MEi:CogSci

Middle European
Interdisciplinary Master Programme
in Cognitive Science

Proceedings of the MEi:CogSci Conference 2015

Ljubljana, Slovenia

Editors:

Peter Hochenauer, Cornell Schreiber, Elisabeth Zimmermann

University of Vienna, Austria

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Published by:

Comenius University in Bratislava in June 2015

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The conference took place at the University of Ljubljana, on 18-20 June, 2015.

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Front Page Design:

Maria Marchante / Fransisca Tan (saCS Design Competition 2015)

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In cooperation with Slovenian society for cognitive science and student organization of Faculty of Education, University of Ljubljana.

ISBN 978-80-223-3876-9

Welcome!

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

welcome to the 9th MEi:CogSci Conference; for the second time we can enjoy the lively and inspiring atmosphere of Ljubljana.

We want to express our gratitude to the University of Ljubljana, particularly to the conference team: Toma Strle, Urban Kordeš, Olga Markič, Bruna Pikš, Lovro Tacol, Sabina Skubic, Julija Podbevšek, Maja Kapitler, Luka Železnik for organising and hosting the event, as well as the Faculty of Computer and Information Science for providing the conference location. The conference was organised in cooperation with the Slovenian Society for Cognitive Science.

Welcome to our invited speakers, Ivan Bratko (Ljubljana), who will open the conference with his keynote, Ulrich Ansorge (Vienna), Martin Takáč (Bratislava), and Thomas Wolf (Budapest). Thank you for joining us this year.

The organising team of Comenius University in Bratislava and the printing of these proceedings were supported by the grant 076UK-4/2013 from the Cultural and Educational Grant Agency (KEGA), of the Ministry of Education of the Slovak Republic. Thank you, Igor Farkaš, for organising this as well as the third publication of these proceedings under an ISBN number.

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

And last but not least it is you, Coxies, who make it happen. Your posters, talks, and initiatives will make the MEi:CogSci Conference 2015 an exciting and joyful event!

Thank you all for coming! Enjoy the 9th MEi:CogSci Conference!

Peter Hochenauer

Brigitte Römmer-Nossek

Cornell Schreiber

Elisabeth Zimmermann

Ninth Middle European Interdisciplinary Conference in Cognitive Science
University of Ljubljana, Slovenia
18-20 June, 2015

Middle European
Interdisciplinary Master Programme
in Cognitive Science

Thursday, June 18, 2015

13:00 – 15:00	Registration	
15:00 – 15:15	Welcome	
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	Gender Differences in Executive Functions in Children with Conduct Disorder *Tjaša Prelog*	Acquisition Of Slovene Adjective Inflection And Semantics *Maja Ljubič Pavalec*
	Measuring Direct Effect of cTBS Over Right DLPFC on Processing Cognitive-Emotional Tasks and its Efficiency as a Depression Treatment Over Time *Nina Majcen*	Using Clustering to Determine the Basic Structure of Natural Language *Tjaša Arčon*
	Effects of Humor and Laughter Group Therapy on People with Depressive Disorder *Dušanka Novakovič*	Natural Semantic Metalanguage Framework (NSM): A Novel Approach to Computational Modeling of Cognition and Emotions *Vladan Šutanovac*
16:30 – 17:00	COFFEEBREAK	
17:00 – 18:10	**Track A (Clinical II)**	**Track B (Language II)**
	Analysis of the Sleep Process in Patients after Stroke *Tina Kojadin*	How Ladylike Is a Ladybug? – Making Sense Of Noun-noun Compounds in Context *Tamara Irsa*
	Using cTBS for Better Rehabilitation after Stroke *Vid Govejšek*	Neural Correlates of Cross-linguistic Laryngeal Contrasts *Alastair Lawrence Brown*
	The Embodied Cognition Explored on a Case Study *Sabina Skubic*	Socioeconomic Status as a Factor in Second Language Acquisition *Nina Škrlj*
18:15 – 19:15	**Keynote:** Predicting Difficulty of Mental Tasks *Ivan Bratko (University of Ljubljana)*	
19:15	Reception	

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	Uptake Mechanisms of Pathologic Tau Protein *Blaž Svetic*	Effects of Visual Stimuli Characteristics to Eye Gaze Fixation Patterns and Information Gain in Children with Autism *Elena Cesnaite*
	Cognitive and Metacognitive Approaches to Mathematical Learning Disorder – A Case Study *Saša Škof*	Energy Efficiency and Novelty Processing in the Brain *Shahrzad Afroozeh*
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11:00 – 11:30	COFFEE BREAK	
11:30 – 13:00	**Track A (Higher Cognition I)**	**Track B (Categories and Perception)**
	Author's Expertise, Certainty in Expression, and Comprehensibility of Text as Factors in Forming of Epistemic Trust *Vladimír Barus*	Adaptation Duration Dissociates Category- and Image-specific Processes for Faces *Adriana Zbant*
	The Role of Audience Presence and Argumentation in Committing the Sunk Cost Fallacy *Ina Ho Yee Bauer*	Factors Influencing Our Food Perception *Simon Knez*
	(Testing) the Cultural Cognition Theory of Risk Perception *Lenka Kostovičová*	The Difference Between Categorization and Comparison in Metaphor Comprehension *Zdenko Kohút*

	Distribution of Information Under Conditions of Uncertainty Or What We Really Think About Wolves *Jana Kováčiková*	Cognitive Semantics, Categorical Perception and Brain Hemispheres *Vadim Kulikov*
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	Computational Micro-modeling of Appraisal Processes as Behavioral Modulators *Michael Palkovics*	Intrinsic and Extrinsic Motivation in Autonomous Agents *Igor Lacík*
	Music Emotions as Conceptual Acts? *Peter Rantaša*	Autopoietic Systems Theory within Hegelian Speculative Philosophy *Andrej Munda*
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	The Medium Is the Message: How Presentation Formats Help People Ask Better Questions *Charley Wu*	Guiding preschoolers' attention to feedbacks in an educational digital game *Yeon Joo Lee*
	Confrontation of Personal Belief with Technology: A Case Study of Size Recommendation Agents *Rahil Hosseini*	Gamification: Play and Solve *Amela Rakanović*
	How to try on Virtual Clothes? A Mental Imagery Perspective *Lidija Grujicic*	Cognitive Aspects of StarCraft 2 *Andrej Čičmanský*
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	The effect of Haptic Guidance on Motor Learning of rhythmic sequences *Matej Klobušník*	Critical Thinking as a Connecting Parameter Between Teaching Mathematics and World Perception *Eugénia Belková*
	How Does Breathing Affect Willpower? *Dominic Reichl*	Rethinking Materialism: An Outline of Integrative Science *Dalibor Jurášek*
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17:30 – 18:15	**Invited Talk:** What Happens in the Brain When We Talk about What We See? *Martin Takáč (Comenius University in Bratislava)*	
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MEi:CogSci Conference 2015,

Ljubljana, Slovenia

Invited Talks

Invited Talk

The Cutting Edge in Priming: How Priming of Attention Bridges the Gap Across Cinematic Cuts

Ulrich Ansorge
Faculty of Psychology,
University of Vienna,
Vienna, Austria

We investigated the conditions under which repeated visual information attracts attention and eye fixations in dynamically changing images. We hypothesized that human attention is primed for previously fixated image content whenever there is the (implicit or explicit) task to relate two subsequent images to each other. Such situations are ubiquitous in many everyday situations, including viewing series of photographs, edited (or cut) videos, imaging devices, or graphical user interfaces. In the first part, we will present data from a series of image recognition experiments where human observers made explicit decisions about the familiarity of repeated vs. novel images. The collected eye tracking data showed that under recognition conditions, participants showed a pronounced bias for previously presented and fixated image content. Moreover, recognition crucially depended on these repeated fixations. In the second part, we discuss results from our experiments with edited videos. Here, we showed our participants two videos on the same screen that frequently contained cuts at the same time. Crucially, the videos randomly switched or kept their positions at the time of the cuts and participants had to track and keep their gaze on only one of the movies (and ignore the other). Using reaction times and accuracy measures we were able to show that participants were significantly better in this task when the visual similarity of the two images separated by the cut was high than when it was low. In the final part, we summarize our findings and discuss the role of repeated visual information for the guidance of attention and eye movements in dynamically changing images in relation to previous research with more strongly constrained stimuli. We also outline our efforts in developing a flexible and universal model of visual attention and gaze control in videos based on our experimental results.

Invited Talk

Predicting Difficulty of Mental Tasks

Ivan Bratko
Faculty of Computer and Information Science,
University of Ljubljana,
Ljubljana, Slovenia

We consider the question of predicting how difficult will a given mental task be for a human? For example, how hard will it be for a student to solve a given mathematical problem, or how difficult is it for a chess player to play the best move in a given chess position? Can the difficulty for a human be assessed automatically by computer? Such automated estimates of difficulty would be useful in computer aided tutoring systems to select appropriate exercises for a student, not too easy and not too hard; or in computer game playing, to make a move that might not be objectively the best, but it will be the most difficult for the human opponent to answer.

In this talk, results will be presented from a case study in difficulty in chess problem solving. The experiments included human's eye tracking while solving problems. The study aimed at the following research questions:

- How good are human experts at estimating the difficulty of problems?
- How can the difficulty for a human be assessed automatically by a computer?
- In human problem solving, which component is more important: general knowledge about the problem domain, or the skill of searching among many concrete alternative paths towards a solution.

Invited Talk

What Happens in the Brain When We Talk about What We See?

Martin Takáč
Faculty of Mathematics, Physics and Informatics,
Comenius University,
Bratislava, Slovakia

How do we use language to talk about our experience in the world? This involves converting rich sensory/motor representations of the world into high-level symbolic representations. How this happens is largely an open question in cognitive science, because language and sensorimotor processing are currently studied in separate disciplines: linguistics and sensorimotor neuroscience. In this talk I will claim that these disciplines are deeply connected, because the syntax of a sentence reporting a concrete episode in the world directly describes the sensorimotor routine through which the episode was perceived. I will briefly present several computational models of the brain mechanisms involved in converting sensorimotor representations of episodes into language. Besides providing deeper theoretical insights, this research can lead to more robust brain-insipred natural language processing applications.

Invited Talk

Joint Action and Music in Interpersonal Coordination

Thomas Wolf
Department of Cognitive Science,
Central European University in Budapest,
Budapest, Hungary

There is a consensus among social cognition researchers that one-person-one-computer paradigms are not a sufficient basis for studying social phenomena [1]. Effects of task co-representation, for example, can only be observed in Social Simon tasks, in which two participants perform individual tasks while sitting next to each other [2]. Some social phenomena may even require experiments testing larger groups of participants at the same time [3]. In many cases, however, introducing a social setting in experiments results in a tradeoff between ecological validity and experimental control. In addressing this issue, D'Ausilio et al. [1] argue that music provides an ideal framework for ecologically valid yet controllable paradigms to investigate interpersonal coordination in a social context. And indeed, the joint action literature has been enriched by successful studies using music paradigms.

In the quite extensive body of tapping literature [4], researchers have been focusing on the temporal coordination of participants who are tapping their fingers. For example, Fairhurst et al. generated sufficient data to model the adaptation behavior of participants into a virtual adaptive tapping partner [5]. And Loehr et al. [6] designed an experiment to test whether ensemble musicians monitor the joint outcome in addition to the outcomes of their individual actions. Specifically, the fact that changes in the harmony between two voices only occur in the joint outcome enabled the researchers to use feedback-related negativity in the EEG signal of two duetting pianists to provide evidence for the monitoring of the joint outcome in addition to the monitoring of the individual outcomes.

In ongoing experiments, we are currently building upon this previous literature to investigate two aspects of how joint action partners represent outcomes in joint action situations: First, we are interested in whether the jointness of the outcome representation can be influenced by beliefs about the intention of the composer. Is it the case that interacting partners put more emphasis on the joint outcome representation when they believe that their individual melodies were composed to be played together than when they believe that their individual melodies were randomly matched from different pieces?

In the second line of research, we are investigating the possibility that joint outcome representations can vary in the degree of their completeness, as well as the possibility that they can also differ among interaction partners – both of which possibilities may have important effects upon interpersonal coordination. Which aspects of the joint outcome are represented to facilitate coordination? According to the tapping literature, rhythm and tempo should suffice to reach acceptable performance levels in the temporal domain. Yet, in line with motor theories involving internal models, we should see further facilitation when information is represented that is useful to modeling the

other's movements, such as her finger sequence or the distal effect of her fingering, i.e. the pitch sequence.

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[2] Sebanz, N., Knoblich, G., & Prinz, W. (2003). Representing others' actions: just like one's own?. Cognition, 88(3), B11-B21.
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Workshops

Pre-Conference Workshop

HOW:EEG

Laboratory for Cognitive Neuroscience, Dept. of Neurology, University of Ljubljana

During an intensive 3-day course 24 participants will receive in-depth theoretical and practical training in the different research applications of EEG in cognitive science and neuroscience. In addition to theoretical lectures, each participant will be instructed in EEG recording methodology by conducting a research-oriented EEG experiment in groups of three participants. Recording subjects will be provided by the organisers. The entire last day will be devoted to hands-on EEG analysis of the gathered data with the BrainVision Analyzer 2 software package. Participants (two per PC workstation) will be guided through the basics of EEG analysis: Artifact rejection, Ocular artifact correction, Filtering, Event Related Potentials, Spectral Analysis and more. The workshop is intended for beginners and complete novices in EEG methodology but intermediate users will find it informative as well.

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saCS Workshop

Student Association for Cognitive Science

http://meisacs.wordpress.com, meicogsci@gmail.com

In a nutshell: Let's grow this study program into something bigger than just academic skills & join us at the workshop if you care to:

- know what projects we have initiated so far,
- get to know students from other generations/countries/cultures/...,
- exchange experiences in order to prepare for your mobility term, thesis, etc.,
- brainstorm for new projects ideas (within the student association),
- simply chat while you munch cookies and slurp juices with us,
- and much more.

Whether you just want to listen in on what's going on, seek guidance for realising one specific idea, or stay tuned for a more long-lasting involvement: Our list of achievements grows with every single contribution and allows to look back at delicious networking picnics, design competitions that resulted in awesome print products, summer seminars that exemplary concluded with last years first Vienna MEiCogSci Guide, and the like. We are excited to mingle and meet new faces!

Post-Conference Workshop

First-Person Inquiry

Urban Kordeš, Olga Markič & Ioana Popa

The study of lived experience was for a long time considered a bad career move, but recently this situation seems to be changing. There seems to be a growing interest and correspondingly a growing body of research in the field of empirical phenomenology (or first-person inquiry). This rise in interest seems to have caught the CogSci community.

The workshop will begin with the lecture, covering some history, the recent development, basic epistemological issues and methodological solutions of this area of research. Afterwards, a selection of most used and/or most promising research techniques, currently used for research of lived human experience, will be introduced. Time and enthusiasm permitting, we will try some of the techniques. The workshop will end with a short disposition and discussion on the possibilities of use of introspection as a technique for researching consciousness. The last part is especially important for those, intending to take up a phenomenological project within the mobility semester in Ljubljana.

MEi:CogSci Conference 2015,

Ljubljana, Slovenia

Talks

Energy Efficiency and Novelty Processing in the Brain

Shahrzad Afroozeh
University of Vienna,
Vienna, Austria

Energy efficiency has been studied extensively in the brain. Brain structure, connectome, has been specifically favored due to its many interesting features that support energy efficiency. Sparse coding [1], elimination of redundant input, and different interconnectivity degrees in different parts of the brain are all examples of energy efficiency. In addition to physical manifestations of energy efficiency, dynamic processes that operate on and maintain these structures should be identified for a complete understanding of brain functions.

Cerebral blood flow provides the neurons with what is needed for continued activation. It has been shown that there is a correlation between blood flow and activation of neurons [2]. Functional MRI uses one type of these correlations as the basis for its measurements. Despite the extensive effort that has been put into functional mapping of the human brain, a complete map has eluded our grasp until now [3].

We argue that to understand the dynamic processes that preserve energy efficiency, neural network and vascular network should be studied in combination. Since changes in blood flow are costly, this constraint leads to having local areas of activation in different parts of the brain. Although the structure of these areas stay similar, their location might change based on the retrieved information and available brain areas.

We propose that novel stimuli processing is a unique opportunity to study these processes. As a result of its novelty, localized processing of novel stimuli is problematic. This difficulty provides us with opportunities to observe and study the coupling of neural and vascular networks in localization of activations for future processing. Coupling of information flow (neural network) and energy flow (blood flow) leads to localization of activations during continued brain processes. Study of these two networks together may shed some light on understanding the neurodynamics of the brain.

References

[1] P Földiák and M Young, "Sparse Coding in the Primate Cortex," The Handbook of Brain Theory and Neural Networks, vol. 1, pp. 1064-1068, 1995.

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Using Clustering to Determine the Basic Structure of Natural Language

Tjaša Arčon
University of Ljubljana,
Ljubljana, Slovenia

The identification of principal characteristics of language and the formation of grammatical concepts has a long linguistic tradition. Old Greeks were the first Europeans to study a language systematically and classify words into categories [1].Throughout history the practice of classifying words for the purpose of grammatical description has been constantly changing due to diverse linguistic traditions and unique characteristics of individual languages. However, Greco-Roman tradition nowadays still forms the foundation for determining and describing word classes in most languages [2], even if such classification is often problematic. In this way the types of word classes and the classification of words are under the influence of historically established linguistic concepts and are not grounded solely in the structure and organization of natural language. The aim of this project is to disregard the established grammatical concepts and describe the principal characteristics of natural language on the basis of syntactic, morphological and semantic similarity of words in a text corpus. Slovene corpora will be used as a basis for the analysis. In order to determine the principal characteristics of language by focusing exclusively on natural language similarity with no additional linguistic knowledge provided, unsupervised machine learning will be used. Different methods of clustering such as agglomerative hierarchical clustering, K-means partitioning clustering, DBSCAN density clustering, etc. will be applied to classify words into clusters on the basis of their similarity. The aim of clustering is to group objects in such a way that there is maximal similarity within groups, but minimal similarity between groups [3]. Distributional or syntactic, metaphorical and semantic features of individual words appearing in corpora will be used as similarity measures. The calculated distance between words will serve as the input into the clustering process. Several combinations of different criteria will be tested. Python programming language together with several useful libraries (NLTK, scikit-learn and Orange) will be employed to determine similarity measures and implement clustering. The resultant word clusters will be compared to traditional word categorizations and serve as the basis for the interpretation of the principal characteristics of language. During the process of clustering it will also be established which aspects of similarity are most informative and which clustering methods most appropriate to determine the basic structure of natural language.

References

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Author's Expertise, Certainty in Expression, and Comprehensibility of Text as Factors in Forming of Epistemic Trust

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Bratislava, Slovakia

Introduction

Living in the Information Age that followed the Digital Revolution provides us with at least as many challenges as it does with benefits. Every day we are flooded with "junk" information, as the society produces more information than necessary for normal functioning, with most information of low quality (email spam is a typical example, with conspiracy theories and pseudoscience following right after). This is a new type of pollution, called information smog [1]. When seeking well-being for self and others using knowledge granted by a system of freely-accessible information, it seems imperative to be able to properly navigate it in terms of credibility of its contents.

Epistemic trust is a potentially quantifiable attitude towards knowledge meant to serve this purpose, a tendency to attribute information with a certain degree of truth value on a spectrum from complete belief to complete disbelief.

Methods

We set out to investigate several factors that may bear influence on the process of attitude formation in terms of epistemic trust towards a piece of information (a text on a specific topic in our case). These are: expertise of the author (text author descriptions), author's certainty in expression regarding presented information, and comprehensibility. Using an 2x2x2 experimental framework, each participant will be exposed to two excerpts with varying levels of the focal variables (e.g. an easily comprehensible text of an expert that expresses absolute certainty in his statements, an easily comprehensible text of a non-expert that expresses his certainty in percentages, etc.) . Participants will be randomly assigned to the experimental conditions, and rate the texts based on their perceived credibility and trust. Subsequently, we will evaluate the amount of influence of individual factors on the decisions of participants regarding the truth values of provided texts. We are expecting author's expertise on the subject discussed, high author's certainty in expression regarding his claims and high comprehensibility of text to increase epistemic trust.

References

[1] BEZROUKOV, N., Information Overload - How Digital Devices Deprive Brain of Needed Downtime, available online as of 15.5.2015 at http://www.softpanorama.org/Social/overload.shtml

The Role of Audience Presence and Argumentation in Committing the Sunk Cost Fallacy

Ina Ho Yee Bauer
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Budapest, Hungary

Committing a Sunk Cost Fallacy (SCF) consists in basing the decision whether to invest in a project or activity on past decisions rather than on benefits expected in the future. Why and when do people commit the SCF? Behavioural economists have attempted to answer these questions hypothesizing that people commit the fallacy because of loss aversion or concerns about wastefulness [1]. This study aims to contribute to the study of social factors and psychological mechanisms at the origin of the fallacy.

An experiment is conducted to test whether the presence of an experimenter is sufficient to create an audience effect manifested by a greater occurrence of the SCF. The prediction is that the need to justify one's choices to an audience will increase the SCF. The hypothesis is that people who feel a need for justification will fall prey of a confirmation bias because they have to find reasons for their choices. They will therefore put too much weight on the reasons for their initial decision and too little on the newly acquired information. Reasoning for an audience is not a cognitive process which favors processing of new information and updating of beliefs [2].

