump Once, Jump Twice: Different Languages Conceptualize Actions Differently

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Linguistic relativity theory proposes that a particular language we speak has an impact on the way we think. The methodology used in this study is based on the structure-centered approach which begins with an observed difference between languages in their structure of meaning [1]. Recent findings indicate that German-English bilinguals categorize events depending on the grammatical constraints of the language which they use [2]. A grammatical constraint of interest for this study is the verb aspect, a notion that expresses how an event, action, or state verb lasts over time. The goal of this study is to find out whether German-Serbian bilinguals routinely encode actions as perfective and imperfective even after receiving instructions in the language that does not contain the notion of grammatical aspect (such as German).

Our initial pilot study showed that Serbian monolinguals had different encoding patterns and used different words to denote both images showing perfective and imperfective activities. They were asked to provide only one word related to activity. As expected, German monolinguals homogenously used the same words to denote the same activities. Therefore, we assume that the bilinguals, having a repository of both languages, will be able conceptualize the activities faster and thus respond faster and more accurately to congruent than to incongruent trials.

Our sample consists of 30 bilinguals that use both German and Serbian on a daily basis. The instructions to the first two parts of the experiment will be in German, while the last part of the experiment is meant as a feedback round and will have instructions in Serbian. There will be three groups according to the three conditions:

- a congruent one, that will present images of perfective activities (e.g. climbing a cliff) in both sets to the participants,
- a second congruent condition, which will present images of imperfective activities (e.g. person has already climbed the cliff) in both sets, and
- an incongruent condition, which will present a set of images of imperfective activities, followed by images of perfective activities.

The participants will be instructed to memorize the images, after which we will present them with the same pictures again (or the action counterpart in the incongruent trial) and we will measure reaction time while they answer if they have seen the image before or not. Afterwards, they will be asked to give feedback to the images in the form of a sentence in Serbian.

We expect to find longer reaction times and lower accuracy for the incongruent trials, which would suggest that the conceptualization of the verbal aspect in the congruent trials occurs before recalling the exact image in our brain.

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The Association Between Grammatical and Natural Gender – Crosslinguistic Evidence

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This research is concerned with the association between grammatical and natural or social gender. Studies have shown that there are crosslingustic differences in the attribution of gender to inanimate entities or animals [1]. In addition to examining the association between grammatical and social gender in different languages and age groups, this investigation aims to detect moderating factors of the attribution of gender properties on in the proper sense 'genderless' entities.

In Croatian, grammatical gender is determined by word endings, while in German, it is determined by abstract declension class membership. This experiment investigates whether speakers of languages with typologically different grammatical gender systems assign different social gender to objects. Twelve 5-6 year old, 12 adult (>18 year old) German native monolinguals and 12 adult Croatian native monolinguals were tested using a voice attribution paradigm. Participants were presented 22 pictures of inanimate objects or animals and had to associate a female and a male voice to the given item. Some items had feminine or masculine grammatical gender in both languages; others had different grammatical gender in German and Croatian. After each item, the participants were subject to a semi-structured interview to give account of the reasons for their decisions. In addition, the Croatian participants were also presented with 12 pseudo-words with either male, female or neuter word endings according to the rules of the Croatian grammatical gender system.

Preliminary results show that both German and Croatian adult participants significantly preferred the voice and the grammatical gender to be congruent, meaning that they e.g. preferred a female voice when the grammatical gender of the word was female. However, the effect is not very pronounced. In contrast, the word endings of the presented pseudo-words clearly triggered the associating to the natural gender. Even though being merely a category of grammar the participants attributed meaning to the grammatical gender of the presented words and mapped them onto the social gender.

This exploratory research provides insight into the association between grammatical and natural gender and hereby contributes to research of the role of language in construction of gender. The experiment should be expanded to populations whose mother tongue does not possess grammatical gender such as Turkish, Finnish or Bahasa Indonesia. Evidence gathered from this research can yield interesting results relevant to the fields of cognitive linguistics, gender studies and pedagogy.

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Grounded Language Learning in Robots - An Information-Theoretic Approach to Adjective Learning

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Introduction

Grounded language learning refers to viewing the language learning process as forming mappings between words and concepts of entities in the physical world. It is important for embodied agents, like factory robots, that have to learn to interact in the real world and communicate with human coworkers. We are concerned with scenarios where robots learn the correct words in an online fashion by interacting with humans that talk about referents while using them.

Problem

In this research, we extend the information-theoretic model for language learning from multi-sensory data introduced by Gross et al. in order to not only learn words that denote objects and actions but also words related to properties of objects [1]. Initially, the algorithm will allow the robot to learn the words referring to the color of an object, however, for future work it will be possible to expand the algorithm to learn words referring to several different properties.

Gap in Literature

The existing literature discusses different approaches towards adjective learning from multi-sensory data. However, our approach can operate with fewer data points and it can cope with the fact that adjectives are not used each time an object is referred to.