In an adaptation of a scenario by Staw participants have to solve a financial decision case [3]. For the first decision participants in the role of managers have to assign 10 million dollars to one of two company divisions. For the second decision they receive updated financial information depicting negative consequences and have to decide how to divide 20 million dollars among the same two divisions. The SCF is measured by the propensity in the second round of decision-making to invest in the same department as in the first round. In a between-subject design participants either anonymously submit their decisions in a voting box (anonymous condition) or explain their decisions to the experimenter (audience condition). The prediction is that the SCF will be significantly higher in the audience condition than in the anonymous condition in which self-justification is unnecessary.

Results could provide insights into the psychological mechanisms and social contexts that lead to committing the SCF and therefore offer essential insights for decision-making strategies in management.

Acknowledgments
Special thanks to my supervisors, C. Heintz and C. Eisenegger, and the CEU for supporting this project.

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Critical Thinking as a Connecting Parameter Between Teaching Mathematics and World Perception

Eugénia Belková
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Critical thinking could be considered an investigating tool for the information age we live in. Without it, it is hard if not impossible to make sense of all the data entering our lives daily. As educational system should prepare us for our future, the author believes that critical thinking should be one of the main educational goals.

One of the ways of teaching young students to think critically is teaching mathematics towards the development of divergent thinking. "Divergent thinking is a thought process or method used to generate creative ideas by exploring many possible solutions."[1] Mathematics, however, is not considered to be an attractive studying option and the author proposes a question: What if the negative relationship to mathematics comes from lack of understanding of why mathematics should be studied? Students often do not see any connection between this subject and the world they live in, therefore they find it useless. If mathematics were taught in a way that could help students solve real-life situations, develop critical thinking and emotional intelligence, would students' general opinion change?

The goal of this research is to examine students' relationship to mathematics and if it could be changed positively if mathematics were taught in a way to prepare students for the future. Data comes from 2 main groups of Grammar school students (age 15-18): one of the groups studies at an institution focused on humanity studies, the second group of students comes from a mathematical background. Data is collected in a form of short questionnaire that is handed to each student at the beginning of the whole experiment and at the end of it. Between filling in the required information students are given 2 math lessons. The first lesson is dedicated to Problem solving - "A problem in mathematics is defined as a situation in which the solver perceives the situation as a problem and accepts the challenge of solving it but does not have a previously known strategy to do so, or is unable to recall such a strategy." [2] The author believes that such activities can lead to development of both: critical thinking and emotional intelligence, if there is a small reflection included after each brain exercise. Consecutive lesson draws students into Real-world mathematical project which is meant to make students more involved in the world they live in and to think about the connections among distinct world components [3]. The results show not only differences between students' attitudes from the beginning and the end of the research, but they are also a useful comparison between 2 types of educational systems.

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Probing the Strength of Infants' Preference for Helpers over Hinderers: Two Replication Attempts of Hamlin & Wynn (2011)

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Numerous studies have shown that preverbal infants are sensitive to the difference between helping and hindering (e.g., Hamlin & Wynn, 2011). Additionally, 19-months-old toddlers are more likely to give a treat to a puppet helping to open a box; and they are more willing to take away a treat from the puppet that hinders this process (Hamlin et al., 2013).

The methodological challenge is to assess whether infants' and toddlers' preferences are the results of the actor's intention or his action. In other words, do they prefer the helper because his intention is good or because he is enabling a good outcome?
Therefore, the present study provides a paradigm, based on Hamlin and Wynn (2011), in which 9- month old, fully developed infants are presented with performance of three puppets- the Protagonist, the Helper and the Hinderer. The Protagonist was trying to open the box with colorful rattle inside and was either helped by the Helper or hindered the Hinderer. At the manual choice test, infants were asked to choose one of the presented puppets and encouraged to grab one of them.

The study was replicated by 2 independent groups of researcher. In both replications 24 infants (9 month old full term) participated in each study. At baseline, the first study did not replicate the findings of Hamlin and Wynn (2011). Toddlers did not show a preference for either the helper or the hinderer ($p=0.44$). In our controlled condition, in which helping did not result in a positive outcome, again children did not prefer the helper over the hinderer ($p=0.70$). The second replication used slightly different procedure, however the results were similar. Group 2 found, that infants did not significantly prefer the Helper over the Hinderer (12 infants out of 24 did so: $p = 1.00$, binomial test).

This study casts doubts about an innate moral core. Alternatively, we hypothesize that what toddlers really prefer is a puppet that imitates the actions of the puppet who needs help.

Acknowledgements
I want to thank to all members of Cognitive Development Center of Central European University for giving me the opportunity to be part of the project.

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Functional Connectivity of the Dorsal and Ventral Frontoparietal Attentional Systems

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The ability to sustain attention over long time periods like while driving a car on the highway or controlling air traffic is called vigilance. According to the literature [1] two systems support attentional control: a bilateral dorsal and a right lateralized ventral frontoparietal attentional system. The dorsal system gets activated during top-down (voluntary) attention, hence, if a person focuses and searches the environment for relevant stimuli, based on internal goals or expectations. The ventral system is mediated by bottom-up sensory-guided shift of attention, according to behaviorally relevant stimuli that appear outside of the focus of attention. The core regions of the dorsal frontoparietal system are the frontal eye field and the intraparietal sulcus. The ventral system consists of the ventral frontal cortex and the temporoparietal junction. It has been suggested that the temporoparietal junction might act as a circuit breaker for the activation of the dorsal system. Therefore, activity of the ventral system can suppress the activation of the dorsal system and disrupt the focused attention, if a behaviorally relevant stimulus suddenly appears. Nevertheless, the role of the temporoparietal junction as a circuit is still under debate [2].

Functional connectivity enables the definition functional brain systems, such as the attentional systems, if for example graph theory is applied to the analysis of fMRI-data. Functional connectivity can be described as the cross-correlation of simultaneous activation of brain areas and their time series. Graph theory is a mathematical theory to study networks. A real-world network, like that of the brain, is then represented as a graph. The analysis of these graphs can show how a network is organized and how efficient networks communicate with each other (e.g.) [3].

23 subjects performed a vigilance task while brain activity was scanned using fMRI in which they had to detect either small or large changes in brightness of two colored dots that where displayed on a screen. Aim of the master thesis will be to analyze the fMRI-data in order to establish functional connectivity profiles of both systems. In addition by applying graph theory to the analysis, system components should be defined more thoroughly and reveal how both systems might interact in order to control attentional processes.

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Neural Correlates of Cross-linguistic Laryngeal Contrasts

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The aim of this research is to further our understanding of how the brain processes sound structures of speech through testing the phonological theory of underspecification (UT). This involves examination of the event-related potentials of a minimally contrastive pair of phonemes across a sample of native German and Croatian speakers in an oddball paradigm.

A speaker's phonology discriminates contrastive and varied speech sounds from the acoustic signal of our environment. A sound segment can be categorised by features such as manner and place of articulation, as well as the laryngeal specification generally referred to as voicing. UT claims that the brain doesn't process all features available in the acoustic signal, rather only specifying those relevant to that language's phonology [1].

Categorical discrimination of phonemes along a temporal dimension called voice onset time (VOT) is the one factor distinguishing words such as 'tart' from 'dart'. VOT is defined as the time difference between the articulatory release of a consonant in the mouth and the activation of vocal fold vibration in the larynx. In Germanic languages VOT is very long, which has led researchers to claim [spread glottis] as the feature specifying aspiration [2]. For short VOT language families such as Slavic, however, [voice] is the feature that is specified.

In order to test the theoretical assumptions of UT for laryngeal contrasts, I am designing an oddball experiment in search of mismatch negativity (MMN, [3]). Deviant stimuli differ minimally from the standards along the dimension of VOT. This difference is in turn responsible for categorical differentiation of [d] and [t] sounds. If the predictions of UT are correct, then we should expect to find asymmetries between the MMN between short VOT [d] and long VOT [t] stimuli within each language. Further, if the predictions of [2] are also correct, and Germanic differs from Slavic phonologies in their processing of feature contrasts, then we should find exactly the opposite distribution of MMN between speakers of the two languages.

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Effects of Visual Stimuli Characteristics to Eye Gaze Fixation Patterns and Information Gain in Children with Autism

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Introduction

According to DSM-5 [1], autism spectrum disorder (ASD) is defined as a neurodevelopmental disorder featuring qualitative impairment in social interactions, verbal and non-verbal communication with restricted and repetitive patterns of behaviour and interests. In previous studies, stimuli triggered by a computer screen were used in order to capture and reveal eye gaze fixation patterns. Such eye-tracking studies investigate whether individuals with ASD tend to focus less on communicator's eyes, but more to the mouth region and to the objects in a background as compared to healthy controls. Inconsistent findings (e.g. [2], [3]) suggest that this could highly depend on the participants' age and the nature of stimuli that were used. It was found that abnormal eye gaze fixation patterns in participants with ASD occurred only to ecological stimuli (movies and pictures with human actors), but appeared to be normal to less realistic depictions, such as cartoons [2]. However, it remains unknown if a person with ASD, who shows a normal response to stimuli, can make any use of the information available.

Research Design

In our study we present participants with series of human-actor and cartoon situations seen in a video. Two groups will be compared: children with ASD and healthy controls, matched by age and sex. Participants for the control group will be selected from a local community, screened by Bayley III and the Autism Screening Questionnaire. Children with ASD will be recruited from an already running programme of rehabilitation. The goal of this study is (1) to assess whether there are any eye-gaze fixation atypicalities in children with ASD and (2) to examine whether these children are able to make any use of the information available. In order to reach the first goal, data will be collected by using an eye-tracker and two groups will be compared by applying two-way ANOVA. The second goal of the study will be assessed by asking video-related questions.

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Cognitive Aspects of StarCraft 2

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In this study author tried to determine how is obtained expertise during playing strategy video game StarCraft 2 in order to verify and expand results of Thompson, Blair, Chen, Henrey [1]. Since importance of variables is not constant across levels of expertise [1] author is using machine learning tools for data mining to define them.

StarCraft 2 is real-time strategy video game that is played at astonishing speed. Players select one of three races and to be successful in game he must command his units, prepare defenses, build base expansions to gather more resources while build bigger armies to outmanoeuvre his opponent. Players experience involves rapid mental and physical coordination, strategic thinking on the fly, and planning. The GUI of the game environment creates a game of incomplete information where efficiently distributing one's attention is paramount. Optimized attention to the environment allows for proper navigation and the coordination of global and local information for real-time decision making. Playing RTS games stresses rapid and simultaneous maintenance, assessment, and coordination between multiple information and action sources was sufficient to improve cognitive flexibility [3].

Data for this study was obtained by analyzing the replay files of game expansion set SC2: Heart of the Swarm. Every replay file creates a lots of behavioral data – most of the games contained more than 1000 moves per player. Using measures of attentional (etc. perception-action-cycles), cognitive-motor (hotkey usage), and perceptual processing of players at 7 different levels of expertise author can show that variable importance is not static across these levels. Author is incorporating fact that, each of playable races have unique design, so they are played differently and produce different kinds of data. This is done by creating statistical classificators to distinguish players from different leagues for each race. Author tries to introduce at least two new types of variables that focuses on ability to divide task into sub-tasks in order to expand previous work in field. Furthermore author is introducing different approach of computing variables than was used in previous researches [1]. Author is applying his previous work in field, game experience and research of predecessor of StarCraft 2 – StarCraft: Brood War [2]. In results author assumes to confirm previous results from this field of study, expand it and introduce new separate results for each playable race. If study will be successful then author is planning to release results and parser for classifier in form of web application, so player community can compare their own replays with these results.

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First-person Comparison Between Autobiographical and Orally Transmitted Memories

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In discussing the 1947 rebellion in the Zafimaniry village in Madagascar, cultural anthropologist Maurice E. Bloch [1] observed that children who have not been involved in the events of that period but who have had these events narrated to them by their elders, appear to ´remember´ these events in a qualitatively similar manner to the elders who have actually experienced them. Specifically, Bloch argues that the hearers of the narratives engage in an imaginative play of "what it was like" thus forming a mental mode which contains both imagery and emotion. In this way, the form, if not necessarily the content, of autobiographical and ´transmitted ´memories is alike.

In a related field of research in psychology, imagination has been implicated in the formation of false memories. One study has found that imagining performing a simple action can lead to false remembrance of having performed that action [2]. The authors propose that this may be because imagination and the intention to perform an action involve similar cognitive functions. Similarly, another study has demonstrated that imagination is also involved in the formation of more complex false memories involving childhood events [3]. Moreover, both of these studies indicate that while there are some qualitative differences between true and false memories, these differences disappear or diminish as the frequency of imaginings increases.

Transmitted memories are not false memories, however it is not unreasonable to propose that the process of their formation is similar. Namely, the aid of imagination during the encoding stage and the repeated recollection of that imaginary scene may lead to transmitted memories being experienced in a qualitatively similar way to autobiographical memories. Thus, the present study will examine the experience of autobiographical and orally transmitted memories for the same events. The focus of events will be from the war in former Yugoslavia in the 1990s.

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Using cTBS for Better Rehabilitation after Stroke

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Stroke is a big problem of ageing population, and it became the second most common cause of death in western society. Of people suffering from stroke, up to 30% experiencing it, become disabled [1]. Until very recently the management of most patients with stroke remained primarily focused on secondary prevention and rehabilitation, and any procedure that would allow faster recovery, and/or gain functional independence, would have major benefits for the whole society.

In last few years, research was mostly done with inhibiting contra-lesional hemisphere, and exciting the damaged sites [1]. This is done with repetitive transcranial magnetic stimulation rTMS, which can excite or inhibit brain tissue through magnetic induction, based on the protocol used. Usually the hypothesis was that stimulation facilitates the stroke hemisphere and initiates changes in synaptic plasticity that improve therapy by enhancing learning-related changes in synaptic connections that are required for reacquisition of skills [3].

Hoa summarized first few years of research and showed that the effect of rTMS inhibition on undamaged sites gives variable results, and little evidence of curing damaged tissue in the brain [2]. Consequently recent work focused on new approaches, and one of them suggests that rTMS could improve learning through a mechanism that involves the phenomenon of "homeostatic" plasticity. This suggests that the ease of producing long term potentiation/depression (LTD/LTP) depends on activity in that area before the sessions. If there is history of low activity, then it is harder to produce LTD, and vice versa for LTP [3].

At the Neurological clinic in Ljubljana, we will design an experiment where our aim is to compare the effects of continuous theta burst stimulation (a variety of rTMS) as an addition to standard procedures on recovery. One group of stroke patients will receive cTBS of the damaged area and one in contra-lesional area in the unaffected hemisphere. Results of these two groups will be compared with those that will receive sham stimulation. CTBS is a form of inhibitory rTMS, with a longer lasting effect that can last up to 1 hour, which is a great time window for a standard procedures of recovery after stroke.

We will compare the gained results with standard measurements used for patients after stroke during longer period of time, like Action Research Arm Test (ARAT) and Jebsen–Taylor Test (JTT) which will be the primary outcome measures and are all standard measurements of recovery in stroke patients. Grip and pinch-grip dynamometry will be the secondary outcome measures.

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How to try on Virtual Clothes? A Mental Imagery Perspective

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Clothes are experienced goods, for which information about important attributes can only be recalled from previous direct sensory interaction. The inherent lack of product interaction and the associated problem of product fit in the virtual world are resolved by enhancing mental imagery through adequate tactile and trial information.

In the pilot study, we tested factors influencing the choice of size in a virtual shop, when a number of issues associated with the size chart, the presentation of apparel, and the role of experience became evident. In short, a low rate of consulting and even lower rate of accepting size recommendations was observed, lack of trust in size charts was reported, whereas the image, rotate, and zoom-in were most frequently used options, all placing the experience, mental imagery and the notion of fit as important factors into perspective. Finally, we assumed the high perceived risk was due to the underperformance of the online store to appropriately represent product information for an informed judgment.

Mechanisms underlying mental imagery are effortful processes that reactivate the modality-specific memory for the purpose of solving a (difficult) task [1] and resemble those of the grounded cognition theory. The memory and motivation, both closely related to imagery [2], play a crucial role for the virtual product experience. The question is how to evoke mental imagery to recreate actual perceptual experience relevant for the notion of fit?
The dual coding theory postulates that a nonverbal and a verbal system are independent, yet jointly contribute to cognition [2]. Previous e-retail research found that verbal information about the product had stronger impact than picture size on mental imagery, and that people perceived more information from one large photo than several large ones, due to lack of visual fluency in multiple presentation. Preference for verbal, i.e. nonverbal information and the resulting impact on mental imagery have also been proven for verbalizers/visualizers respectively. Picture and text interact to different degrees depending on their concreteness, which evokes different number but also vividness and clarity of mental imagery [3].

I argue that the interplay of nonverbal and verbal presentation plays a key role in shaping the mental imagery, the perceived cognitive effort/fit to provide informed judgment. This study shall contribute to the limited research on fit of virtual clothes from the mental imagery perspective.

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The Feathered Politician and Evolution of Intelligence

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Common ravens (Corvus corax) are a large bird species found all over the Northern Hemisphere. From a cognitive perspective, this species is remarkably similar to humans, not only in its ability for abstract reasoning and tool use, but also in its complex and nuanced social life. Ravens live in groups with well-structured hierarchies. To rise in ranks, outcompete their conspecifics, and reach their goals, they essentially engage in politics, just like we do: they build coalitions, maintain valuable friendships, hold grudges, exchange favors, understand and sabotage others' relationships, and practice the art of deception [1].

Such behavior, that requires complex cognitive skills, has been observed in many non-human species, most notably non-human primates and corvids (a family of birds which includes crows and ravens). These species seem to have many cognitive features in common, among others: episodic memory, abstract reasoning, planning, perspective taking, and the ability of flexible decision making. However, the environmental pressures leading to the convergent evolution of such features are yet to be established and remain an open research question.

One of the possible answers to this question is The Social Intelligence Hypothesis (SIH), which proposes that evolution of the brain is primarily driven by a species' complex social life, and not the ecological factors of its environment [2]. Though the consensus on a rigorous definition of what exactly constitutes a 'complex social life' still hasn't been reached, most definitions have one feature in common: competition with other members of the same species. Two major predictions are made by the SIH about more socially competent ('intelligent') individuals: that they have more reproductive success and that they perform better at cognitive tasks. Additionally, SIH predicts that a species' brain size should be positively correlated with its social complexity. These predictions match what is known about different species and their cognitive capacities quite well.

Our research is firmly grounded in the framework of the SIH: we are hoping to determine animals' cognitive abilities, and the origins of such abilities, by studying their social life. For the most part, a species' social life and its properties cannot be observed directly, we can only deduce them through observations of that species' social interactions. We are therefore conducting various studies on groups of common ravens, both observational (to understand their social structures) as well as experimental (to understand their cognitive abilities, especially in the social domain). Our current work, its theoretical foundations, and some of our recent findings will be presented, along with various research methods.

Acknowledgements
I would like to express my sincere thanks to prof. Thomas Bugnyar of the Cognitive Biology department at the University of Vienna for his help and his mentorship.

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Learning Environmental Probabilities in Changing Worlds

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In this research project, we want to investigate human learning in changing environments. Change is a fundamental aspect of environments relevant to human cognition. Some kinds of change, however, are more typical across natural environments than others. When human observers make inferences about the identity of objects given sets of observations, for example, changes in object base rates arguably occur more frequently than changes in object properties. In the more formal language of Bayesian statistics, the former correspond to changes in the prior probabilities of objects, while the latter correspond to changes in the likelihoods of objects having a particular feature value, conditioned on object identity. Given the adaptive nature of cognition, we believe these differences to be reflected in human learning and have devised an experiment to test for this.

Our experiment is split into two sessions. In the first session, all subjects learn the probabilities of a single baseline environment. For subjects to experience probabilities in an ecologically valid way, the environment's statistical structure is conveyed through experience-based learning with natural sampling from environmental probabilities [1]. Each trial, a stimulus object (a patient, a biological organism, or an abstract shape, depending on the cover story told) is randomly generated from the environment's prior probabilities and likelihoods. Subjects are then given cues (symptoms, object features) and are asked to predict the unobserved object identity (disease, category). After each trial, subjects receive feedback as to whether their prediction was correct. This process is repeated until they consistently categorize each object as the most probable stimulus, given that object's features.

In the second session, subjects are randomly assigned to one of two conditions. In the 'prior-change' condition (and in the 'likelihood-change' condition, respectively) subjects re-learn environmental probabilities when only prior probabilities (or likelihoods) have changed. In choosing environmental probabilities, we use computer optimization methods to guarantee that the two environments are similarly different from the baseline environment. We thereby control for the overall amount of change while only varying type of change. The learning process is identical to the first session and terminates upon reaching criterion performance. Our main prediction is that subjects will be faster in reaching the learning criterion in the prior condition vs. in the likelihood condition.

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Confrontation of Personal Belief with Technology: A case study of Size Recommendation Agents

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Using explicit or implicit preference elicitation methods, Online-shop recommendation agents (RA) reduce consumers search effort by suggesting a small set of items with preferred features from numerous options. Technology Acceptance Model (TAM) has been widely used to model adoption of RAs which considers perceived usefulness and perceived ease-of-use as the most influential factors [1]. Nevertheless there are still more influential factors that are yet to be studied.

Due to lack of tactile experience in online shops the degree of information asymmetry between the customers and product performance, e.g. size, becomes higher which results in perceived risk of online shopping and its consequences. To enhance risk handling process size-recommendation agents (SRA) have been recently introduced to suggest a size with the highest likelihood of fittedness based on the customer's' measurements.

We argue that SRA has distinctive features from other common RAs that provide an opportunity to study other dimensions of technology adaptation, namely confrontation of personal belief with technology. First they are not used to reduce search effort, instead customers actively use them to reduce perceived risk directly. Second customers have confirmation bias against the suggestion; body size is very central to self-image and through many shopping experiences and social feedback a strong opinion about one's garment size is constructed and this reference size is frequently used as rule of thumb in further shopping.