Approach

The approach to solve the posed problem is based on using normalized pointwise mutual information between words in the utterance describing an action and the referents involved in the action. Moreover, we will utilize the knowledge about objects' types and their properties by representing all information about a particular object as informational frames. Thereby, the different objects can be compared and, based on their similarities and differences, the adjective-property mappings can be calculated.

Method

In order to achieve this goal, we will implement the existing model in Python and enhance it as described above. Each possible solution will be tested with data comprising descriptions of the test subject's actions aligned with a list of object references, partaking in the respective scene. This can be data from existing corpora or self-constructed data to test edge cases. These steps are part of an iterative process where implementations are tried out in practice and improved based on their performance.

Impact

We expect this new method to enable robots to learn the words denoting various properties of an object, which is important for differentiating objects (also of the same kind), a crucial part of successful human-robot interactions.

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The Looping Effects of Personality Types

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Introduction

According to Hacking [1], human kinds of phenomena, such as homosexuality, differ from natural kinds, such as water, in that they exert influence on themselves. Because of the self-understanding capacities of the phenomenon classified as a human kind, the very act of classification changes the nature of this phenomenon, which furthermore affects how it will be classified in the future; in other words, human kinds are subject to a looping effect.

To empirically test this primarily philosophical theory, I have chosen to examine the personality types of the Myers-Briggs Type Indicator (MBTI) personality assessment system [2] as exemplary human kinds. My research hypothesis is that after reading descriptions of their assigned personality type, the MBTI characteristics of participants will shift further in the direction of the poles predicted by this type.

Methods

Participants (n = 36) were divided into three equal groups. Each group took an online 94-question MBTI instrument [2] before and after a two-week period. Control group (1) did not receive questionnaire results, participants in group (2) were informed of their personality type, calculated from questionnaire answers, while group (3) was assigned a fixed type irrespective of questionnaire answers; both (2) and (3) received detailed descriptions of their type and were requested to read them. Agreement with assigned type was determined on a Likert scale using a post-reading quiz. I will compare differences between first and second testing in the number of responses in favour of either pole in all four MBTI characteristics for each group.

Expectations

Research is ongoing with partial results. I predict control group (1) will display standard variability between first and second testing, while experimental group (2) and (3) will see an increase in the number of answers predicted by their assigned personality type, e.g. an extroverted type will provide more extroverted answers on second assessment. It is also possible that participants, should they disagree with their assessment, determined using the Likert scale, may attempt to manipulate the questionnaire and provide answers they suppose go against the assigned type. Either outcome would indicate that systems of human classification, i.e. human kinds, affect how classified people understand themselves and will thus in effect change them and their consequent classification.

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Frequency of Idiomatic Word Groups in the Internet: A Comparative Language Study

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Context

As humans the primary instrument we use for communication is language. Not only we put words in a specific order, but we also group them in a certain way, and attribute a meaning to those groups – the meaning different from just a sum of meanings of the constitutive words. But the ways we use these groups of words differ from language to language. Especially, these differences become apparent when we look across distant groups of languages, such as Germanic and Slavic, for instance. How can we approach these differences scientifically? Is it possible to apply a quantitative approach to the matter?

Idea

The idea of this research is to perform a comparative search in the World Wide Web and create statistics describing how often an idiom or a common phrase appears in Google search when placed between quotation marks (fixed), and without quotation marks. In this study we compare two languages – Russian and English.

The empirical research that is undertaken here has a significant gap in terms of literature, primarily, because the WWW text corpus does not offer high credibility. Based on the data gathered, we aim at developing a theory of and answer the questions about the reliability of the WWW as a rich source of text and a basis for further empirical research.

Method

We search for groups of at least three words using Google Search Engine. If the words are parts of phrases or idioms, they yield a high number of hits if placed between quotation marks (“). We call the ratio between”word1 word2 word3” and word1 word2 word3 - *exclusiveness*. We then repeat the search with each word group after at least 24 hours, and accept the mean of the results, if they do not differ by more then 25%. If they do, we perform the third search, following the same procedure. If then, again, the results differ too much, we give up on that phrase - this is our criterion for reproducibility.

We investigate two languages in parallel, in a mixed regime.

From the hit numbers, we construct a diagram, with exclusiveness on the x- and number of hits of phrase parts on the y-axis.

Results

According to the previously conducted research, the number of hits and exclusiveness factor result in a scatter plot quite typical for each language in case of the comparison of English, French, German and Latin languages [1]. As it looks now, English and Latin appear quite special. The question is, whether only these two languages are special, and all other languages look the same, or not. The first hypothesis would be, that Russian will look like German and French, but different from English.

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The Recreating of Art Through Posing and Posting

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Introduction and Problem

Participation culture of visitors in museums has been studied from different perspectives, including the phenomenon of the museum selfie. This study examines the recreation of art (reproduction of the character's pose in front of the artwork) and the reasons behind on the example of the Austrian Gallery Belvedere.

In the social network Instagram we can find a lot of different types of selfies and photos with accounts' owners in the museum, but only some visitors try to copy works they are looking at. Why do they interact in this particular way with artworks and choose certain works more often than others?