The current research aims at answering when customers find it useful to replace their reference size with SRA and to what extent they rely on SRA more than their rule of thumb? The hypothesis is that overall shopping perceived risk and incongruence level of SRA's suggestion are two of the interacting determinants in shaping customers' attitude toward SRA.
To experimentally test the hypothesis a 2 (Perceived risk-PR-: High vs. Low) 2 (Incongruence level-IL-: High vs. Low) Between Factorial design has been applied and the dependent variable is SRA's suggestion acceptance. The task for participants is to choose a size for two items on a hypothetical online shop where a SRA generates a suggestion either incongruent with the participant's reference size (High IL) or close to it (Low IL). Perceived risk is defined in terms of common return policies in real online-shops. In case of High PR if the chosen size doesn't participants have to return the garment without any replacement and in case of Low PR participants have the chance to change the size unconditionally.

After data collection, Analysis of variance (ANOVA) will be applied for hypothesis testing. Moreover further extension of the project by means of combining personality tests is also being considered.

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How Ladylike Is a Ladybug? – Making Sense Of Noun-noun Compounds in Context

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Introduction

Many psycholinguistic experiments have studied the processing of compounds and investigated the role of the two compound constituents, their transparency and the relevance of headedness [1]. These experiments usually use lexical decision tasks on lists of single compounds, where understanding is established mostly by bottom-up decomposition of the constituents or by holistic lexical access [2]. The problem with such studies is that we normally do not encounter compounds in isolation but in the context of a text or conversation. Yet, in text linguistics and corresponding psycholinguistic experiments text comprehension has been shown to involve top-down-processing [3]. Already the first sentence of a text creates expectations about what is to follow and the importance of bottom-up processing is diminished.

Consequently, this paper wants to investigate how top-down and bottom-up processing interact in the comprehension of compounds of different transparency in the context of a minimal text. Moreover, the cross-linguistic differences between L1 German and English speakers and the processing of native versus non-native English speakers are studied.

Experiment

20 native German speakers and 30 non-native English speakers are tested at Vienna University and 20 L1 English speakers at Brock University, Ontario.

Participants have to read 2-sentence stories and then intuitively rate on a scale from 1 to 4 how much sense the story makes. The two sentences are presented on the screen, appearing word by word with each press of the space bar.

The material consists of 64 triplets of sentence sequences with lexical, semantic or neutral priming: The first sentence of a sequence is always the same except for the last word, which is either identical to one of the compound constituents, semantically related or neutral. The second sentence is identical for each triplet with the target compound always in second position after a determiner.

Preliminary Results

It is expected that top-down processing will have the most impact in lexical priming and the least in neutral priming. Accordingly, the reaction time for the target compound and the whole second sentence should be shortest for lexical and longest for neutral priming. Analyses of German native speakers so far confirm these expectations. Regarding L1 versus L2 differences, it is anticipated that bottom-up effects will be stronger for L2 English speakers due to higher metalinguistic awareness.

Acknowledgements

Special thanks to W.U. Dressler and Gary Libben for the many weekends they sacrificed.

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Spatial and Temporal Distribution of Gabaa Receptor Subunits in Human Cortical Areas

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Introduction

γ-Aminobutyric acid (GABA) is quantitatively the most important inhibitory neurotransmitter in human brain and exerts its actions through GABAA receptors (GABAA-Rs). GABAA-Rs are pentameric chloride ion channels, which can be composed of 19 different subunits. The subunit composition of the receptor determines its pharmacological properties and, to some degree, its sub-cellular distribution. GABAA-Rs contribute to important brain functions including memory functioning, learning and cognition and are the site of action of many clinically relevant substances, including benzodiazepines, anesthetics, and ethanol [1]. Notably, there is paucity of data regarding the distribution of different GABAA-R subunits in the human brain on protein level. Thus, describing the distribution of different GABAA-R subunits is of great importance.

My project involved studying brain on histological and neuropathological basis. I focused on the distribution of different GABAA-R subunits in different cortical regions (inferior temporal, entorhinal and insular cortex) and in different layers (marginal zone, intermediate zone and subventricular zone) that are involved in cognitive processes. The purpose of my research was to describe the normal development of different GABAA-R subunits in the human cortical brain structures and to compare them to the age-matched (14-34 gestational week) Down syndrome (DS) cases. I performed a detailed histological investigation of four GABAA-R subunits (α1, α2, α3 and γ2) in human cortical areas and evaluated the immunoreactivity (IR) patterns for each subunit-specific antibody.

Methods

A total of 67 age-matched fetal cases of normal and DS human developing brains were included in this study, on which immunohistochemistry was performed. Glass slides were converted to digital slides with high-resolution digital slide scanner. Selected structures were exported and evaluated for the presence or absence of specific IR for different GABAA-R subtypes using program ImageJ. The percentage of the stained area in both groups was measured and statistical analysis was performed using SPSS.

Results

Final data revealed spatial and temporal differences in expression patterns of single GABAA-R subunits during normal development. This expression was disturbed in DS cases, at which we could notice lower amount of IR as well as delayed onset of immunohistochemical detection of single subunits. These findings support the possibility of GABAA-R subunits being an important factor in human neurodevelopmental disorders.

Acknowledgments

I thank my mentor Ivan Milenkovic, MD PhD and his team at the institute for kindly providing all the resources that were needed during my project work.

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Rethinking Materialism: An Outline of Integrative Science

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Introduction

Contemporary science is predominantly based on a materialist paradigm. It assumes that everything is essentially material and governed by deterministic or random interactions. The best or only scientific method is to separate the world into discrete concepts, measure it from the third-person view, and base theory primarily on these data, rather than on more holistic insights.

The materialist approach has achieved successes in many areas. On the other hand, it has some notable shortcomings, mainly in the study of consciousness and answering the "big questions" (e. g. Why is there something and not nothing?). In my thesis, I propose a method of first-person inquiry that could complement materialism. A unification of these two approaches would form the basis of integrative science.

The Complement: First-person Research

I propose a method of first-person research that would require researchers to train their mental abilities: heighten their perceptiveness to inner phenomena, and develop the ability to retain a lucid, critical, self-aware consciousness in various altered states of consciousness (e. g. lucid dreaming).

This method could help overcome the limitations of materialism:

* It would allow us to systematically observe and experiment with certain conscious phenomena (e. g. lucid dreaming), enabling to have a more comprehensive view of the human mind.
* Research shows that some altered states of consciousness, e. g. dreaming, foster insights. [1] Being more lucid in these states could perhaps enable us to gain insights more effectively. Based on these insights, we could build more holistic theories.
* Mystics claim that by sustained cultivation of certain inner practices, a whole new range of conscious phenomena can be unlocked and experienced. Some of these experiences purportedly provide a type of knowledge which provides answers to the "big questions". This knowledge is said to be objective, but inexplicable in terms of materialism. By systematically examining these experiences, we could find out if such knowledge is possible. [2]

All observations gathered by the method I propose could be intersubjectively compared by researchers who have developed the necessary skills. Some insights could also be verified using third-person methods. Thus the objective would be separated from the subjective, as science requires.

Conclusion: Integrative Science

The unification of first- and third-person research approaches would form the basis of integrative science that would enable us to explore a wider range of phenomena than materialism currently does.

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Differences in Our Constructions of Reality

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Science versus religion debates often boil down to an argument between two very different notions of what qualifies as knowledge and how it is attained. Perry (1968)[1] distinguishes these epistemological beliefs into dualism – the conception of knowledge as either right or wrong and reliance on authority for the distinction, and relativism – where knowledge and its application varies between contexts and there is no one authority that has all the answers. Our research attempts to apply von Foerster's[2] constructivism and his postulate that "[t]he nervous system is organized (or organizes itself) so that it computes a stable reality" to this distinction between different epistemological beliefs. In this vein we hypothesise that we differ in our constructions of reality.

Content-oriented types construct their lifeworld with a model of the world (all knowledge refers to this one world), whereas relation-oriented types refer to a multitude of different communicative situations. Communication, in the case of relation-oriented types is used to maintain interpersonal relationships in these communicative situations. Content-oriented types, on the other hand, use communication to describe their model of the world. Coinciding with Perry's (1968)[1] categories, Relation-oriented types are dualistic in their perception of knowledge (depending on authority) and content-oriented types use knowledge from different sources to build on their model of the world.

Our research plan is to first conduct a thorough introspection in order to refine our model. In order to test our model we shall conduct in-depth phenomenological interviews. In order to tackle one of the challenges of exploring these constructions of reality – the prediction that persons with relation-oriented constructions of reality are averse towards (self)research – we shall conduct special interview sessions conducted by many different interviewers, with the prediction that content-oriented persons will not show great differences in their answers between different communicational situations. What we also have to very strongly look out for is our own influence on our observations, seeing how we both identify as constructing reality in a content-oriented way, as well as the scientific method in general being a content-oriented procedure.

Our goal is to test and refine our model, perhaps expanding it beyond the two originally hypothesised types, if the interviews reveal such necessity. This research hopes to provide useful groundwork for future studies. A hopeful vision for the future would include the search for neurological correlates of epistemological attitudes, joining first person experience with third person observations.

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The Effect of Haptic Guidance on Motor Learning of Rhythmic Sequences

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In this thesis, we are investigating the effect of proprioceptive feedback on motor learning. For proprioceptive feedback, a haptic guidance is used. In this paradigm, the subject is physically guided through the ideal motion by the haptic interface, thus giving the subject a proprioceptive information about the required position of his joints. We are elaborating on work of Lewiston [1] and Grindlay [2] which used haptic devices such as a keyboard and drum in motor learning of rhythmic sequences. In sequences, we can distinguish between its temporal and ordinal property, where ordinal property refers to the order of the notes and temporal to the time intervals between successive notes. In both of these studies musically naive subjects learned rhythmic sequences with varying temporal, ordinal or both properties. Three conditions were used to present the target sequences (haptic, audio and audio haptic) in the training phase of experiment and subjects were subsequently required to reproduce it in the testing phase. Results showed that the ordinal property was better learned when audio feedback was combined with haptic guidance. Measurement of the temporal property showed conflicted results. Therefore, use of different types of rhythmic sequences was discussed as a possibility for the further investigation of the temporal property.

In our thesis, we constructed an electronic haptic keyboard in order to investigate the effect of haptic guidance on a temporal property. Users finger are firmly attached to the keys of this keyboard and the keys can be moved programmatically together with fingers. Three experiments (N=15) were conducted with the use of this device with the above setup. The first experiment is designed to validate our haptic keyboard by replicating chosen experiment from Lewiston. This experiment tested the effect on the ordinal property. The second experiment was targeting temporal property of rhythmic sequences where timing performance on more difficult sequences was measured. The third experiment took focus on rhythmic sequences with varying both temporal and ordinal property.

Results of the first experiment showed that the ordinal property was significantly better learned during audio haptic condition. This is consistent with previous studies and it confirms the effectiveness of our device. The second experiment showed that the haptic audio condition was better for learning temporal aspects. The third experiment also showed better performance in both sequence properties. These data support that this form of haptic guidance is more effective at teaching musically naive subjects to perform a new rhythmic sequence, when compared with audio-only learning.

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Factors Influencing Our Food Perception

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The field of modern civilization diseases (obesity, cardiovascular diseases, neurodegeneration, atherosclerosis etc.) has become an important field of study in today's day and age. While different factors are associated with these diseases, in our work, the focus will be on the diet. Two aspects of dieting will be established and described. First it is hard not to put a causal link between our eating activity and the modern diseases, since exposure to modern food resources is positively and strongly correlated to the number of occurring conditions [1]. Therefore the access to modern, processed foods is one part of the equation. Another part of the equation however, is also our food perception. While most animals are driven by internal homeostatic systems on food preference [2], humans can (to a certain point) regulate this internal urges. The regulation of those urges can be influenced by other factors, such as individual (physiological, psychological), environmental (culture), context dependent (time and place) and the food factors itself (packaging, nutritional information etc.) [3]. The influence of different factors on our food choices creates a subjective reality. The subjective reality is a personally constructed reality, that is usually different than the objective reality, that is based on scientific research [3]. In cases where specific dietary guidelines need to be followed, the difference between the subjective and the objective reality should be minimized.

In my master's thesis, the goal is to create a mobile application, which would help the users to close the gap between their subjective and the existing objective reality. For this, the masters thesis will be divided into three parts. In the first part, the theory of food perception will be described, in the second part, different diet related diseases will analyzed and in the last part a mobile application will be created. The mobile application would allow the user to record and analyze their food choices via taking photos of the meals and keeping records of them (manual input of eaten food possible object detection algorithms). The analysis of the appropriateness of the eaten food and further suggestions will be based on the analytical analysis of the literature from the fields of food perception and diet related diseases.

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The Difference Between Categorization and Comparison in Metaphor Comprehension

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Introduction

Metaphors allow us to speak about one concept in terms of some other concept. For instance, the metaphor "My boss is a shark" allows us to speak about the so-called target term "my boss" in terms of the so-called base term "a shark".

Theories of metaphor comprehension disagree about the question whether and when are metaphors processed as categorizations or as comparisons. In this study I aimed to disentangle the problem.
It was previously shown that the greater the difference between two vertically aligned concepts, the more likely it is that they will be distinguished by different category names (referred to by different words) [1]. Inspired by this we proposed that when there is a large difference between the number of properties encoded by the metaphorical base and the target, the sentence will be considered a categorization, but when the difference is relatively small, the sentence will be considered a comparison.

Study design

The proposal was tested experimentally using the free paraphrase method. Participants were provided with 16 metaphorical utterances in either categorization form (X is Y) or comparison form (X is like Y) and instructed to paraphrase them. To assess the difference between concepts, two predication types were distinguished: a) double predications - properties applicable to both base and target; b) single predications - properties applicable to target only. For example, the sentence "Some ideas are diamonds" can be paraphrased with double predication as "Some ideas are rare and desirable" or with single predication as "Some ideas are insightful" [2]. Single predications were considered indicators of greater difference between the concepts than double predications.

71 university students participated in the study. 36 participants filled the questionnaire with all metaphors in comparison form and the rest filled the questionnaire in categorization form. Half of the sentences in each questionnaire was conventional and the other half was novel. Conventionalization ratings were obtained from 10 independent raters.

The hypothesis for both novel and conventional metaphors was that categorization form metaphors will be more often paraphrased with single predications than comparison form metaphors.

Results

Since the data from the conventional metaphors showed too large variance, I was able to draw conclusions only for novel metaphors. In accord with the hypothesis, a significant difference between the number of single predication responses as a function of the sentence form was found ($t(3.38)=11.13$, $p < 0.01$, $d = 2.03$), with categorizations being more often paraphrased with single predications than comparisons.

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Analysis of the Sleep Process in Patients after Stroke

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Introduction

Sleep is essential for normal functioning of the body and cognition while we are awake. In sleep process the brain wave frequency is changing while going through sleep phases, which are associated with the activity in various brain regions. These brain regions can be damaged after an ischemic stroke, caused by the blockade in the blood vessel leading to lack of oxygen supply and producing lesions in brain areas, what results in a loss of brain function. As a consequence of a disrupted brain functions, the sleep architecture can be affected [1]. Studies show, that there are some differences in sleep patterns among healthy sleepers and subjects after stroke, showing that subjects after stroke spent more time in slow wave sleep and less in REM sleep in comparison with the healthy sleepers [2]. Based on these findings the goal of this study is to analyze the sleep process among patients after stroke conditioned on the affected brain area after stroke. Different brain regions affected by the stroke can influence sleep patterns among the patients and thus indicate the neuroanatomical importance of the regions on the sleep process.

Methods

This study includes 51 polysomnograpy (PSG) recording taken from patients after stroke. In all patients the brain magnetic resonance (MRI) was performed to locate the stroke affected area. The points of interest were patients with effected supratentorial regions (43) and patients with stroke in brain stem (8 subjects). The task was to compare their sleep architecture and other sleep features like sleep efficiency, time in bed and awakenings with Matlab program.

Results

The results are indicating on differences in the architecture of sleep in the patients with stroke in the brain stem, showing lower REM latency ($p = 0.07$), lower efficiency ($p = 0.003$), more staying awake during sleep ($p = 0.04$) than in the patients after stroke in supratentorial regions.

Conclusions

There are differences in the architecture of sleep between patients with stroke in the brain stem comparing with the patients with stroke in supratentorial region. The results are linking REM phase with the brain stem. These finding are providing evidence how different brain regions can affect different sleep features. For further studies it would be advisable to include more patients and a control group.

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(Testing) the Cultural Cognition Theory of Risk Perception

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Several decades of research sought to answer the question how people form positions on the risks they encounter. Especially when they lack experience, expertise, time and cognitive capacity to adequately understand a lot of data. Simple heuristics are suitable candidates for numerous findings regarding judgment and decision making under risk. However, recent research suggests that heuristic processing interacts with cultural values [1].

In our study, we test the Cultural cognition theory of risk perception. It posits that individuals selectively deal with information on risks in a manner that mirrors and reinforces their cultural worldview or preferences about desired state and organization of society [2]. Building upon research by Kahan et al. [1], we examine two models explaining the mechanisms through which culture might influence evaluation of risks and benefits: polarization effect and credibility heuristic. Moreover, we focus on sample- and domain specificity of risk perception in the context of two socially relevant topics.

We recruited 482 respondents who filled out an electronic questionnaire. After exclusion due to the time limit, we analyzed data from 349 participants (110 males, M = 30.7 years, SD = 10.6). Research material primarily consisted of the Cultural cognition worldview scales [2] adapted to local conditions, and risk perception and knowledge scales. Experimental manipulation was based on providing (opposing) arguments, either ascribed to two anonymous authors (experimental group 1) or two advocates described by a specific constellation of cultural values (experimental group 2). Members of the control group answered without being exposed to any arguments. The two topics addressed were administered in a random order.

Preliminary results of the experiment will be presented and discussed within an interdisciplinary context of cognitive psychology, medicine and neuroscience as well as law and political sciences. Research efforts aimed at analyzing perception of risk, uncertainty and probability, might result in important implications, ranging from communication of information on statistics and scientific findings to the public, to policy making interventions.

Acknowledgments
Special thanks belong to Miroslav Valuš and Janka Bašnáková for their help and support.

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Distribution of Information Under Conditions of Uncertainty or What We Really Think About Wolves

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In our work we have attempted to bring anthropology and its methods back to awareness of cognitive science. Firstly, we present an overview of possible influences which cultural and environmental factors could have on cognitive processes, e.g., gender-sensitive language accelerates gender identification in children. We explained cognitive and cultural niche, cultural models, and socially distributed cognition in more detail to illuminate shared cognition. We paid special attention to folkbiology as an intuitive method for gaining information about nature [1] and myths as incorrect but effective transmitters of information [2]. Secondly, we discussed the position of anthropology within cognitive science and introduced a method, which could be an important link for closer cooperation of these disciplines - Cultural Consensus theory (CCT). It obtains cultural truths about certain topic from a group of people [3]. CCT is used for ethnographic studies, and studies of opinions or knowledge, e.g., what Americans think that are the most often causes of death in the US.

Our aim was also to support cooperation of anthropological and psychological research with practical application of two methods.. We have tested 120 hunters, shepherds, and animal activists about their beliefs about wolves. Then, we applied CCT model on data to divide the respondents according to consensus in shared knowledge into groups. Subsequently, we applied Cognitive Diagnosis Assessment (CDA) which divided the same respondents according to true or false knowledge they believed to. CDA is primarily used for a diagnostic feedback on proficiency level in learners. We have investigated that the groups identified in analysis overlapped, which means that one group consistently believes in truth, while the other group consistently believes in false information. Further, we expected that shared cultural consensuses from CCT assessment will correlate with groups of hunters, shepherds, and animal activists, because of their different perspective in work, but this hypothesis was not confirmed.

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Cognitive Semantics, Categorical Perception and Brain Hemispheres

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As a part of cognitive semantics, categorical perception (CP) investigates how the concepts in the brain, innate and acquired, linguistic and non-linguistic, influence perception in a top-down manner (see [1,2] for an introduction to the topic). A general, language-restricted hypothesis is the *Sapir-Whorf* hypothesis which states that the structure of language affects cognitive processes and the ways in which its speakers conceptualize their world views. There is evidence supporting CP: stimuli from different linguistic categories (e.g. colors, faces etc.) are discriminated faster or more accurately than stimuli from the same linguistic category. For example, in Russian there is a commonly used word for light blue with a slight, almost unrecognizable hue of green (RGB 85,170,255), but not in English. It has been shown [1] that Russian speakers are faster at disciminating blue from this light-blue than English speakers.

It is well known that language processing is lateralized to the left hemisphere in most people. The question arises: are CP effects more prominent when the stimulus is presented in the right visual field (RVF) (and therefore first transmitted to the left hemisphere) than when it is presented in the left visual field (LVF)? There is a body of research suggesting that the answer is ``yes", see e.g. [2]. However, there have also been failed attempts to replicate those studies and there is even evidence suggesting that the answer is ``no" [3]. In the present research, an experiment was designed in order to highlight a simple reliable lateralized phenomenon related to categorical perception. In our experiment there is no discrimination between multiple targets, but instead participants are asked to recognize the color of a stimulus. The duration of one trial is 130 ms during which two stimuli are presented, the first is a prime and the participants are asked to judge the color of the second one. Half of the primes are colors and half are words expressing a name of a color. Half of the trials are with matching primes and rest with mismatching. Half of the stimuli are presented in the RVF and half in the LVF. Our hypothesis is that the priming effect with word primes is stronger in the RVF. As a part of ongoing study, the data is still being collected; nased on the preliminary data and the aforementioned research, we predict that the verbal priming effect will be stronger in the RVF while there will be no lateral difference in the color primes.

The understanding of the neurology of categorical perception has relevance to the field of cognitive semantics which investigates how concepts are formed, acquired and used, how do they correspond to reality and how stable this correspondence is. Thus, the current study is a building block in cognitive semantics as well.

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Intrinsic and Extrinsic Motivation in Autonomous Agents

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Organisms tend to perform various actions in response to similar stimuli. Taking a domestic cat as an example - if it has constant access to a food source, sometimes it will feed itself, while other times it will pass by the resource seemingly uninterested. Motivation has been defined as a reference for a set of needs that activate, direct and sustain goal-directed behavior (Nevid, 2013). There is a difference between motivation for actions like eating or sleeping compared to reading. When eating, we are motivated extrinsically, while our motivation for reading is intrinsic (Oudeyer & Kaplan, 2008).

A model combining intrinsic and extrinsic motivation as needs in internal state space has been proposed (Pileckyte & Takáč, 2013). The main aspect of the model is based on representing the current state of needs as a point in a multidimensional need space. The satisfaction level is determined by the distance from homeostatic equilibirum - needs set to 0.

We implemented the model using neural networks integrated in an actor critic architecture. The agent learns by performing actions and retrieving reward signals from the environment. If, after performing an action, the agent's internal need point is closer to equilibrium, the reward is positive. Learning to perform an action in a given state means the action has a higher priority for being chosen. When the agent is bored, the priority is being distributed across all available actions causing the agent to perform a potentially surprising action and lowering the boredom value. We built an application enabling researchers to create an unlimited number of model configurations. Using the application a researcher prepares a custom environment, configures an agent to place in this enviornment and logs data from the experiment for further analysis. The application runs on www.actorcritic.sk.

Preliminary results show that the agent is able to learn to cycle between actions in order to satiate its needs in simple scenarios. In scenarios where the agent moves around in order to find food - without intrinsic motivation being integrated - it is only able to learn to sleep in all states despite being increasingly hungry. After integrating intrinsic motivation in the agent in such a scenario, it is able to remain close to homeostatic equilibrium and portrays complex behavior.

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Guiding preschoolers' attention to feedbacks in an educational digital game

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Magical Garden is an R&D project of a Teachable Agent based educational game in mathematics for 5-6 year olds, conducted by Educational Technology group in Lund University, Sweden. Teachable Agents are the digital characters that children can train in the game playing the role as teachers based on the concept of 'learning by teaching'. We are extending the study to explore children's meaning-makings of what happens in the game with regard to the interaction with digital characters.

The project is focusing on the adaptation of the presentation of pedagogically important feedback (Central Feedback Instances, or CFI) in the game. The idea is that even though we provide meaningful feedback to children, it will not be helpful with learning if they do not pay attention to it. In this paper, I focus on the attention issue questioning if children pay attention to the CFIs and what the effects would be if we manipulate the salience of CFIs via different strategies. I investigate them with respect to the social relationship with digital characters. Thus, the strategies consist of three categories: social cueing such as a character pointing and gazing at the object; non-social cueing such as lightening up the object itself; and the combination of the two. The hypothesis is that the attention per se may be equally affected by social strategy and non-social strategy leaving the effect on learning aside. In addition, the combination of the two could either strengthen each other or produce conflicts or distractions.

Methods

There has been increasing interest in using eye-tracking data to gain insights on the cognitive and perceptual processes underlying a user's performance with an interactive system [1]. In this study, I contribute to this line of research by using gaze information to understand if and how children attend to CFIs. The data can be divided into two types: total fixation time, which is the total time a child's gaze rested on a displayed object for each CFI; and the gaze shift speed, which is the time that elapses between the evocation and the first fixation on the item.

Discussion

Even though the attention itself does not show significant difference between social and non-social strategy, the information processing and learning might be more affected by the social strategy. Further studies in Magical Garden project are expected to identify how children' attention is related to their understanding and progress rate. Moreover, insights can be derived from a more detailed analysis of the attention patterns associated with how much children interact with digital characters. In the long term, we want to use this information to build the adaptive and supporting software that can be distributed at large-scale and thus reach the children who are at pre-schools where little effort goes towards early math training.

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Acquisition Of Slovene Adjective Inflection And Semantics

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The project Acquisition of Slovene adjective inflection and semantics dealt with the Slovene adjective inflection. The latter was interesting to explore both from cognitive and linguistic points of view, since besides grammatical descriptions, there was not much written about Slovene adjectives. The morphology of Slovene adjectives is (similar to Slovene nouns) quite complex due to the heterogeneity of their inflection.

The aim of our research was to investigate the new subject of the acquisition of adjectives in Slovene and to focus on parent-child input-output relations in a longitudinal study. After dealing with formal aspects of Slovene adjectives (especially those which occur in our data), we presented and interpreted acquisition data, and analyzed them from a morphological and syntactic perspective. Then we analyzed the semantic and lexical relations of the adjectives used focusing on word fields, antonyms and synonyms.

We analyzed the speech production and the input received by one Slovene girl from age 1,5 to 2,8. The material used for this analysis is based on theoretical assumptions in [1], [2], [3] and on empirical data, provided by the first author.

The predominant strategy of adjective acquisition was by repetition. At age 1,5–1,7 no adjectives were produced, since 1,8 only occasionally, since 2,0 more often, at 2,1 isolated inflected forms appeared, whereas at 2,8 we found a consistent amount of adequately used adjectives. Our results showed that not only the lexical category of adjectives, but also their inflection emerge late and that their development depends less on input frequencies than on contrastive relations between adjectives, in terms of antonyms and word fields.

We believe that this paper can contribute to the field of cognitive and psycholinguistics and it has been accepted to be published in across-linguistic volume on the acquisition of adjectives edited by three Dutch, Russian and Italian editors and proposed to a British publishing house.

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Measuring Direct Effect of cTBS over Right DLPFC on Processing Cognitive-emotional Tasks and Its Efficiency as a Depression Treatment over Time

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Transcranial magnetic stimulation (TMS) is a noninvasive method that uses electromagnetic induction through which we can manipulate brain activity and alter cortical excitability. There has been more than 15 years of research on the use of repetitive form of TMS (rTMS) for the treatment of patients with depression. High frequency (10 Hz) rTMS applied to the left dorsolateral prefrontal cortex (DLPFC) is a FDA approved treatment for adults with resistant depression [1].

A newer form of rTMS protocol, theta-burst stimulation (TBS), has been shown to produce similar if not greater effects on brain activity than standard rTMS, while administration duration is reduced. There are two commonly used patterns of TBS, designed to mimic the endogenous theta rhythms of the brain, continuous (cTBS) and intermittent (iTBS). Hypoactivity of the left DLPFC and hyperactivity of the right DLPFC are common explanations for the occurrence of major depression. Intermittent TBS applied to the left DLPFC or a combination of iTBS plus cTBS applied to the left and right DLPFC, respectively, were shown to be more effective than cTBS or sham TBS in treatment-resistant depression [2].

The aim of our study is to test and optimize one cTBS protocol. We will choose between two protocols (30 Hz and 50 Hz) that are under research at the moment. We will use the one that will prove to be more efficient in changing brain plasticity in primary motor cortex over time. We will also try to improve the protocol by using neuronavigation system (combined with fMRI) in order to accurately localise the target area on right DLPFC individually on each subject. We will use depressed patients and sham controls, and during 10 sessions we will evaluate change in depression severity measured by the 21-item Hamilton Depression Rating Scale (baseline versus end of treatment). The aim is also to measure whether this cTBS protocol has any direct effect on execution of tasks which will be specially designed to induce cognitive-emotional interactions. The hypothesis is that over time subjects will report being less depressed (lower scores on depression scales) and that there will be an observable and significant immediate effect following each cTBS session - we expect the responses on tasks to be less emotional.The results will give us a better insight into depression treatment with TMS and will help us to optimize the procedure for the future implementation of treatment of drug resistant depression.

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Pragmatics and Empathy in Second Language Aptitude

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Introduction
While beneficial, learning a language after the critical age in adulthood is a trying task in which some people seem to fare better than others. Our research was driven by our wish to study personality traits and their role in second language acquisition, especially in the aspect of pragmatics.

Hypothesis
We believe that individuals with greater ability to relate to others and to feelings of others would additionally have more success in acquiring the subtle and unwritten language rules that together form the pragmatics of a language. Our hypothesis is supported by research of individuals with autism who usually score low in the common EQ tests and are reported to have underdeveloped pragmatical language ability while their structural language skills range. [1]

Experiment
We used standard Baron-Cohen EQ test and for pragmatical ability we adapted a Test of Pragmatical versus Grammatical Awareness designed by Bardovi-Harlig & Dörnyei [2]. It consists of 20 scenarios from school environment out of which 8 are pragmatically and 8 grammatically wrong. The participants must report which behavior they find incorrect, why and how serious they consider each error.

Results
We accepted the answers of 68 Slovak native speakers. Average age of these participants was 24, average EQ was 41 and most common English level was 8 out of 10. The score was calculated as the number of correctly found errors minus false alarms for both the pragmatical and grammatical ability. While we can report a significant correlation of the pragmatical score to empathy ($r=0.325$; $p<0.01$), the grammatical score shows no such relationship ($r = 0.228$; $p > 0.05$).

Conclusion
We can conclude that pragmatical ability is related to empathy. We hypothesized that individuals with higher EQ show greater pragmatical awareness and such behavior was shown by our participants. Just as important is our finding that grammatical ability is not related to empathy as we would not expect such relationship to appear and we would have to reconsider our theory or testing procedure. Our main hypothesis was novel and as such emerged from the literature as well as from our experience with ESL learners.

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Autopoietic Systems Theory within Hegelian Speculative Philosophy

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Autopoiesis refers to a system capable of reproducing and maintaining itself. An autopoietic systems is autonomous and operationally closed, in the sense that there are sufficient processes within it to maintain the whole. I have tried to analyse further the basic logic of autopoietic theory and general systems theory in Hegelian speculative philosophy. To do this, I have generally addressed his Science of Logic and particularly the Notion as such; its "role" and "status" in Hegelian overall philosophical system and especially its determinateness in Nature. Especially, my aim is to understand dialectics "in practice": in Hegel's Philosophy of Nature (in concepts such as organisms, teleology, life, externality) and how is that connected to the Hegelian self-reference (or, self-relating negativity). My main objective in this paper is to analyse the concept of self-referentiality as it is developed in the autopoietic systems theory. Autopoietic theory considers this kind of self-relation as a minimal form of life. Apart from the conceptualization of this self-referential closed system, I want to track this concept in history of philosophy to German idealism, from its beginning in Kant, in his regulative concept of teleological Organism, to Hegelian speculative philosophy where autopoietic structure refers to the Notional deployment as the Idea within his philosophical System. My Thesis is that the Hegelian philosophical system is the first systematic inquiry which deals with the logic of autopoiesis. In his Science of Logic, he starts with Being, Nothing and Becoming which is nothing but autopoietic relation of Being itself, as being Thought, up to the Notion, as the explicit materiality of thought (or, ideal self-relation of externality of nature). However, there is a paradox we have to keep in mind in operational closure. As Luhmann noted, operational closure is a condition for openness of the system; such systems are viewed as teleological in a functionalist state since they are directed toward this state. Such a minimum of self-relating is an elementary form of life through which the limit between Inside and Outside can emerge (Hegel even terms the organism as the "unity of inner and outer"). Autopoiesis is a logical bootstrap, a loop: a network produces entities that create a boundary. A self-distinguishing entity exists when the bootstrap is completed. This entity has produced its own boundary. It bootstraps itself out of a soup of chemistry and physics. This ontological paradox is the unity-in-difference of matter and life, reality and ideality, nature and thinking. This, and none other is the old metaphysical question of how can we account for a whole that is larger than the mere sum of its parts. In Hegelian view of the Notion, it is also not (pre-)given but created – it posits itself by itself – it posits its own presuppositions. Autopoietic theory renews circular causation in efforts on conceptualizing operational closure as a mechanism capable of explaining the phenomenon of self-production.

Effects of Humor and Laughter Group Therapy on People with Depressive Disorder

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In a society where depressive disorder (depression) affects approximately 350 million people worldwide, the demand for its curbing is on the rise globally. According to WHO fact sheet, there are known and effective treatments for depression, however, less than a half of those affected in the world are not provided with such treatments. A lack of financial resources is often one of the barriers to effective care [1].

Therapies with humor and laughter are low-cost and have various research supporting its possible preventive and therapeutic values. Most of the interventions focus on treatment with one aspect of humor and laughter (e.g. laughter yoga, watching comedies, telling jokes etc.) and have their frequency usually limited to once per week [2]. The intervention design presented here, will consist of more frequent sessions and will combine three modified interventions. First intervention, used by Gelkopf et al. consists of watching funny movies twice daily (five times weekly) over a 3-month period [2]. In the second one, used by Dolgoff-Kaspar et al., the 20-minute laughter yoga involves breathing and stretching exercises, simulated laughter and consists of 10 sessions over 4-weeks period [3]. In a third, used by Walter et al., the moderator starts the session by telling or reading humorous stories [2]. Afterwards patients are invited to share their happy biographical episodes and memories [2]. This intervention consists of 12, 1 hour sessions, every two weeks [2].

In the following intervention design, sessions would be administered three times per week (every other day), over a 2-month period. First day would consist of watching a funny movie, third day of 30-minute laughter yoga, and fifth day of 1 hour talking session. Talking session would involve moderator telling humorous stories, after which a group members would share their happy biographical episodes and memories as well as tell jokes. I suggest that interventions are done in hospitalized environment, where an experimental group of patients that receive humor and laughter therapy would be compared with a control group without such therapy. Pharmacological treatment in both groups would stay unaltered.

I hypothesise the humor and laughter therapy will reduce depressive symptoms and improve patients well-being. To evaluate its effectiveness, Patient Health Questionnaire-9 would be used pre- and post-therapy.

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Computational Micro-modeling of Appraisal Processes as Behavioral Modulators

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Contemporary approaches to integrating affect into computational models of cognition typically map reified theoretical concepts to specific affective "states" or "procedures" exerting distinctive influences on behavior and cognitive faculties. In contrast, our goal is to more specifically micro-model interactions between affective and cognitive processes. Akin to Robert Marinier's work within the SOAR framework [1], we aim to integrate insights from the affective sciences into a well-known operationalization of practical reasoning [2].

We plan to utilize the component process model (CPM) of Klaus Scherer's [3] cognitive appraisal theory of emotion: Through sequential stimulus evaluation checks (SECs), appraisal processes exert systemic effects on, for instance, a person's physiology and action tendencies, which in turn influence cognitive capabilities including attention, memory, and reasoning. Closing the circle, these capabilities provide inputs for appraisal processes. Thus, Scherer's theory can be viewed as a complex systems model of the dynamic unfolding of processes bringing about affective phenomena.

We aim to derive and integrate a micro-model of affective processes into an artificial virtual agent within the BDI (beliefs-desires-intentions) framework. Abstracting away from many details of cognitive processes and focusing on practical reasoning should allow for well-defined micro-level process interactions and predictions of behavioral effects. Even if of limited scope (of verified justifiability), the results of this first proof-of-concept could warrant deeper follow-up research on integrating affective and cognitive processes in more complex agent-control architectures.

Possible merits of such a model include providing agents with a principled "natural" arbitrating of needs ultimately grounded in affective values of desires and equipping agents with more pervasive and fine-grained behavioral-adaptive capabilities. Uses could then go well beyond purely synthetic research settings, contributing to improving human-computer-interactions of virtual tutors/teachers and (not only) non-functional user-interface qualities.

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Acknowledgments

Sincere thanks to Paolo Petta at OFAI for supporting this project.

Serious Game Design Patterns: Contributions from the Affective Sciences

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Abt [1] first introduced the notion of Serious Games (SG). He presented them as a means for improvement in education. SG are safe game environments intended to make users aware of behavioural influences through cognitive conflicts [2]. In the development of SG, game designers have to work with stakeholders and experts, in order to make a game, or some specific aspects of it, instructive. There is a need of a solution to help make game designers and other experts share a common vision about processes and artefacts essential for this purpose.

I was a part of a design pattern research regarding SG. The main focus of our research was on the improvement of effectiveness of SG development by offering a functional repository of game design patterns. In this regard, we started an investigation on the Serious Game Design Pattern Canvas (DPC) as a possible solution to the identified issues. The DPC is a unified game design tool for improving the state of the game design. Further, we researched the relevance of affect in learning, within and beyond the scope of SG (e.g., motivation, learning proficiency, engagement), and studied the concrete example of a specific SG („Re-Mission“) and its key design elements.

First, we presumed the game forms a single pattern, so that we could easily identify the games' key parts for affective learning. Affective learning being defined as „an increasing internalization of positive attitudes toward specified content“ ([3], p.63). After we identified the key parts we tried to „map“ them into specific sections of the DPC. This was done as a preliminary first attempt of applying tha basic analytic dimensions at a simplified and highly abstracted level.

From the studied example of a specific SG and the identified key design elements of affective learning which we have mapped into specific sections of the DPC, we have demonstrated that the canvas is easy to use and a promising tool for improving SG development.

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Gender Differences in Executive Functions in Children with Conduct Disorder

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Conduct disorder (CD) is one of the disorders which includes problems in emotional and/or behavioural regulation. It refers to a pattern of severe antisocial and aggressive behaviour manifested in childhood or adolescence, which violates either the rights of others or major societal norms [1]. Though CD is a common psychiatric diagnosis among children of both genders, gender differences in executive functions (EF) of CD have been little studied.

There is no global agreement regarding the nature and number of processes that are EF. Nonetheless, there is consensus that such processes facilitate self-regulation necessary to achieve goals successfully and their malfunction can increase the risk of CD. Therefore, the deficits in EF could explain certain characteristics of individuals with CD, such as disinhibition, poor moral development, aggression, impulsivity, reckless conduct and sensation seeking [2]. Since neuropsychological impairments are involved in the etiology of CD [3], we need to fully understand them in order to provide children with CD with better examination process and treatment designs.

I want to determine whether EF deficits are common between children with CD and whether they are gender specific. In the study, my goal will be to employ different tasks that are designed to measure different EF, such as verbal fluency (e.g. oral word association test), working memory (e.g. self-ordered pointing task), planning (e.g. Tower of Hanoi), inhibition (e.g. Stroop task), set-shifting (e.g. trail making test) and problem solving (e.g. mathematical tasks). The experiment will be conducted with 20-30 school children between the ages of 8-12 years with CD and the results will be compared at a general level and by sex with a sample of children without the disorder with similar characteristics. In accordance with the recent research [2, 3], I anticipate that task performance will differ between the sexes and the control group. I hypothesize that results will give us further insight into the executive and cognitive functioning of children with CD.

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Gamification: Play and Solve

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Research background

"Gamification" is a term which became widespread around year 2010 and describes the use of video game elements in non-gaming systems to improve user engagement and user experience [1]. There are many online gamification platforms, where researches are trying to engage people in not so commonly popular subjects. In this talk we will explore how Gamification relates to problem solving. Problem solving refers to a state of desire for reaching an end 'goal' from a present state with steps that may or may not progress toward the goal [2]. Problems can be divided into many categories, but we will mainly focus on the differences between creative and non-creative ones [3]. Creative problems require approaching the solution in a new way. Here is an example of problem which requires creative problem solving: "There are eight eggs in the basket. Eight people each take one of the eggs. How can it be that one egg is left in the basket?". On the other hand analytical problems, such as solving integrals, require more methodological and logical approach. Some problems can be solved with either creative or analytical approach. One such example is solving a maze where a person can start solving it from the beginning (analytical) or from the end (creative).

Talk summary

In this talk, we will review the basic concepts of gamification and continue with our attention set on the question which gamification problems people enjoy the most. We will discuss problems from both the analytical and creative category and present plans of our future experiment. Our approach to the research from will take an interdisciplinary point of view, involving mathematical analysis, psychology and development of software with game design. This type of research is important for improving the learning experience in schools and engaging more people in the problem solving. Gamification offers an opportunity for people to start enjoying the subjects which they would normally avoid, and our research results should help to decide which approach is the best for a particular problem.

Acknowledgments

We would like to thank dr. Janez Demšar for the idea of two types of problems.

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Music Emotions as Conceptual Acts?

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Music can express, regulate and arouse emotions in human listeners and producers. But despite hundreds of studies over several decades it remains unclear what kinds of affects and emotions are elicited by music and how. A recent review of 251 „music and emotion“ studies [1] found inconsistency between competing notions of emotions, data and results. 70% of the studies employed variants of the discrete or dimensional emotion models. A reluctance to commit to the underlying theories of emotions was observed.

A key question is wether music emotions are special and processed by dedicated mechanisms and neural substrates. Juslin [2] has proposed a framework of processes through which sounds are imbued with meaning that shall explain ‚everyday' as well as ‚aesthetic' emotion by eight psychological mechanisms: Brain Stem Reflex, Rhythmic Entrainment, Evaluative Conditioning, Contagion, Visual imagery, Episodic Memory, Musical Expectancy and Aesthetic Judgement (BRECVEMA). According to this view, music emotions are a special kind.

Distinctions that oppose aesthetic to practical experiences and emotions find little support in a broader historic and geographic context. Rather, the human ability for music is theorized to be based on functions that have been shaped by evolution in a complex interplay of adaptations, exaptations and spandrels of functions for Auditory Scene Analysis. Thus music emotions should be seen not as a special kind but in in the wider context of human auditory and general cognition.

Psychological constructivist models of emotion appear to be good candidates to account for the different experiences of musical and everyday emotions. Specifically, I intend to theoretically assess the Conceptual Act Model of emotions recently proposed by Lisa Feldman Barrett [3] for its explanatory power for music emotions and the elicitation of emotions by sound. According to this model emotions are not natural kinds but modulations of core affect through learned concepts that are adapted for each specific situation. The assumption is that emotion experiences rely on domain-general psychological mechanisms that give meaning to situations and context based on prior experience of inner states and the perception of external objects and events.