Literature Research

Existing studies about museum selfies with imitating the pictures examine them as a process of meaning-making through embodiment [1], as a possibility to virtually touch and appropriate the artwork to raise visitor's social capital [2], to become associated with "something larger than themselves". [3] Still, they do not answer the question how visitors choose objects to interact with. The aim of this research was to define this call-to-action, hidden in the artworks: affordances for situated cognition.

Approach and Method

According to my hypothesis, a presence of a person and a clear composition with readable character's pose, a content of the artwork resonating with the visitor and the popularity of the work can be the affecting affordances. Also, I want to examine which artworks are chosen more often, and if awareness of existing examples of art recreating and social approval expressed in likes influence the decision.

The study uses quantitative and qualitative methods of netnography: collecting of open data in Instagram (posts, photos, comments and likes' amount) and in-depth interviews with subjects. Current sample contains 73 posts with location "Belvedere" shared during March and April 2019. Python library Pandas was used to quantitatively analyze the data and to define, which paintings were recreated more often and if the amount of likes in such posts is increased. Also 9 visitors were interviewed about their experience, associations, motives and feelings to clarify their motives to recreate the artworks.

Results and Perspectives

During the interviews composition, content and popularity of the artwork were confirmed as affecting affordances. More wide-known pictures, such as "The Kiss" and "Napoleon", were recreated more often; in average, art imitating did not receive more likes (which did not confirm the influence of social approval). The study can be continued with a larger number of interviews and using of graphical analysis of posts.

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Benefits of Music Education for Children with Autism Spectrum Disorder

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Autism spectrum disorder (ASD) is a range of neurological disorders characterized by difficulties with social cognition, verbal and non-verbal communication, repetitive behaviors and restricted interests. Autism and Asperger syndrome are the most common conditions on the spectrum. Many theories address deficiencies of ASD from cognitive perspective, e.g. theory of mind and weak central coherence theory. In contrast, theory of social motivation [1] suggests that it is a disrupted social interest that may cause impaired social skills. If so, such deficits could be reduced by encouraging appropriate social interactions.

Previous research has shown that specifically in the domain of music, ASD does not hinder the understanding of emotions as opposed to the social context [2]. Ockelford argues that the inherent structure of music reflects the features of the autistic mind as "music is typically supersaturated with far more repetition than is required for it to be coherent" [3]. This notion is supported by the remarkable musical talents of autistic individuals and their natural preference for music over speech and environmental noise [2].

In our project, we collect real-life data from thirteen pupils with ASD, who attend an inclusive music school together with their neurotypical peers. We use qualitative observational methods including video recordings of the individual and group music lessons, behavior evaluation scales and observation notes. The emphasis is put on the eye contact, focused attention, appropriate verbal and emotional responsiveness. We hypothesize that children with ASD show less social deficits in the inclusive environment where they can pursue their natural interest. We would also like to see if there is any positive dynamics in the communication skills development and transfer of learning.

Although the concepts of neurodiversity and inclusion remain controversial and there may be no universal theory of autism that would explain both social and non-social aspects of it, the studies of evidence-based practices can help recognize effective educational strategies for children with ASD.

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Functional Near-Infrared Spectroscopy Study of Improvisation in Professional Dancers: Do We Always Think of Others As We Dance?

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The present contribution, as part of a larger body of research concerning the transmission of emotions through dance, aims to investigate the differences between two distinct dimensions, or modes, of dance improvisation. In the first of these modes, the improvised dance is performed with a clear intention to communicate meaningful content to an audience. The second mode is characterized by the lack of such an explicit intention, allowing dancers to place a stronger focus on themselves and their immediate surroundings as they perform.

The specific research question is: Are there discernable differences in patterns of brain activity between situations in which a dancer performs with the specific intention to convey a certain (emotional) content to an audience, and scenarios in which the dancer improvises without necessarily wanting to transmit any specific kind of information to the viewer?

Brain regions of interest for this question are the medial prefrontal cortex (mPFC), which has been shown to respond to thinking of other people and their psychological states [1], as well as the right inferior frontal gyrus (rIFG), which is linked to affective empathy [2]. Activations in both areas are anticipated to be higher in the first mode of improvisation, as it is directed at communicating content to spectators, than in the second, which does not seem to require thinking of others.

In the experiment conducted, nine professional dancers, including performers and teachers of various styles, experienced in dance improvisation, were connected to a functional near-infrared spectroscopy (fNIRS) device to measure brain activity in mPFC and rIFG in three settings.

The first task was to express four different emotions through movement or dance in a way that a viewer could guess what emotion is being conveyed. Participants were given a 30 second planning phase and then were asked to perform.

In the second and third conditions, the task was to improvise. Dancers were told they could do anything they liked, and that they need not worry about communicating anything to another person. Both improvisation settings had two trials, but participants were given 30 seconds to plan for task 3, whereas in task 2, they were asked to improvise immediately.

Results will have implications for the conceptualization of dance improvisation as well as dance as a performing art more generally, and should provide orientation for possible future directions of research.

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