The method of this study will be systematic interdisciplinary semiotic triangulations of philosophical, psychological and neuroscientific models and data along the graphical model of the matrix of semiosis developed by Martin Krampen.

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How Does Breathing Affect Willpower?

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Willpower has been found to be reflected by increased heart rate variability (HRV) [1][2]. Since it has also been shown that HRV can be modulated by respiratory rate [3], it stands to reason that breathing affects willpower. However, this has not directly been empirically investigated so far. Therefore, this Master project experimentally tests the hypothesis that brief voluntary respiratory patterns have immediate short-term effects on people's capability of resisting distraction through voluntary attention.

The experiment mainly consists of an executive-function task in which participants are asked to perform a breathing exercise and subsequently focus their attention on a monitor in front of them where a boring screensaver is displayed, while to its right a second monitor shows distracting video clips including audio output (their appropriateness for this task was verified in a prior rating study). Subjects are recorded with a video camera, and their heart rate and respiratory frequency are measured. Willpower is quantified by the amount and duration of subjects' looking toward the attention-grabbing stimuli coming from the distractor screen.

A slow-paced breathing exercise is predicted to lead to better and a fast-paced breathing exercise to worse willpower performance as compared to the control group with no breathing exercise. Further, better willpower performance is expected to positively correlate with increased HRV, greater heart rhythm coherence, higher conscientiousness, more experience with breath-focused activities as well as regular physical exercise.

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The Self - Phenomenological Accounts of Psychosis and Mystical Experiences

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Speaking about the self might often be confusing, since it depends a lot on the background of people with whom you discuss what the concept of the self actually means to them. The topic I am concerned with attempts to define the self as the core of subjective experience, as the cardinal point by which experience is structured and shaped. It is something so immideate in our experience that we are hardly aware of it reflectively. Moreover, it seems that the fundamental aspect of this „core self" (minimal self) is that it cannot be the object of our awareness. It is transparent and pre-reflective.

Every experience we are making is not just an experience, but it`s part of the experience that there is someone making this experience. For instance, when I look at a red wall, there is not just the experience of the „red wall", but it seems to be integral to my experience that I am experiencing it; this feeling of being someone that is rooted in the world. The importance of the experienced dichotomy between the self and the world becomes apparant when the boundaries become vague or even dissolve.
It has been argued that mental illnesses like psychosis and especially schizophrenia are the result of a disturbance of this feeling of being a self, rooted in the world (feeling of ipseity). The self-disorder consists of two complementary aspects that can only be understood in their mutual elucidation. The first is hyper-reflexivity and refers to a form of "exaggerated self-consciousness".More precisely, it denotes the shift of what has been a formerly automatic or tacit aspect of experience into reflective, thematic consciousness. A patient thereby no longer inhabits what was a part of herself before but experiences herself as an external object. Complementary to hyper-reflexivity there occurs a diminishment of self affection. Self-affection refers to the basal pre-reflective self-manifestation of consciousness. "Affection", in this sense, has nothing to do with liking or keenness but it denotes that consciousness affects itself: "It is manifesting itself to itself in a way that involves no distinction between a subject and an object."

Apart from schizophrenia mystical experiences can have similar characteristics of disturbances of ipseity. Some people might argue that the underlying mechnisms might be similar or even the same with the difference that they are often culturally shared. Moreover mystical experiences might be induced or voluntarily accomplished by contemplative techniques like meditation, trance, schamanism etc. It`s also claimed that mystical experiences are transient, and often don`t last longer than a few days maximum. This however is controversial as long term spiritual practise might result in a permanent shift in how we experience the world.

My interest and endevour in this work is to shine further light on the topic by carrying out phenomenological interviews with people who either underwent severe psychotic episodes or who had mystical experiences (mainly people who practice Zazen for many years). I will attempt to analyse the data by the concepts and frameworks mainly used in phenomenological psychiatry.

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In Time with Rhythms – Beat Perception and Sensorimotor Synchronisation Investigated with EEG

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Rhythmical sounds are ubiquitous. When we listen to music or speech, how exactly is the temporal structure of the sounds we are hearing represented in our brains? Further, music and beat perception are strongly connected to movement, a phenomenon known as sensorimotor synchronisation (SMT). Movements can range from simple finger tapping to more complex sequences of movements while e.g. dancing. How are we able to synchronise movements to external events, given perceptual processing and action planning delays?

Nozaradan [1] has recently shown that beats are represented in the brain in form of entrained oscillations which are tuned directly to the beat frequency. In other words, the brain synchronises its electrical activity to the beat, so that brain waves oscillate with the same frequency as the beat frequency. Notably, so far only metronome-like beat sounds have been used for acoustic stimulation.
In behavioural experiments concerned with SMT a common finding is that synchronisation accuracy is decreasing for increasing inter-beat-intervals (IBIs). However, additional explicit metrical levels (MLs) or metrical structures in general eliminate this effect [2].

From these basic notions, the current study seeks to examine how more complex rhythmical sounds are creating temporal expectancies and how multiple explicit metrical structures are represented in the brain. During the experiment, participants listened to beat-sounds varying in metrical complexity (1 ML, 2 MLs-ternary, 3 MLs-quaternary, 3 MLs, random; higher MLs were presented with decreased loudness) and IBI (short vs. long). Their task was to synchronise finger movements to the first-level beat while EEG was recorded. It was hypothesised that 1) regarding the behavioural performance, multiple MLs will increase synchronisation accuracy, and 2) these multiple levels will be represented in the brain in form of entrained oscillations tuned to the beat frequency of each ML. Results from 15 participants (mean age = 22 ± 3 years) indicate that additional MLs increase synchronisation accuracy for longer IBIs and that entrained oscillations, tuned to the beat frequency of each metrical level, emerge.

The usefulness of being entrained to multiple metrical structures lies in the increased accuracy of predicting crucial future events (e.g. the next beat). Further, neural oscillations offer an explanation of how distant brain areas communicate with each other and coordinate their activity (as the auditory cortex and motor areas during beat perception and SMT).

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Cognitive and Metacognitive Approaches to Mathematical Learning Disorder – A Case Study

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Mathematical knowledge is highly valued in our society. Mathematics can be useful in many different areas, such as researching the way humans manipulate information. Siegler and colleagues [1] designed a model of distribution of associations, which tells us how we study mathematics and how single combinations of numbers are represented in the long-term memory, which enables us to recall the solution and strategy of solving an arithmetical problem immediately. But pupils with dyscalculia or with lower cognitive abilities usually exhibit struggling with understanding number words and numerals (and the relation between them) and/or difficulties when carrying out mental arithmetic or solving 'word problems', etc. Dyscalculia is defined as a specific learning disability or difficulty in mathematics as a result of an impairment of particular parts of the brain involved in mathematical cognition, but without a general difficulty in cognitive functioning [2]. There are many signs and symptoms of dyscalculia, difficulties with: i) understanding of concepts (quantities, number lines etc.); ii) understanding and solving context-based mathematical tasks; iii) sequencing data or events; iv) using suitable steps when making calculations; v) understanding of division and fractions; vi) handling the money; vii) identifying useful procedures when dealing with addition, subtraction, division and multiplication; viii) combining concepts with mathematical procedures; ix) understanding concepts related to time perception; x) organizing written tasks and keeping stability of an equation. All of those symptoms are seen in persons with lower cognitive abilities, which makes it hard to reliably diagnose dyscalculia.

The goal of our case study is to identify mathematical learning difficulties (dyscalculia) in our participant via a systematic interview technique about her cognitive processing. She seems to have great problems when dealing with number sense and some other symptoms that are typical for dyscalculia. We found out that she fails when given a task of adding up 3 and 5, while she is able to successfully solve quadratic equations. However, to accomplish the later she has followed a learned step by step procedure, which she didn't really comprehend. Our aim is to find the point at which she has failed to acquire some facts or concepts that are crucial to numeracy development. Training will start at that point, using a structured multi-sensory approach which uses real objects to explore mathematical ideas with the participant, discussing what she is doing. We will apply Polya's model of strategies of solving mathematical problems and Zimmerman's Self-regulation empowerment program.

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Socioeconomic Status as a Factor in Second Language Acquisition

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For many years, research in second language acquisition (SLA) has mainly focused on identifying the universal processes in SLA, emphasizing similarities between second language (L2) learners. Nevertheless, in order to answer the question of why a fairly large individual variation in L2 learning outcomes can be observed, it is important to look at differences between L2 learners as well. There are many factors thought to influence the success of SLA, and they can be categorized as internal or external to the learner. To date, a great deal of research has been concerned with internal factors, such as age of L2 onset, language aptitude, first language transfer, motivation, and so on. Language aptitude, which is conceptualized as comprising of various cognitive skills related to L2 learning, was found to be the most consistent predictor of success in SLA [1].

However, such studies have typically not considered variation in the social context in which SLA takes place as an important factor [2]. In addition to internal factors, the external factors, such as cultural variables, L2 learner's socioeconomic status (SES), and so on, may also play a role in SLA and therefore affect L2 learning outcomes. Previous studies investigating the relationship between L2 learners' SES, usually assessed through maternal education levels, and their L2 learning outcomes have found positive correlation between higher SES and more advanced L2 skills [1]. The aim of the research project, which will be presented, is to look at the relationship between L2 learners' SES and their language aptitude and thus further examine the role of SES in SLA.

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The Embodied Cognition Explored on a Case Study

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In my research I will use the alternative paradigm in cognitive science, embodied cognition. This approach states that the nature of the human mind is largely determined by the form of the human body. In this paradigm aspects of the agents body beyond the brain play a significant causal role in cognitive processing. [1] An interesting question is if with the improvement of the motor tasks, a better performance of the cognitive tasks follows. A recent study [2] shows that children who started doing regular physical activity at school and thus performed better on the Test of Gross Motor Development also improved their grades in math. My study is set to explore how strong the interaction is between motor processes and cognitive processes in a participant with motor impairments.

My participant is a 56-years old woman with cerebral palsy (CP) with no cognitive deficits. She has spastic and distonic type of CP combined, with a defect of pyramidal tract and basal ganglia. She has a partial motor paralysis of the left and right leg, 60% each and a partial motor paralysis of left and right arm, 40% each, in total she is a 100% invalid. She can walk in places she knows (i.e. at home) with the help of cruthes, elsewhere she needs to use a scooter. I will try to influence on her body with physiotherapy to reduce painful spasms and slightly improve her motoric. There are going to be ten one hour long sessions performed within one month period. Before and after the physiotherapy my participant will perform motor tasks adapted to her abilities and cognitive tasks. Afterwards the performance on all tasks will be compared. My expectation (and assumption) is a slightly better performance of the motor tasks and reduced pain and spasms after the physiotherapy since »it can be speculated that [...] physical fitness training, is beneficial to improve physical behaviour in persons with CP.« [3]

The questions to which I would like an answer is to what extent does body play a role in cognitive processing and if a slight change of body (i.e. less pain, less spasms, slightly improved motoric) could influence cognition. If such an effect will be visible, that would add a credit to the role of the body in cognitive processing and it would also add a new insight into a role of physiotherapy in individuals with motor impairments.

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Natural Semantic Metalanguage Framework (NSM): A Novel Approach to Computational Modeling of Cognition and Emotions

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Conceptualising cognition at large, and emotions in particular, in such a way that would provide us with valuable insights into their very nature has been a long-lasting challenge for science in general. One of the methods that has proven effective in this regard is modeling. A process that allows us to address the complexity of the investigated phenomenon by creating its functional simulacrum, i.e. a model. This model, in turn, represents an "artifact that can be mapped onto a phenomenon that we are having difficulty understanding" [1]. By examining the model, we can test the validity of our conceptualisation and, in this manner, increase our overall comprehension of the phenomenon of interest.

A class of models that has proven particularly useful in this regard are computational models. That is to say, implementations in the form of functional computer programs powered by specific-purpose architectures. The more multidimensional the underlying architecture is, the more efficient our model and the closer to deciphering the complexity at hand we will be.

Pursuant to this, the primary (ontological) goal of this study is to introduce one such multidimensional architecture that grounds cognition, and emotions in particular, in a web of linguistic schemata - NSM scripts, formulated in a universal Natural Semantic Metalanguage (NSM). The secondary (epistemic) goal, to provide empirical insights into the intuitiveness of the framework itself with regards to its affective-modeling potential, as well as its potential for modeling cognition at large.

The practical rendition came in the form of a qualitative behavioural study based on a carefully designed questionnaire, aimed at testing the [a] modelling efficacy of the framework & validity of the existent emotion-scripts [pt. I] and [b] intuitiveness of the framework based on participants' self-devised emotion-scripts [pt. II]. Resting on the findings of the study, the ultimate goal is to propose the implementation scenario for a universal affective architecture in the form of a multi-language software - the "NSM cogni-cultural emotion translator".

Although originally a brainchild of linguistics, the multidimensional character makes the NSM framework [2] highly applicable to other disciplines as well. One such discipline that could benefit profusely from its potentials is also A.I. - domains that deal with computational modeling of cognition and emotions in particular [3]. Implemented in this manner, the NSM framework can be regarded as a linguistic substrate of cognition and emotions.

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Uptake Mechanisms of Pathologic Tau Protein

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Introduction

Tau is a microtubule-associated protein encoded by a single gene (MAPT) on chromosome 17q21. Alternative splicing generates six isoforms, which are present in the adult human brain [1]. Tau aggregation occurs in neurodegenerative diseases, including Alzheimer's disease and many other disorders, collectively termed tauopathies [2]. Deposition of phatologic tau protein in distinct brain areas and in distinct cellular populations is reflected by the diversity of clinical phenotypes of this tauopathies. However, tau pathology converges in the hippocampus in all of them. In addition, prion-like spreading mechanism is proposed for meny of tauopathies [1]. Unfortunately, exact mechanisms of cellular tau uptake and ways of spreading are still not known. Thus, our aim is to investigate the possible mechanisms of tau uptake in the cell culture. We started our study by investigating the colocalization of tau protein and Rab5. RAB5A localizes to early endosomes, where it is involved in the recruitment of RAB7A and the maturation of these compartments to late endosomes [3]. The results gave us first indicators for possible mechanisms of tau protein aggregate propagation, in this case via the early endosomes.

Methods

Firstly, we employed basic biochemical techniques and protocols for isolation of different pathological forms of tau protein from human brain tissue. Next, we prepared primary rat hippocampal cell cultures. The primary cell cultures, which had been grown on a special glass cover slips were then incubated with previously isolated tau proteins. Next, we labeled tau protein and Rab5 with methods of imunnofluorescent staining. The last step was detection of eventual colocalization of tau protein and Rab5 with confocal microscopy.

Results

With analysis of preliminary results of pictures taken with confocl microscopy, we showed that none of the pathological forms of tau protein colocalized with Rab5.

Conslusions

From our results, we infer that tau protein is not involved in the internalization pathway via the early endosomes. In the next steps, we will first try to determine the possible candidate marker proteins for other internalization pathways, and then study colocalization of that markers with pathological forms of tau protein.

Acknowledgements

Special thanks to Dr. Ivan Milenković, for giving me the opportunity to join his team and project.

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"What Is It like to Be a Buddhist?"

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Buddhism seems to be the fastest growing religion in the West both in terms of converts and of previously non-religious individuals who seek to practice various meditation techniques. What is it like to be a Buddhist in the West? How does one experience the world, how does one describe it, what world-views does one have? Does one's experience change significantly and permanently after embracing Buddha's teachings or is it just a temporary "persona" one puts on?

I tried to answer these questions with the help of phenomenography and Corpus linguistics analysis. Phenomenography, a pragmatic method for doing qualitative research, aims at investigating different ways people think about a phenomenon. Its data analysis is always whole group oriented; patterns which emerge from the data are collected into categories of description [1]. Corpus linguistics, a study of large bodies of "real world" written texts, is an empirically-based approach with the focus on the meaning; by observing the occurrence of lexical units (words, multi-word units, phrases etc.) in context we find out how they are typically used [2]. I investigated texts that 16 Buddhists (experimental group) and 16 non-Buddhists (control group) from different European countries produced when answering a questionnaire I designed for this occasion, the Questionnaire of Life Situations. Its main point is to describe feelings, thoughts, attitudes etc. about important aspects of life as vividly and as detailedly as possible.

Very briefly, Buddhists seem to be a lot more compassionate and tolerant than general population; their way of thinking about the world is much more holistic and all-inclusive, to the point of overgeneralizing; they turned out to be more positive and optimistic as well as more self-assure, peaceful and calm. However, analysis of the correspondence with Buddhists via online forums and mails shed a sceptical light on the results as I have encountered quite some ill-tempered and defensive behaviour. Based on this disparity and the fact their answers were extremely imbued with main Buddha's teachings I argue that Buddhist participants exhibited strong socially desirable behaviour and exaggerated in a sense that they used the questionnaire to promote Buddhism and "teach" me its virtues.

The study has some disadvantages – age bias and lack of criteria for defining non-Buddhist group to say the least. But since this is a novel combination of approaches and my first exploration of this much unexplored interdisciplinary area of psychology of religion, world-view studies, and cultural issues in cognitive science, I am very satisfied with the result. In the future, it would be interesting to expand the study by getting more participants, enriching the questionnaire, and investigating different groups.

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Modelling Early Sensorimotor Development with Intrinsic Motivation

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Motivation

Early human sensorimotor development has been observed and is believed to be quite well described, for instance by the constructivists [1]. In Piaget's theory of Cognitive and Affective Development, the infant's capabilities and internal schemas are documented and explained at various substages of their sensorimotor phase. There has been a variety of approaches for computational modelling of the topic, ranging from traditional cognitivist, such as the Sensorimotor Schemas [2], to more data grounded emergent systems. We chose to explore a particular embodied model - one based on a curiosity drive and active exploration of the world.

Model

Intelligent Adaptive Curiosity (IAC) is a learning system simulating an autonomous robot [3]. The IAC is curious, being driven by internal reward derived from achieved learning progress - getting better at predictions. As a side effect, it seeks novel experiences, but also is careful and avoids completely unknown, thus potentially dangerous, situations. Having no prior knowledge of the world, the robot learns to act and to predict only via interaction.

In a complex world, it becomes unwieldy for a single monolithic learning system to handle everything. As the size of observed data grows, IAC organizes itself to better reflect parts of the world, developing experts for classes of situations. This organization then also allows for maximizing learning progress by letting the robot focus on the most salient task.

Results

We implemented the IAC algorithm (using the scientific Python stack) and benchmarked it on multiple virtual environments (a blind BatCat playing with a toy, or a robot trying to locate its docking platform). It actively explored the world, switching to more complex endeavours once the simple ones were understood, confirming the results of Oudeyer et. al. The most important task remains ahead: to fit IAC in the real world robot and reveal, whether its organizational mechanisms are enough to abstract away low level sensorimotor interactions, and produce similar behavior as the infants in Piaget's sensorimotor stage.

Acknowledgements

I wish to thank RNDr. Martin Takáč, PhD. for his utmost support, encouragement, and the insights on the topic he provided.

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The Medium Is the Message: How Presentation Formats Help People Ask Better Questions

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Background

A large body of previous work has shown that performance on probabilistic reasoning tasks is heavily dependent on how information is presented [1]. However, it has not yet been examined if presentation formats also facilitate how probabilistic information is utilized in an information search task. We examined (1) whether or not search strategies are affected by presentation formats, and (2) if this effect is mediated either by the ability to accurately understand the probabilistic structure of the search environment or by numeracy skill.

Methods

We conducted an MTurk study (n=818) where subjects were asked to make an information search query with the explicit goal of maximizing classification accuracy. The underlying probabilities of the search environment were designed such that the two possible queries corresponded to the optimal strategy for different informational utility functions, namely the reduction of uncertainty measured via Shannon entropy ("information gain") [2] on one hand, and the improvement of classification accuracy ("probability gain") [3] on the other. Relative to the goal of maximizing classification accuracy, only the probability gain query can be considered rational.

The three main types of presentation formats that we tested were the "probability format" (numbers expressed as percentages), the "natural frequency format" (numbers expressed through natural sampling), and various "visual formats" (icon arrays, bar graphs, and dot diagrams). Subjects were randomly assigned to a presentation format, which was displayed for both the information search task and a probability estimation task. Lastly, subjects also completed a numeracy test.

Results

The results are twofold, uncovering a strong effect of presentation format on search decisions (rational search decisions ranging from 27% to 86% of subjects), as well as finding no evidence that this effect is mediated either by numeracy or subjects' ability to judge the environmental probabilities. Taken together, our findings suggest that the way statistical information is presented strongly influences human information search behavior. Additionally, our results also indicate that the widespread use of explicit probability judgments may be a poor indicator for how well a subject can reason about a problem. Instead, we found that given the appropriate presentation formats, individuals can be quite capable of making rational decisions, regardless of their ability to explicitly provide accurate probability judgments.

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Adaptation Duration Dissociates Category- and Image-specific Processes for Faces

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In the last decades several studies have demonstrated that the way we perceive faces can be biased by the prior presentation of another face, a phenomenon commonly referred to as face-related after-effect (FAE). This effect was linked to a neural signal-reduction at the occipito-temporal areas. This stimulus-specific signal reduction has been referred to as adaptation (ADA), repetition suppression, or neural priming [1]. In case of faces, ADA can be observed in the amplitude modulation of the early event-related potential (ERP) components, such as the P100, N170, and P2. Recent studies suggest that manipulating the duration of the first face presentation provides an opportunity to selectively adapt neural processes at different stages of visual processing [2]. Although rapid (<1000 ms adaptation duration) ADA paradigms have found conflicting ERP results, these findings indicate the adaptation of early, short-latency responses, while for longer ADA durations a strong category-specific modulation of the N170 was observed. To date, only few studies [3] have investigated the effects of varying adaptor durations. Therefore the goal of this study was to uncover the effects of systematically varying adaptor durations on the behavioural and neuronal responses. To this end, in a 2AFC familiarity decision paradigm, we used five adaptor durations: 200, 1200, 2000, 3500, 5000 ms, and three face adaptor categories: Different Identity (Diff ID), different images of the Same Identity (Same ID), identical images of the same person - Repetition Suppression (RS). A Fourier phase-randomized adaptor image served as control (No). A strong priming effect was observed both in the accuracy and in RT, mainly in case of RS condition. A clear adaptation effect was found for all adapted conditions on the P1 and N170. In case of the longest (5000 ms) duration but not for the shorter ones (<3500 ms), there was a dissociation between image- and category-specific information reflected on the N170. In terms of P2, there was a step-by-step differentiation among No, Diff ID, Same ID and RS in an ascending manner for the right hemisphere. Our findings imply that by manipulating adaptation duration one can dissociate image-specific (comparisons with RS), identity-specific (Diff ID) and category-specific (No) processes for faces.

Acknowledgements
Special thanks to my supervisors, Gyula Kovács and Márta Zimmer for their invaluable help and guidance.

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The Power Of Being Here And Now - Mindfulness And Emotional Reactivity

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Introduction

Cultivation of mindfulness, the ability to pay un-judgemental attention to the inner experience of the present moment, is becoming an increasingly popular subject in the scientific society and in the past twenty years there have been hundreds of scientific studies researching the effects mindfulness based interventions (MI) have on the body, cognitive processes in the brain and with them connected behaviour. Several studies have demonstrated, that MI can be successfully used in the clinical setting, as well as for the improvement of cognitive functions and general well-being in a non-clinical population. This positive effect is often contributed to an improvement in adaptive emotion regulation (ER) - the ability to regulate the subjective as well as physiological and behavioural responses to emotional stimuli - which is suggested to occur due to the enhanced attentional control and monitoring abilities developed through the practice of mindfulness [1]. While previous research has shown that even a short mindfulness practice indeed leads to a smaller emotional interference in a resting state [2], the precise mechanisms behind it as well as the ways they differ from more conventional ER techniques are still unknown.

Experiment design

My research will focus on the unique feature of mindfulness ER technique that it doesn't seek to alter the experienced emotion per se, but rather the relationship an individual has with it, therefore regulating emotional impact by adopting the attitude of acceptance. This is in a contrast with other ER techniques that employ an active manipulation of the unwanted emotion, which, in addition to reduced emotional interference, also leads to restricted attentional focus and consequently impaired cognitive performance [1].

I am aiming to develop a task that would observe emotional-interference in the instances, where traditional emotion-regulation techniques are difficult to apply, such as when emotions are triggered without a visible cause and not fully cognisant, which makes it hard for a person to wilfully regulate them. The effects of MI on such subliminally evoked stimuli hasn't really been researched so far, but based on the supposedly enhanced ability of the meditators to attend to the present and choose what emotions they will react to, my hypothesis would be that emotional interference in meditation-naïve subjects should lessen after a few weeks of MI. Furthermore, I would hypothesize that the same pattern wouldn't be observed to the same extent in the people that practise other ER techniques.

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MEi:CogSci Conference 2015,

Ljubljana, Slovenia

Posters

Modality Differences in Processing of Auditory and Visual Oddball Tasks: a High-resolution EEG Study of P3

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Introduction

Electrophysiological studies of attention are mostly connected to EEG measurements of the P3 event related potential (also named P300). P3 is not a unitary phenomenon – it contains two temporally, functionally and topographically distinguishable subcomponents: P3a and P3b. The first originates from stimulus-driven disruptions of frontal attention engagement during task processing, while the latter can be observed when temporal–parietal mechanisms process stimulus information for memory storage [1]. P3 is usually elicited using the oddball paradigm in which target stimuli are randomly mixed with standard stimuli and possible distractors that are presented to the subject. Even though the P3 potential is a widely studied event related potential (ERP), there has been no conclusive evidence for different processing of stimuli from various modalities. Some initial evidence for sensory-modality specific generators of a cognitive P3 potential has been presented by Dreo, Attia and Pirtošek [2]. Our study will examine the electrophysiological correlates of attentional processes in two different modalities; auditory and visual. The main question to be answered is whether attentional focusing takes place along one unified processing pathway in a modality-independent fashion, or if there are rather multiple attentional processing pathways for specific sensory modalities.

Methods

Healthy, young adults (N=30) were asked to participate in the study. They will be required to participate in three separate sessions, during which their brain activity will be recorded with a 128-channel EEG. Subjects will have to count the number of randomly placed targets (oddball) in a series of more common (standard) stimuli with distractors. There will be two types of conditions for each task set: task difficulty (easy and hard) and sensory-modality (visual and auditory). Special task sets were designed to determine task difficulty for each subject based on a modified transformed two-up one-down algorithm [3]. This adaptive algorithm will be used to determine a subjects' personal just noticeable difference (JND). JND is a measure of the smallest frequency (auditory) or angle (visual) difference between standard and target stimuli, which subjects can consistently recognize.

Results

EEG recordings are underway and will be available partly in 1 month and fully in 3 months, we base our expected results solely on the aforementioned pilot study [2]. They found that both P3a and P3b exhibited statistically significant ($p < .001$) differences in brain surface potentials in three distinct regions. For the P3b these were: 1) one medial-central around Pz, 2) two bilateral parieto-occipital regions and 3) two bilateral central regions.

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Insight and Outside Creativity: "Aha!" Moments and External Hint Processing in a Remote Associates Task (RAT)

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Creativity enables us to produce new ideas, concepts, solutions and products and is therefore one of the most fascinating capacities of the human brain. Although many theories of creativity have been proposed, the definition of creativity is still debated.

This study takes a process-oriented approach and focuses on creative problem solving which is often accompanied by a sudden moment of insight – colloquially referred to as "Aha!" experience – revealing new interpretations of a problem. The aim was to investigate brain areas associated with creative as opposed to analytic problem solving with functional magnetic resonance imaging (fMRI). In the following we present the results of the behavioral data acquired in the course of the fMRI experiment; the fMRI data is presented by David Willinger (same volume).

Method. The Remote Associates Task (RAT, [1]) comprises word puzzles consisting of three words; the solution word forms a compound word with each one of them (example: cream – skate – water, solution: i c e [2]) and can be found either with insight or with analytic strategies (i.e. search). 48 RAT items were randomly selected for every subject and presented for 20 seconds and another 10 seconds with a hint in case the participant could not solve the problem. When the solution was found, subjects were asked to indicate which out of four presented options the last letter of their solution corresponded with to control for solution correctness. As a sudden feeling of insight is characteristic for creative problem solving [1], participants were asked to rate their feelings of insight and impasse (scale 0–5) after each trial.

Results. Participants solved 58% (n=668) of the problems and 72.6% of the solutions were correct. About two thirds (65%) of the problems were solved before a hint was shown. In 65% of the cases that had not been solved (n=484), participants reported that they understood the displayed solution. Participants found significantly more and more correct solutions and reported significantly decreased feelings of impasse and increased feelings of insight after the second block of trials.

Discussion. The increase of correct solutions and "Aha!" moments after the second block suggests that the resting state scanning phase (6 min) that was conducted after the second block of trials influenced the problem solving performance. This finding nicely confirms the proposition of previous studies [3] that broadening the focus of attention (e.g. letting one's mind wander during the resting state scanning) enhances creativity.

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Effect of Visual and Psychological Content of Electronic Games on Depressive Traits in Perception and Attribution of Players

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Electronic gaming on various platforms has been here for over 50 years. Effect of electronic gaming in terms of stress relief and mood management is in interest of scientists only for last decade. Treatment of depressive disorders is current topic because it is one of the most common diseases in developed countries. In has been discovered that electronic gaming may influence mood of player in positive and also in negative way [1]. We focus on effect of visual and psychological content of electronic games on depressive traits in perception and attribution of players. Furthermore we evaluate strength of this effect depending on various personality traits. Participants of both sexes were university students (18-28 years). At the beginning of experiment we tested them for Big five personality traits using NEO-FFI and we used PAQ-9 for evaluation of depressive traits. Depressive traits evaluation was performed at the beginning and after testing period which lasted one week during which participants played specific game for one hour per day in the evening hours. We chose two games, first and the main game was "The Cat Lady" by Harvester Games and the secondary game was "Static speaks my name" by developer Thewhalehusband used only for the last session of the testing period (strong content for maximal influence). Control group was evaluated before and after testing period without undergoing gaming sessions. Results of this study focus on influence of frustrating games on depressive traits in perception and attribution of participants in possible relation with big five personality traits.

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Manipulation of Balance in Tai Ji Quan and Changing Reflex Muscle Response by Using MM Method

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TJQ (Tai Ji Quan) is a Chinese martial art that is performed individually or as a training in pair. The ideal of effectiveness in TJQ is to control the opponent's balance with as little force as possible and can be described with the well-known metaphor that "4 ounces can defeat 1000 pounds " [1]. This metaphor usually stands for a special effect in TJQ called fajing. We talk about fajing effect when we prepare our partner to lose balance, or to bounce to maintain the balance, with very little force on our part. In this study, we focus on the muscular activity associated with the fajing effect. This will help us understand how and why a fajing effect is different from ordinary pushing or punching. On the basis of this understanding could be made further research and understanding of other basic TJQ principles as "attention" and "softness".

The study has two phases. In the first phase of the study, which is based on the demonstration of renowned Tai Ji Quan teacher, we tried to discover what muscle reflex reaction is necessary to reach the fajing effect and how this response differs from the usual pushing or pulling. In the second phase, which is in progress, we want to find out if regular person can achieve at least transitory fajing effect, which usually takes a lot of years of regular exercise, with very short massage intervention in the form of MM (Modulation of Motoric Processes) method [2]. MM method is an intervention massage that uses TJQ learning principles and movements to modulate motoric processes. We are measuring the muscle reflex response before and after the intervention. For this study we used a measurement system with double plates to measure the forces on the ground (left and right leg), EMG (Electromyography) system to measure muscle reflex responses, and program for capturing data developed by S2P d.o.o..

Our hypothesis is that the fajing effect do not need to be described in abstract terms such as word Qi, but it can be described in terms of reflex muscle reactions. The ability to manipulate the opponent's reflex muscle responses, enables TJQ combatant to destabilize the opponent with very little power. In case that the participants in this study will be able to successfully produce fajing effect even after 15 minutes of intervention with MM method, we will confirm hypothesis. At the level of TJQ exercise, this means that during the practice the participant learns to push in a new and different way, and that he must therefore create a new movement pattern.

Acknowledgements
Special thanks to Jernej Sever and Center premik d.o.o..

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Enhancing Sensorimotor Rhythm with the Use of Neurofeedback

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It has been shown that stroke patients with hemiparesis have significantly impaired sensorimotor rhythm (SMR) and its desynchronisation over contralateral hemisphere. This correlates well with ability to use the affected arm [1]. Thus it is reasonable that enhancement of this component might contribute to overall improvement.

Neurofeedback is a technique commonly used for operand conditioning of various EEG components. The exact mechanism of brainwave modulation is not clearly understood but it has been proven to be effective in treatment of diseases like attention deficit hyperactivity disorder or epilepsy [2][3].

Goal of this project is to verify whether neurofeedback training with our device setup is able to improve SMR on healthy subjects. We aim to find and test a suitable protocol in at least 10 subjects, which are being recruited mostly from our faculty. However, first step data collection is in progress and we work hard to obtain positive results in a near future. Later, after the effective protocol will be verified on healthy subjects, we aim to train SMR in stroke patients.

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Problem of Categorization on Obživa.sk

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Introduction

Obziva.sk is a portal for ordinary people, who can offer their skills in the form of service. This is how people can earn some money, even mothers on maternity leave.
The whole project started this March and we have already more than 150 registrations and these people offer more than 400 services. The more interesting part is that everything is based on categorization. Each category has to be accurate and when user visits the site, he has to know where to find the service he is searching for. And that's the problem, because We are no experts on every field there is. Maybe I'm able to design subcategories of "Hardware" or "Software", but not "Beauty" or "Electricity".

Method

That's where we decided to use user's descriptions of the service they provide to improve existing categories. To do so, my advisor Kristína proposed an idea to extract roots of words to be able to count their frequency in the descriptions. For this we searched for a good stemmer to begin with. The best official stemmer closest to Slovak language was the one from Ljiljana Dolamic, stemmer for Czech language [1]. But only counting the words in descriptions wouldn't be much help as we would get the most common used words that wouldn't be related to the specific category such as prepositions etc.

We had to get rid of those and just to have a document with unwanted words wouldn't be efficient. Here we used more sophisticated way and that's TF-IDF technique. Its numerical value shows importance of word in the document using term frequency and inverse document frequency.

Preliminary Results and Future Research

Now our preliminary results show that there are really some useful suggestions for new subcategories that we didn't even think about before. There are also useless words, but to improve results we will find stemmer for Slovak language as there are few differences compare to Czech. Also we want to use mentioned file with the words that we eliminate manually but only the ones that pass TF-IDF importance test.

In future there is lot of potential for these word suggestions, such as search engine optimization where we can set the most commonly used words by users as meta-keywords., because there is a strong believe that when ordinary people write these descriptions, then other people will try to find these services by the same keywords.

Acknowledgement

I would like to thank my supervisor RNDr. Kristína Rebrová PhD..

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A Physiological Correlate of Empathic Accuracy in Attentive and Non-attentive Listening: An EDA Study

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Empathy is central to social interactions, providing a link between the internal states of one person and another by observation of psychological and physiological cues [1]. The accuracy of empathic judgements is known as empathic accuracy, which builds on a combination of experience sharing and mental state attribution processes including both cognitive and affective domains [2], [3].

The present study is designed to investigate whether behavioural synchrony and EDA (electrodermal activity) synchronisation can differentiate between attentive and non-attentive listening, and whether there is a real-time empathic accuracy correlation with these responses. EDA provides information on the level of arousal from which emotional intensity can be inferred. The lack of affective valence is compensated through the combination with 'Affect Dial' ratings of the behavioural slices. During the initial phase of the study, 2 female and 2 male participants are recorded presenting emotional autobiographical event while having their EDA measured. Afterwards, they are instructed to watch the recording, and use 'Affect Dial' to continuously rate the intensity of the affective valence they had felt while telling the event. In the second phase of the study, 20 participants with equal gender distribution watch the recorded videos under normal and distracted conditions while continuously rating them using the 'Affect Dial' and also having their EDA simultaneously measured. This is a minor modification to the original methodology described in [3]. If the attention manipulation works, a lower empathic accuracy and EDA synchronisation in the distracted condition are expected. Moreover, we expect the EDA synchronisation to correlate with empathic accuracy in the non-distracted condition (between subjects). This would outline the importance of attention in empathic accuracy judgments and the necessity of attention training (e.g. therapeutic, clinical psychology education).

Acknowledgments
The authors would like to specifically thank Dr. Geraldine Fitzpatrick, Petr Slovak and the Human-Computer Interaction (HCI) group at the Vienna University of Technology for supporting this project.

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Provoked Confabulation in Patients with Brain Diseases

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Introduction

The aim of this study is to investigate how spread the phenomenon of confabulation is among patients with brain diseases. The term confabulation broadly refers to false or incongruous statements which are produced without the conscious knowledge of their falsehood and without the intention to deceive. To date, limited consensus has been reached regarding the definition, classification, differential diagnosis and cognitive mechanisms underlying this disorder. One accepted view among authors is that confabulations differ in the way they manifest. They can be categorized into two major sub-types in terms of form: spontaneous or provoked. Spontaneous confabulations occur without prompting and appear as an incoherent stream of consciousness whereas provoked confabulations occur in response to direct questioning and appear as a normal response to a faulty memory. There are many experimental studies describing single cases and others made with larger groups of patients who are already expected to be confabulatory. However, there is a lack of experiments involving larger samples with various neurological patients who are not a priori defined as confabulatory. With the use of a standardized, structured questionnaire, the present study will test the hypothesis whether provoked confabulations are more wide-spread among patients with brain disease.

Methods

The instrument chosen to elicit confabulations is Dalla Barba's Confabulation Battery [1], which has been used in numerous studies to quantify the number of confabulations across episodic, semantic, personal and non-personal domains. The questionnaire was translated and localized into Slovene. The subjects in the experimental group were recruited at the Neurological Clinic of Ljubljana. The inclusion criteria for the experimental group, which we believe will consist of 50 or more subjects, will be very broad in order to include as many different types of neurological patients as possible. The interview will be held at the hospital room of the participant. Every conversation will be recorded with consensus of the participant and re-listened by another experimentator before analyzing the data. The control group will consist of 20 or more healthy subjects who will match the experimental group on age and gender.

Preliminary Results and Future Research

The results of the questionnaire will be compared between the experimental and control group. In case some significant differences emerge, we will investigate the neurodegenerative disorder or location of brain lesion of those subjects who resulted confabulatory on test scores. We also consider analyzing the quantity, type and content of confabulations of confabulatory subjects and try identifying whether there is a common pattern occurring within groups of neurological patients. The criteria for dividing patients by neuropathologies still have to be determined. We believe that our research is not only important for determining how wide-spread the phenomenon of confabulation is, but also to test whether questionnaires as the one used in our study are appropriate for distinguishing confabulatory subjects from healthy individuals or patients with other disorders (e.g. Aphasia), which might be wrongly classified as confabulatory.

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The Effect of Cognitive Framing on Motivation and Risk Taking

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Motivation

The design of the incentives affects cognitive frames that influence the decisions on risk and effort, separately and jointly. Several theories talk about effort and risk-taking behavior separately, but in real life they are usually connected [1]. In the experiment, we will analyze choices in different frames created by the design of incentive scheme and outcome fairness and link decisions to cognitive and personality traits. We want to compare decisions on risk, effort and risk and effort jointly in dependence of incentive scheme design (bonus or malus) and outcome fairness (fair and unfair outcome distribution). Further, we want to explore the relatedness of these decisions with some personality traits. We hypothesize a relationship between the incentive scheme frame and outcome fairness and BIS/BAS questionnaire score and Achievement Motivation Scale (AMS) score .

Method

We will divide the participants in six groups, which will be a combination of bonus/malus and fair/unfair scheme. In the unfair scheme, participants can be overpaid or underpaid. The participants will have to make decisions, with which we will measure risk, effort and risk and effort jointly. These tasks are firstly measured in base condition (without incentives) and then in one of the six possible manipulations. At the end of the experiment, the participants will be asked to complete a behavioral approach system (BAS) and behavioral inhibition system (BIS) questionnaire and a revised Achievement Motivation Scale, which will allow us an insight into their personality traits.

Expected results

We expect that the results will complement the results of our previous experiment, where we researched which cognitive frames dominate in combined decisions about risk and effort [1]. In addition we would like to connect personality traits with decisions connected with effort and risk. We expect that the participants with high BAS and AMS score will more often decide for hard task when in bonus fair scheme and those high in BIS and low in AMS will opt for the hard task when in bonus and unfair scheme.

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Romantic Love and Visual Recognition

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In our experimental design we attempted to ascertain whether romantic love influences our visual perception to account for monogamous relationship. We submitted a group of young women in stable, exclusive relationships, to an experimental design in which they were presented a set of visual stimuli - pictures of individual facial features belonging to the subject's boyfriend, an attractive male neutral and an attractive female neutral. After each stimuli the participants were asked to respond by indicating who was on the picture. We hypothesize that there should be no correlation between the intensity of love and the ability to recognize the boyfriend and the female neutral, but there should be a negative correlation between the love intensity and the ability to recognize the male neutral. The measure of differentiation in recognition was the accuracy with which they could tell who was on the picture.

We used this previous study by Lundström and Jones-Gotman focused on olfactory perception as a basis for our experiment and decided to see if the mechanisms they talk about relate to other perceprion modalities, in our case the visual modality. The authors mention two separate, but connected mechanism – the increased attention to one's partner, which they call attention theory and the attention deflected from other potential partners, hence deflection theory. In their experiment they found out that there was a negative correlation between identification of an opposite-sex friend and degree of love, supporting deflection theory. We want to try a similar experimental design with visual stimuli to see if we can replicate the results or if there is no such effect with visual perception. [1].

Since facial recognition is a task the human brain is very good at, as it evolved to be, we decided to work only with facial features instead of whole faces and decided to keep the presentation of the stimuli for as short a time frame as possible. We decided to present the stimuli for 200ms based on two basic components that are tied with facial recognition. The weaker M100 and the stronger N170 (M170). While we did not employ EEG/MEG in our project we used this study as a reference for setting the time frame for stimuli presentation [2].

The relationship was assessed by Passionate Love Scale, a 15-item scale measuring the intensity of passion in the relationship. We hypothesize that the stronger the passion in the relationship is the less the women will be able to differentiate the male neutral control [3].

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Investigating Inequity Aversion in Pack-living Wolves and Dogs

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Domestication of dogs may have initially occurred to increase interspecific cooperation between wolves and humans. During domestication, humans bred for cognitive traits that enabled ancestral wolves, and eventually dogs, and humans to communicate and work together more effectively. Investigating cognitive, environmental, and social differences between wolves and dogs enables us to distinguish cognitive abilities that have been shaped by humans from those that have not changed since domestication from earlier, ancestral wolves.

Social structures of wolves and dogs rely heavily on cooperation. Inequity aversion, defined as partners resisting inequitable outcomes [1], may have evolved alongside cooperation as it allows individuals to assess with whom they should and should not cooperate. This study compares inequity aversion in wolves and dogs raised in pack environments to determine phylogenetic and ontogenetic factors involved in a cognitive process that potentially contributes to cooperative behavior.

Pairs of captive, pack-living wolves and dogs are tested under various equity conditions at the Wolf Science Center in Ernstbrunn, Austria. Equity conditions in the social setting consist of three tests: Equity (subject and partner receive same low-value reward for same amount of work), Quality Inequity (subject receives low-value reward, partner receives high-value reward), and Reward Inequity (subject receives no reward, partner receives high-value reward). In the No Reward condition of the asocial setting, subjects are tested on how many trials they will work without receiving a reward.

We expect results for pack dog dyads to indicate that dogs are sensitive (stop working earlier, display more stress behaviors) to a Reward Inequity more-so than a Quality Inequity. We also expect they will stop working earlier in the Reward Inequity test than in the asocial No Reward test. We predict wolves will show sensitivity to Reward Inequity. We also predict they will stop working earlier in the Reward Inequity test than in the asocial No Reward test. A sensitivity to Quality Inequity may indicate that wolves are more inequity averse due to their high dependence on intraspecific cooperation, or that they focus on food rewards more than pleasing a human, an effect of domestication.

We can compare pet dogs to pack dogs to determine which social interactions are shaped by a dog's training and close relationship with a human and which interactions are more broadly shaped by domestication. Wolves provide an important baseline comparison to the differences between pet dogs and pack dogs in order to identify the environmental and social pressures that contribute to the development of inequity aversion as a cognitive process in canids and potentially other species as well.

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Analysis of Biological, Behavioral and Cognitive Aspects in Children with Autism Spectrum Disorder

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Introduction

Autism spectrum disorders (ASD) are a set of heterogeneous neurodevelopmental conditions, characterized by early-onset difficulties in social communication and unusually restricted, repetitive behavior and interests. Moreover children with ASD often present high rate of behavioral and emotional problems that might have significant impact on their lives, families and society [1] .The etiology of behavioral/emotional problems in humans is likely complex and includes both biological and behavioral causes. Some studies suggest that testosterone can play a role in the complex etiology of various behavioral/emotional problems, especially aggressive behavior [2]. From cognitive aspects, increased levels of frustration might be one of the factors associated with behavioral/emotional problems in humans [3].

Aims

Purpose of our study was to investigate relationship between plasmatic testosterone levels and behavioral/emotional problems in boys with ASD. Further, association between frustration and various behavioral/ emotional problems was tested in the sample.

Methods

The study sample consisted of 40 pre-pubertal boys (ages 2-10) with ASD. In all children, parents completed Nisonger Child Behavior Rating Form (NCBRF) consisted from specific subscales: conduct problems, anxiety, hyperactivity, self-injury/ stereotypic behavior, self-isolated/ritualistic and overly sensitive. Frustration levels were assessed using single item from NCBRF. Total plasmatic testosterone levels were determined in venous blood samples.

Results

It was found no correlation between plasmatic testosterone levels and any of the subscales of NCBRF. Testing second hypothesis, we found out that boys with higher frustration were significantly more hyperactive ($t(38)=-3.132$, $p=0,003$), overlysensitive ($t(38)=-6.049$, $p=0,0003$) and had more conduct problems ($t(16.74)= -4.274$, $p=0,001$) in comparison to boys with low frustration.

Conclusions

Although we did not find significant correlation between plasmatic testosterone and behavioral/emotional problems, research has shown that androgen effect of testosterone is not only influenced by actual testosterone levels. Further investigation of complex androgen activity [1] might bring more clarification to the role of increased androgenicity in behavioral and emotional problems in ASD. Moreover, frustration appears to be important cognitive phenomenon contributing to complex etiopathogenesis of behavioral/emotional problems in pre-pubertal boys with ASD, which is in line with previous findings [3].

Acknowledgements

I would like to thank my supervisor Dr. Anna Pivovarčiová for the time and effort she devoted to the project.

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Neuroimaging of Religiosity

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Religious convictions in neuropsychological studies are usually evaluated either by complex questionnaires or by simple “grade your belief in God in 1-7 scale”. Both approaches, have advantages and disadvantages, however they display one common weakness - assessment of religious conviction is entirely subjective and therefore can be influenced by respondents willingness to disclose their beliefs, comprehension of assignment and ability to accurately evaluate themselves.

Goal of our research is to find an objective method for one’s beliefs appraisal. Possible alternative measures will be discussed with emphasis on neuroimaging. N400 potential is proposed as marker of convictions. Normally it is elicited in response to semantic violation, although it has been proven to appear after stimuli conflicted with subject moral values system. Amplitude of N400 is postulated as religious beliefs indicator.

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Experiential Differences Between Typing and Handwriting

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Introduction

Writing is a complex activity that involves a number of cognitive actions and relies heavily on perceptual and sensory-motor processes. Although the process of writing has been studied from many different perspectives, not much attention has been paid to its intrinsic "bodiliness" and the importance of the tool it is carried out with. Clearly, writing is very different when using a pen and paper or a keyboard and a screen regarding the movement patterns and the focus of visual attention [1]. What changes in our cognition when we switch from pen to computer? While numerous studies focus on the influence of the usage of distinct writing technologies on participants' knowledge and performance, not much has been said about its implications for the phenomenology of writing. The aim of this project is to highlight the experiential differences in typing versus writing by hand. Phenomenological interviews and various third-person observational methods were combined in order to carry out an in-depth qualitative analysis of participants' writing experience.

Method

The research plan was formed following the first-person observations of my own writing experience. The core of the inquiry was the phenomenological interview, conducted following the technique described by Petitmengin [2], the goal of which was to help participants become aware of their subjective experience and describe it with as much detail as possible. During the session the subjects interchangeably used handwriting or typing and talked about the accompanying experience; the sessions were videotaped and the computer screen display video captured. Since introspective examination requires motivation as well as skill, the participants were chosen on the basis of their interest in the topic studied and interviewed in three or more successive sessions, thus gradually turning into skilled researchers of their writing experience.

Future Research

In addition to the analysis of interview-acquired phenomenological data, I will also examine the participants' behavior during the writing sessions and the course of their text-creation. Although they have not yet been thoroughly analyzed, the phenomenological data from the first three participants suggest a number of medium-dependent characteristics of their writing experience. The current findings will serve as a guidance for further research with more participants which will hopefully reveal some generally present patterns of the studied phenomenon.

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Has the New EU Directive (Legal Framework) Influenced the Recognition of Sleep Apnoea Syndrome?

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Report of the European Union Obstructive Sleep Apnoea Working Group [1] states Obstructive Sleep Apnoea (OSA) as one of the highest risk factors for motor vehicle accidents. This issue was addressed by the new EU directive [2] - the drivers, both professional and amateur, suspected of excessive daytime sleepiness are temporarily forbidden to drive. The aim of the present study was to examine if these new regularities had any effect on the diagnosis of the Sleep Apnoea in Slovenia, comparing patients diagnosed with Sleep Apnoea Syndrome in 2009 and 2014. Clinical features, risk factors and polysomnographic characteristics of patients will be described and analysed.

Data was collected at the National Sleep Disorder Centre at the Institute of Clinical Neurophysiology, Ljubljana UMC, for the entire year of 2009 and 2014. There was a different sample of patients each year. Comparison of these two periods includes the clinical features of patients, variables, recognized as most important for the diagnosis of Sleep Apnoea, and characteristics of their polysomnography recordings.

In 2009, 55 patients were diagnosed as having Sleep Apnoea while in 2014 this number increased to 96. In 2009, family physicians appropriately referred 10,9% of all patients discharged with the diagnosis of Sleep Apnoea. This number increased to 91,7% in 2014. Comparison of categorical distributions of the two periods for the Epworth sleepiness scale (ESS) has shown statistically significant difference ($p = 0{,}007$). The differences in categorical distributions of the duration of sleep related problems ($p = 0{,}053$) and average decrease in saturation ($p = 0{,}100$) were statistically significant at 0,10 significance level.

Our study shows that the EU directive had effect on the number of referrals by the family physicians. The indication of OSA was better among family physicians and the number of patients diagnosed as having Sleep Apnoeas in these two years had increased. The duration of sleep related problems was shorter in 2014 compared to 2009, indicating that problems were more properly recognized. Furthermore, the categorical distribution of the ESS could imply that the subjective evaluation of sleepiness in 2014 is less pathological than 5 years prior. On the other hand, the average saturation while sleeping indicates a reverse trend compared to subjective reports.
Further analysis of patient's risk factors for Sleep Apnoeas for both periods will be conducted.

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Does Age Modulate Neural Networks Underlying Empathy For Pleasant and Unpleasant Touch?

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Empathy may be a fundamental mechanism guiding prosocial behavior across the lifespan, however evidence on how the level of empathy is affected across the life span is limited. Neurofunctional studies exploring the effect of age on empathy in response to observing others' pain have shown an age-related decline in neural activity in anterior insula and anterior mid-cingulate cortex compared to younger adults [1]. In a behavioural study, Hühnel et al. [2] reported that while cognitive empathy was reduced in older adults, affective empathy was not affected by aging.

In a recent study Lamm et al. [3] found that depending on the valence of the experience, distinct neural networks are activated. These networks, activated by both first-hand and vicarious experience of touch, included the medial orbitofrontal cortex for pleasant touch and the right fronto-insular cortex for unpleasant touch. Hence, the aim of this study is to expand the knowledge of empathy by investigating how age modulates the neural and behavioral responses underlying empathy for pleasant and unpleasant touch.

To this purpose, functional magnetic resonance imaging was employed to scan 100 participants belonging to three different cohorts, adolescents (N=35, age=16-20), adults (N=32, age=25-34) and old adults (N=33, age=59-78). Participants were administered two independent experiments, enabling the joint investigation of first-hand and vicarious responses to pleasant and unpleasant touch. Participants were stimulated by visuo-tactile stimuli and then asked to rate the perceived valence of stimuli for self and for a confederate in different sessions respectively. The expected results would indicate a negative relationship between age and behavioral and functional empathic responses to touch.

Behavioral data showed that all three age groups rated unpleasant stimuli in the first-hand experience as significantly less unpleasant than in the vicarious experience, indicating empathy for touch. Old adults rated unpleasant vicarious experience as significantly less unpleasant than the adolescents and adults, indicating a decline in empathetic response. The functional analysis in addition to these results, will offer greater insight and clarity on empathy in relation to age and how this is reflected in neural and behavioral responses.

Acknowledgements
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Conceptualization of Cognitive Science and Cognitive Scientist Through Metaphor Analysis

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A metaphor allows us to think about an abstract concept in terms of concrete concepts. For example, time is money is a metaphor that shows our understanding of the value aspect of time, an abstract concept compared to money, in this case used as a concrete concept. Metaphors are not merely linguistic ornament, but an expression of the structure of the thought [3]. There is renewed interest in phenomenon of metaphors in disciplines of cognitive science, such as cognitive psychology, cognitive linguistics, computer science, anthropology, and some others. Study of metaphors is useful as the analysis of them can reveal the underlying conception of a phenomenon [2]. Thus, the basic idea of this study is that by analyzing a metaphor we discover how a person thinks about a particular topic.

The study investigated metaphors that individual participants formulated in order to describe concepts of cognitive science and cognitive scientist, respectively. Two samples of participants, experienced researchers in cognitive science and students of the Mei:CogSci program in Ljubljana, were asked to complete an online survey. The first part of the survey was used to obtain some relevant demographic information about participants' characteraistics related to the field of cognitive science. Metaphor analysis technique was applied in the second part to examine the perception of cognitive science and cognitive scientist's role. Participants were prompted to complete two sentences of the form: The X is like ... because ... .", using one metaphor in each case to indicate their conceptualization of each term. Association between the metaphor topic (X: cognitive science, cognitive scientist) and the required response (metaphor vehicle) was emphasized through the use of the word 'like'. The association was expected to be clarified through the use of the word 'because'. The qualitative data analysis used the methodology of inductive thematic analysis, which consists of labeling, sorting, unit of analysis, categorization and estimation of inter-rater reliability rate. Obtained data allow also for quantitative analysis.

The final results have not been obtained as yet, as the study is still in progress. Obtained major conceptual categories attributed to various metaphors will reveal how participants think about cognitive science and their professional identity. The findings of this study could influence deliberations about cognitive science and possibly be used within the instructional process of this discipline.

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How does Cleanliness Effect on Preening Behaviour in the Common Raven (Corvus Corax)

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Social touching is an important factor affecting the social dynamics and the networking of a society. Allogrooming or allopreening refers to cleaning another individual's fur or feathers using hands or mouth. Removing ectoparasites from the body parts of an animal, especially parts in which the animal is not able to reach by itself, not only helps the animal's wellness, it also promotes social relationships. There are two distinctive benefits of allopreening; the first is hygiene, and second is strengthening the social bonds. Biological Market Theory [1] suggest that allopreening is critical in the social market for an individual who needs to keep tracking on who is grooming whom and maintain the social networking.

There are a number of observational studies on preening and its effects on social life, but few experimental studies have been conducted. In experimental manipulations, Hemelrijk found grooming related to agonistic support [2], and Madden and Clutton-Brock found a correlation between allogrooming and ectoparasite level [3]. Although preening effect on feather maintenance has been studied before, few studies have focused on bathing. Birds use water for bathing to clean their feathers and remove parasites. The aim of the study is to investigate changes in preening activity after manipulating the hygiene level of ravens by controlling the cleanliness of their bathing water.

Nine hand-raised ravens at the Haidlhof Forschungsstelle, Austria were observed four times a week for three months. During the experiment, bathing water was taken out for two days. In the first phase of the experiment, clean water was introduced after the bathing water had been removed for two days. In the second phase, muddy water was reintroduced. The behaviour after bathing starts with shaking movements and continues with preening behaviour. The ravens refused to bathe in the muddy water condition. Therefore, changes on preening activity level in clean and muddy water condition is an expected result for this experiment. A connection of preening and its influence on the social structure can be an interesting point of view for an interdisciplinary perspective.

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Enabling Mental Time Travel in Virtual Environments: An Interdisciplinary Approach!

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Introduction

Research in philosophy of needs suggests that people are very often hardly aware of them [1]. Bewextra (B.) [2] is a recently developed methodological approach at the University of Economics in Vienna to gather knowledge about needs from stakeholders in organizations.

B. consists of 3 phases. Data acquisition (B. Collect) is based on a 20 minute imaginative mental time travel exercise called "Interacting with an envisioned future". This should enable participants to detach from present boundaries and restrictions to report their needs from a future desired "as-if" perspective [3]. The gathered needs get aggregated with an abductive qualitative method (B. Analytics) and validated among all participants (B. Validate). The method results in a catalog of validated needs from all stakeholders within organizations and can be used as a starting point for organizational learning (e.g. to develop a bottom-up vision or mission statement).

Problem and Motivation

In B. Collect, a workshop setting provides dedicated time and space as well as personal guidance to enable the time travel exercise. That is why the scale of B. Collect is rather small. To scale the method for larger organizations (e.g. for more participants) the question arises whether it is possible to reproduce the workshop setting within a virtual environment.

Research Question

The project seeks to answer the following question: "What are cognitive, technological and situative requirements to enable 'Interacting with an envisioned future' using Information and Communication Technologies?"

Results

Requirements will be drawn from the domains of cognitive psychology, human-computer-interaction, usability studies, online-based-therapy, online-coaching and mindfulness studies. Detailed (design) recommendations for the practical implementation will be given and structured on different dimensions. The review is still in progress but preliminary results suggest that there are few possibilities to actively support participants to enter a mindful state of cognition. Rather, facilitating imagination implies turning off distractions combined with easy to use and intuitive interfaces.

Acknowledgements

Many Thanks to Alexander Kaiser, Florian Kragulj and Thomas Grisold for supervising this project, to Katharina Rötzer for helpful ideas and to three anonymous reviewers for helpful comments.

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"Viennese Language Cafés" – an Exploratory Case Study into a New Phenomenon

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A Language Café is a new cultural phenomenon adhering to the current spirit of the time. It is an autonomous, self-regulated learning process, within which people gather in an informal setting for a linguistic and cultural exchange. The concept is gaining popularity due to the world's globalization and people's desire to learn languages and socialize.

One of the main goals of the current work is to make a first scientific attempt of exploring Language Cafés in Vienna. For that purpose German Cafés were chosen, where the preferred language is German, and also German-English Tandem Cafés, where the languages switch according to the principle of a tandem. In the first step, general background information (e.g. motivation to visit, personal background) on the participants was collected via questionnaires. Next, the physical space of a Café was examined. For example, the group dynamics in terms of physical space was analyzed (e.g. the ability of the participants to move between tables and form different groups). An additional questionnaire about a personal language learning history and experience with Language Cafés in the past, was administered.

One hypothesis was that the members of a Language Café are attending such meetings mainly to balance other forms of education, especially the formal learning in class. The first results confirm this hypothesis, showing that the majority of participants have recently been attending a language class or do so at the moment.

Further research questions are directed at the investigation of the relation between a meeting structure and people's attitudes to a Café, as well as the goals of participants and the success rate of reaching these goals.

As a preliminary result of this first exploration we suggest, that the more structured and guided the process is, the higher is the learning outcome for the participants. Similarly, the more relaxing the setting is, the lower seem to be the educational benefits, due to the fact that people constantly switch to English or their native language, or mostly are engaged in a "small talk". However, compared to a "non-formal" setting, a "structured" setting makes people feel less comfortable and relaxed. Another problem which was identified was the problem of finding a topic of conversation with new acquaintances. This lowers the educational benefit and should be addressed further.

The concluding part of the project includes reflections on what the ideal Language Café should look like. Except for being a means for cultural and language exchange, it can also include some key elements of a similar phenomenon, a World Café [1], which provides a platform for opinion sharing and creating new knowledge through interaction. Future research is needed to refine the present results which are first explorations into a new research field.

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Investigating the Ability of Dogs to Follow Human Gaze into Distance

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The ability to follow others' gaze is considered to be important for the understanding of others' mental states. It enables sharing intentions and forms a basis for collaborative actions. It has been argued that sharing intentions is a unique human ability that plays a central role in human cognition, specifically in human ontological development [1]. However, gaze-following is not limited to humans and has also been found in other species.

It is possible to distinguish two kinds of situations in which gaze-following provides a significant benefit. First, it can be used as a communicative intentional tool, such as when individuals share information about the location of food in one of two containers. Dogs prove to be especially skilled at reading human cues in this context, which is even more unusual as this ability has not been demonstrated in non-human primates. Second, gaze-following into distant space is a source of information about significant events in the environment [2]. It has been observed in a number of species, including apes, birds, goats and wolves, but it is believed to be absent in dogs [3]. If this observation is confirmed, it raises questions such as why dogs have the ability to follow gaze in one but not the other situation.

The present work investigates whether dogs have the ability to follow gaze into distant space. For this purpose 220 videos of a behavioural test conducted between 2010 and 2013 at the Clever Dog Lab in Vienna will be analysed. During the test, the dogs were separated from their owners for a period of 3 minutes. After this time, the owners came back, but did not greet the dog instantly; instead they were instructed to look ahead. Dogs, similarly to many other species, engage in greeting behaviours after a period of separation, and the lack of reaction from the owners is likely to violate their expectation and thus serve as a as a cue for an important event happening in the direction towards which the owners looked. The dogs' behaviour while their owners are ignoring them and looking into distance will be analysed with respect to whether the direction in which they were looking was the same as that of the owners. The expected result is that that the dogs will follow the gaze of the owner into distant space in this context.

Acknowledgments
I thank Zsófia Virányi and the Clever Dog Lab for enabling this project.

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Psychophysiological Responses During Blood Pressure Measurements

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Introduction

Blood pressure (BP) will always be a variable haemodynamic phenomenon that is influenced by many factors, including the circumstances of measurement itself. The condition in which an individual is hypertensive during repeated conventional blood pressure measurement, but pressures measured outside the medical environment are normal, is called white coat hypertension [1]. Psychological mechanisms, like anxiety are also thought to play an important role in white coat hypertension. In a study with hypertensive patients, those with white coat hypertension experienced significantly higher levels of anxiety during BP measurement in the clinic [2]. There has been less research on the role of other personality dispositions. We investigated whether individual's personality and level of anxiety affect white coat hypertension and weather individual's BP drops with each additional measurement. We were also interested, if other psychophysiological parameters such as skin conductance (SC) and skin temperature (ST) correlate with variations in participant's BP.

Methods

Data was obtained in 23 (7 male) participants (22-52, average 25.4 years of age). Recordings of skin conductance and skin temperature were made using Biopac MP150 system. Two electrodes for SC and one for ST were attached to the palm surface of the distal phalanx of the index, middle and ring fingers, respectively. BP was measured using automatic oscillometric device (Microlife BP A200 AFIB) on the left arm and continuous non-invasive arterial pressure (CNAP) on the right arm. Each participant was seated upright for 3 minutes before manual BP measurement began and was instructed not to move or speak during measurement. Each participant had five measurements with automatic oscillometric device, with 1.5 min pause between each measurement. Continuous non-invasive pressure, ST and SC were measured through the whole process. All subjects also filled out a brief version of the Big Five Personality Inventory (BFI-10) and two anxiety rating scales. Data have been collected but not yet analysed.

Acknowledgements

Special thanks to Nina Gržinič Frelih, izr. prof. dr. Gregor Geršak and izr. prof. dr. Anja Podlesek, for help and opportunity to work on this study.

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Does Auditory Textures May Lead to Conscious Processes in the Brain?

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Main aim

The theoretical neuroscience suggests that for conscious states to emerge it is necessary to activate a broad range of cortical networks e.g. arranging a certain representation of complex environmental stimuli. At the same time detecting residual consciousness, and thus a predictor for future recovery, in unresponsive patients after severe brain injuries remains a major clinical concern. To distinguish between two states of disorders of consciousness (DOC): minimally conscious state (MCS) and vegetative state (VS) it requires measurements that directly assess their cortical functions state e.g. in reaction to external stimuli. The main goal of the following experiment was to use auditory texture stimuli for the differentiation between conscious and unconscious brain states.

Methods and Materials

During the pilot study EEG recordings were performed on 10 healthy controls and 8 DOC patients with behavioral diagnosis of MCS or VS state. Subjects were received natural sound textures stimuli of rain and bubbling sounds and the change from one to another occur randomly in 3 different times. The change was relatively easy to detect, but the perception of each sound requires high level modeling of the statistics. To identify significant changes in neural response independent component analysis, across trial averaging and source localization were performed.

Results

The first step of analysis concentrate on establish the EEG evoke responses and localization of its components in healthy control group. It revealed changes from auditory to higher cortical regions while perceiving a change in the stimuli. The comparison to vegetative state/ minimally conscious patients showed that the differences were most prominent in frontal and central areas, mainly in VS group. Additionally EEG response patterns in VS group reveal a set of differences to response in MCS or control group. This results suggest the possibility that auditory textures can be further investigated as a marker of conscious processing in the brain.

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Comparison of Character Recognition by Humans and OCR Software

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Motivation

Character and word recognition (reading) is considered to be a crucial part of basic cognitive abilities of humans, it is nonetheless a highly complicated process that is influenced by multiple variables such as the type of handwritting, the language presented, whether the read subject is well understood or whether the given text has some if any meaning to reader. The main goal of this project is to account for these variables with the use of inferential statistics.

Method

The first task was to produce at least 4 arbitrary articles made up of at least 200 characters, equal distribution of characters and with approximatelly the same amount of all characters. The second task was to distribute said articles in order to produce 8 samples of hand written text of given articles. This will yield two examples of cursive text of every article and two examples of typed text of every article. There will be two types of text to be recognized by humans, first type will be article with coherent meaning that will make sense to human reader. The second type of text will be of no coherent meaning made up of pseudo-words that are syntactically similar to Slovak language. This is to account for the human ability to infer words based on the previous words in sentence and meaning of the sentence as a whole. The next task is to look for certain patterns of errors in human recognition in comparison of two types of texts (simple text versus pseudo text) and to look for the most common character substitutions in the recognition process and to compare the error rates of cursive and typed text. The last task is to compare human ability to recognize characters to the current cutting-edge open source optical character recognition software Tesseract-ocr which is one of the oldest OCR engines, currently being mainly developed at Google.

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Mortality in American Novels (1900-1999). A Quantitative Analysis.

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The purpose of this study is to investigate the cognitive attractivity of death, especially violent mortality in the 20th century American literature. The most important assumption behind the project is that fiction exaggerates the odds of dying from an agentive death [1]. It is assumed that fiction can be considered to be a kind of threat simulator [2], meant to simulate a very specific kind of threats: ordeals. Ordeals differ from threats because we cannot take precautions in order to prevent them from occurring, nor can we prepare ourselves for these ordeals, except by simulating them in our heads [3].

The study has been conducted in a form of quantitative analysis of a corpus of 744 novels, including general, violent, science fiction, and fantasy. These novels had to be written by an American citizen in English between the years 1900-1999. There is only one book per author, no co-authored books, no unfinished books or short stories compilations, no children or young adult novels. All novels with a Wikipedia summary and satisfying these conditions were included. The corpus has been manually coded.

The aim of the study is to compare the odds of dying in fiction with the odds of dying in real life. Specifically, we investigate the absolute mortality rates in fiction assuming that overall mortality would be much higher in fiction than in real life. We looked at three types of deaths- agentive, accidental, and natural. This prediction was tested against two baselines- a generous and a conservative one. Results show that homicides are least likely to occur in real life, but are massively over-represented in fiction. Accidents are over-represented and natural deaths are slightly over-represented in fiction than in real life. It is important to state that this concerns also mainstream, non-genre fiction. It is not an effect due to crime or horror novels.

We also investigated the proportion of accidental deaths due to predation since predation was a common ordeal in our evolutionary past and should be over-represented. The results show that the average frequency of predator attacks is significantly above our baseline 0,0001% and predation was found in all investigated genres. It is interesting that even realistic fiction features predation, sometimes at risk of stretching the limits of realism. However, analysis and interpretation of the data is still in progress.

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Can Technology Aid Interpersonal Skills Training? A Comparison of Reflective Processes in Psychotherapy Education

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Psychotherapists need to hold a variety of interpersonal skills to appropriately support their clients. In order to develop these skills students of psychotherapy actively review and explore their therapeutic experiences. During psychotherapy education such reflective processes are institutionally supported by different kinds of supervision. In recent years however, possibilities have been examined to facilitate the development of interpersonal skills with technological tools that guide and scaffold reflection. Our research compares reflective processes of psychotherapy students with and without a software tool called "mPath". It is aimed at increased understanding of possibilities and limitations to support reflection in psychotherapy education by means of technology.

mPath provides a framework for psychotherapy students to analyze video recordings of practice-sessions. It was developed to help students focus on individual aspects of the therapy setting and enables feedback from other students in the role of clients [1]. mPath is the first technology to support the development of interpersonal skills and reflection during counseling education and so far no studies have been conducted on whether or how the software can aid the development of interpersonal skills. In our study we identify ways in which mPath scaffolds reflection of psychotherapy students by gathering and analyzing observations of reflection, retrospective reports and interviews.

As a first step we conducted semi-structured interviews with experts from the Centre for Logotherapy and Existential Analysis (GLE) in Vienna to examine how students learn to reflect at this institute. In a second step we asked pairs of students from the institute to conduct therapy-sessions and reflect on them with and without using mPath. We qualitatively analyzed reports and interviews about their experiences during reflection in order to bring to light similarities and differences in the thought processes and outcomes initiated with and without using mPath. We will extract criteria for the quality of individual reflective processes in psychotherapy education in order to find possibilities of evaluating the qualitative differences of methods employed.

As a whole our research shall outline possibilities and limitations of technology to support reflection in psychotherapy and act as a starting point for further studies in the field.

Acknowledgements
We especially thank Petr Slovák and the HCI group for enabling and most helpfully supervising this project, the GLE for kind cooperation and the participants for bringing the theory to life.

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Color Vision Evaluation Based on Dynamic Intensity Adaptation of a Tunable Light Source

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The group for Integrative and animal physiology at Department of biology of Biotechnical faculty, University of Ljubljana, is investigating the basic mechanisms of perception of color and polarization of the light in insects and in humans. For the purpose of producing defined and controllable stimulation, a light synthesizer was developed. The goal of the project was to implement the device in determination of color sensitivity of cells in insects (ERG, single cell recordings) and sensitivity of the visual system in humans (ERG) [1].

The system consists of an array of 24 light emitting diodes, which cover the wavelength range between 350 and 650 nm. The response of the visual system is recorded for each LED separately. Light adaptation of the cells is avoided by stimulation with pseudorandom spectral sequence which is performed in seconds. Such implementation gives us a possibility to repeat multiple sequences and improve the signal to noise ratio.

The sequence is driven by an Arduino microcontroller board and a multichannel, pulse width-modulating driver. The array of LED lights is synthesized with a diffraction grating. The intensity of each LED is measured with a calibrated radio-spectrometer and adjusted to emit equal photon flux at all wavelengths. The response signal of the visual system is measured with microelectrodes and fed to the second Arduino microcontroller board, filtered and further processed with Fourier transformation to record the real amplitude of stimulus-related frequency components [2]. The difference between the single wavelength response amplitude and the average response is used as a correction factor to adjust the light intensity of LED in the next round of stimulation. The array of correction values for each of 24 LED is sent from the recording microcontroller to the microcontroller driving the LED array via analog output. The process is repeated until the stimulation evokes equal responses at all wavelengths. The number of iterations of corrections is determined empirically. The wavelength dependent correction factors represent the reciprocal spectral sensitivity of the visual system.

The implemented solution is robust and fast enough to be in actual use. Because of its high spectral resolution our system is unique on current market. The light adaptation could be further reduced with the implementation of the m-sequence; this sequence can be generated using linear feedback shift registers which represents the opportunity for optimization and dynamic, online adjustment of stimulus parameters.

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The Evolution of Morality: Axial Age in India

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Recent work in the cognitive study of religion found strong correlations between high levels of energy capture per capita (an indication of economic prosperity) and the emergence of moral religions [1]. The aim of the present paper is to trace the spiritual developments of ancient India during the Axial Age (i.e., ~800-200 B.C.) along the lines of behavioral ecology, in order to propose the following hypothesis: high levels of energy capture led individuals towards adopting a slow life-history strategy, which in turn favored the emergence of moral religions.

According to behavioral ecology and life-history theory, everything else being equal, any organism will deploy at any given time a set of fundamental motivations and fitness-enhancing processing mechanisms, in accordance with the cues it receives from the environment. In this sense, in the case of an unfavorable environment, the organism will adopt a fast life-history strategy, marked by, among others, an earlier reproduction, lesser investment in quality of offspring in favor of quantity, overall opportunistic behavior and low levels of self-care [2]. This may have been reflected by the positive view on violence and material success of the tribal societies of the early Vedic period (i.e., the RigVedic tribes). The high levels of mortality and general insecurity of the environment were due to the scarcity of resources, which generated frequent tribal wars and within-clan conflicts. Political leaders would conduct sacrifices asking the gods for victory in battle and wealth in cattle. Immediate reciprocation was sought-after, with high incidences of narrow, "tit for tat" morality being representative for this period. Also, there was no regulation of sexual life and no concern for detachment, while the belief in reincarnation was still mediated by kinship (i.e., one would reincarnate as one's own family member). The time of transition was marked by an increasing stratification of the social order, where the conducting of battles was gradually substituted by the competing for status in ritual settings. However, the much more prosperous time of the Axial Age (when energy capture was at an all time high) favored the adopting of a slow life-history strategy, associated with a later psychological development and sexual maturity, higher self-care, long-term investments and the delaying of gratification to increase future payoff. As a result, the late Vedic and post-Vedic period saw the emergence of practices such as asceticism, chastity and celibacy, renunciation, non-violence as well as an ethically-based belief in reincarnation. Moreover, the by now already entrenched ontological dualism encouraged high levels of altruism (e.g., bodhisattva) and redefined traditional, ritual-related core concepts (e.g., dharma, karma), by placing them under an ethical scope. This ultimately resulted in expanding the moral circle [3].

Finally, our hypothesis seems to be in accordance with data from the cognitive study of religion.

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GDNF, Ibogaine and Addiction

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Chronic drug and alcohol abuse result in biochemical and structural changes in the human brain and are especially expressed in midbrain dopaminergic neurons. Studies suggest that activation of glial cell line-derived neurotrophic factor (GDNF) signal pathways importantly promote growth, survival and regeneration of dopaminergic and motor neuron populations in adult brain. This properties make GDNF a potential candidate as a therapeutic medicine for drug or alcohol addicts [1]. The problem appears with administration, since GDNF cannot pass the blood brain barrier in the human brain. Indole alkaloid, ibogaine, which is extracted from the roots of the plant Tabernanthe iboga, promotes expression of GDNF in the brain. Ingestion of ibogaine resets the balance of some receptors and transmitters. Another studies showed ibogaine's effect on a cellular level that trigger remodeling of the housekeeping metabolism. After some initial energy costs it increases efficiency of physiological antioxidative systems, which reduce oxidative damage and decrease basal metabolic needs, liberating free energy for a prolonged period of time [2]. Patients can also gain from the psychedelic experience, which are common for higher (~15mg/kg) doses. Intense introspective states can be a powerful therapeutic tool and tend to lead to some life promises. When ibogaine is administered to treat drug dependence, patients usually report reduction of withdrawal syndromes and elimination of drug craving for prolonged time periods. Because of the prohibitive legislation of ibogaine in many countries, treatments are being held in uncontrolled environments [3], what can cause problems for patients and further research. Proper approach demands systematic testing before human use, that is why studies on enzymes, yeast, rats and human hepatocytes are necessary to create a safe medicine. For further work we have decided to culture primary human hepatocyte line ex vivo, since it is a valuable model for testing their mutual effects with drugs because to some degree the metabolic and transport pathways stay the same as in the liver in vivo.

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The Diagnosis of Parkinson's Disease Using Eye Tracking

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Eye tracking has already been used as a diagnostic tool for neurodegenerative diseases in previous research and has proved to bear potential for finding disease-specific features that could enable differentiation between respective neurodegenerative diseases [1].

Our aim is to develop a diagnostic tool that would provide assistance in the diagnosis of Parkinson's disease (PD) and in differentiation from other clinically similar parkinsonisms. The long-term goal is to conduct a longitudinal study to verify specificity of the eye tracking method to diagnose and predict the development of the studied neurodegenerative diseases. We hope our research could demonstrate, whether saccadic eye movements can provide an objective biomarker to accurately diagnose and evaluate the progression of PD, which could offer a cheaper and more easily accessible diagnostic method for initial screening than the ones currently used.

Materials and methods

Saccadic eye movements will be used to assist in the differential diagnosis between respective parkinsonisms and PD. We will measure eye movements in unmedicated participants who have been clinically examined and diagnosed with one of the selected neurodegenerative disease and healthy age-matching controls. We will be using the Tobii TX300 eye tracker to gather our data. Participants in the research will be shown pictures and videos, while we will simultaneously monitor the movements of their eyes. The tasks will involve the fixation protocol, SPEM (smooth pursuit eye movements) task, reflexive or pro-saccade, the anti-saccade paradigm and the memory guided saccades. With these tasks we will be able to perform measurements in relation to latency, amplitude, velocity and duration of the eye movements [2].

Expected results

We expect that the latencies of the eye movements will be normal in PD and Progressive supranuclear palsy (PSP), but patients with Corticobasal degeneration (CBD) will show a prolonged latency, especially in voluntary saccades. It is expected that such results will show in the antisaccade errors, which are common in PSP and dementias, but are not observed in patients with PD or Multiple system atrophy [3]. We also expect the fixation protocol will differentiate between PSP and PD, due to PSP patients having a reduced amplitude and peak velocity when compared to patients with PD [1].

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Emergence of Communication: Triadic Interaction

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According to theory that language has evolved in cooperatively-competitive environment [1], we have designed an extension to existing Tacit Communication Game (TCG) [2] to observe the interaction of the real participants. Adding the third player, the original two participants will have to communicate the same way as in original TCG, but in conditions that force them to hide their pseudo-language in front of the eavesdropper. A pilot research results will be presented.

It is typical for our communication that not everything we say has to be absolutely true. Language is full of misinterpretations, metaphors, lies or just misunderstandings. Still, we keep using it as a way to pass the information in a good belief, that the other side will understand us the way we want them to. What is more, it appears to be pretty successful. Unfortunately, there is no way to find out, how and why did such idea come to our minds back then. We can only guess and observe and create a behavioral models to (maybe!) get a little bit closer to this mystery.

One of the theories about emergence of communication says that language has evolved in cooperatively-competitive environment [1]: there might be a need to hide the passing information from the third person in the way that will be understood only by the chosen ones, so we were forced to create more and more complex ways to express ourselves. And as the Red Queen said to Alice: "Now, here, you see, it takes all the running you can do, to keep in the same place." [3] In other words, to keep our communication hidden and the other communication understandable (even when we were not supposed to), we were forced to improve in both: encrypting and decrypting messages over and over again.

Based on the previous experiments [2][4], we have designed a communication game to observe the communication between participants in an environment that prevents almost any usual way of communication with a third person eavesdropping. The two original players can not see the moves of the eavesdropper, but they will be informed when their code talk can no longer be safe. Then the participants can alter their code in environment without eavesdropper (and a reward). The role of the third player is to break the code talk as soon as possible.

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Is Neuronavigated Hot Spot Determination of the Motor Cortex Hand Area More Accurate than the Traditional Method?

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Introduction

Transcranial magnetic stimulation is a technique that can be used for excitation of cortical neurons via electrical currents induced by a rapidly changing magnetic field [1]. The importance of accurate coil positioning in TMS has been emphasized in many recent studies [2].Targeting the correct area of the brain (e.g. the DLPFC in the treatment of Major Depressive Disorder) is of great importance for achieving the optimal effect. Moreover, each individual has a slightly different brain morphometry, which makes the traditional landmark based estimation techniques, (e.g. 5 cm rule or 10-20 system) inaccurate [2]. In our study, we will compare two methods for determining the optimal stimulation site for the hand area in the motor cortex, known as the 'hot spot': traditional 'hot spot' hunting and coil positioning guided by neuronavigation. The main goal of our study is to determine which method is more accurate in locating the motor cortex hand area.

Methods

Five healthy volunteers will participate in this pilot study, and undergo both hand area hot spot determination procedures on two consecutive sessions. Resting motor threshold (RMT) and MEP latency for both procedures will be analyzed and compared offline.

Discussion

We expect that the neuronavigated method will produce a lower or equal rMT and a shorter or equal MEP latency, when compared to the traditional hot spot hunting method. This study is aimed at determining whether MRI guided TMS could be an alternative, not only to landmark estimated coil positioning on the motor cortex, but also to the traditional motor cortex hot spot hunting procedures, which are known to be time consuming, subjective and inaccurate [2].

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Implementing a Reinforcement Learning Algorithm for Analyzing Probabilistic Reward Processing Tasks

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Almost all living organisms follow the same general principle of maximizing rewards and minimizing losses. This can be achieved by repeating behaviours that were rewarded in the past and avoiding behaviours that were punished. During decision making, the brain utilizes a common currency for value which is associated with the predicted outcome of a certain decision and is represented by the mesolimbic dopamine system. This system forms stimulus-outcome associations in order to optimize the likelihood of obtaining future rewards which is called reinforcement learning. The mechanism behind reinforcement learning is based on the reward prediction error, the difference between the expected and actually received reward. The neurochemical correlate of this reward prediction error is represented by the neurotransmitter dopamine in the midbrain [1].

To investigate the causal role of dopamine in human decision making, one can use challenge agents to systematically block dopamine receptors and then observe its effects in a probabilistic reward processing task [2]. In this task subjects have to learn to discriminate between stimuli which are associated with gain or loss of money by trial-and-error and subsequent positive or negative feedback. This learning behaviour can be characterized and modelled by using the Q-Learning-Algorithm, which estimates two parameters: alpha, the learning rate, which describes how feedback (gain 1€ vs. lose 1€) influences the subjective value of a stimulus and beta, the temperature, which describes the randomness of choice and reveals the nature of the underlying choice behaviour [3].

My final task consists of implementing the Q-Learning technique in the MATLAB® programming environment, which then will be used to analyse further behavioural paradigms of similar nature [1] developed by the Neuropsychopharmacology and Biopsychology Unit at the University of Vienna and also will serve as my first attempt of computational modelling in the domain of decision neuroscience.

Acknowledgements
I would like to thank Dr. Christoph Eisenegger and Dr. Michael Naef for supporting this project

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Temporal Sampling Framework: Pilot Study on Slovak Children with Developmental Dyslexia

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Introduction

The temporal sampling framework for developmental dyslexia suggests that an impaired perception of slow amplitude modulations in the auditory signal is responsible for phonological deficits in developmental dyslexia such as decreased ability to detect syllable onsets and stressed syllables, but also problems with the perception of musical meter and amplitude rise time perception. This deficits might be due to the lack of lateralisation in slow amplitude modulations processing in dyslectic population [1]. Previous research also suggests different performance of dyslectic children in dichotic listening tasks [2]. In this study we investigate a relationship between reading level, patterns of lateralisation and perception of amplitude modulations and musical beat.

Problems with the temporal sampling have been reported in many languages, but to our knowledge there was no such study in any Slavic language.

Methods

A total of 28 right handed children aged between 10 and 15 years who had Slovak as their native language participated in this study. Children in the experimental group (N=14) had statement of developmental dyslexia from their local education authority. We used the control group matched by age (N=14).

All participants received the short hearing test and the short text reading task. They also completed The Hand Preference Questionnaire [3]. The lateral asymmetry was investigated with a free recall dichotic listening to the CV syllables [2]. Then we used two tasks described in [1]. In the rise time discrimination task 3 tones were introduced on the each trial. Two of these were standard tones (fixed 15 ms rise time) and one was deviant (rise time varied logarithmically from 15-300 ms between trials). Participants had to identify the deviants. The beat perception task consisted of 9 short rhythmic phrases played twice within one trial by a vibraphone. In half of the trials the accented note duration in the second phrase was increased by 100 or 166 ms. Participants had to identify trials with the prolonged notes.

Results

Although, there are no final results available yet, we assume that the results will be similar to those in other languages. This effect was reported in a great variety of languages both the syllable and the stress based and also with the different orthographic depths.

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Empathy of Catholics

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Main aim
This project is focused on the phenomenon of the empathy, defined by Baron-Cohen as an ability to suspend our single-minded focus of attention, and instead adopt a double-minded focus of attention. He continues that "empathy is our ability to identify what someone else is thinking and feeling, and to respond to their thoughts and feelings with an appropriate emotion."[1]

Empathy is as an important part of social life and as a common element or object of many socio-cultural and political discussions. The main reason for choosing this topic is the fact that in the most emotive social discussions in Slovakia the empathy is often emphasised as something certain sides of these discussions lack of. The most recent case was Slovak February 2015 referendum about the definition of marriage, adoption rights and parental rights regarding sexual education. In this case, it was the supporters of the referendum who were frequently blamed for being hateful, heartless, prejudiced and "phobic", with all of these being, I suppose, results of low empathy. The referendum was basically non-religious, but there is an evident significant overlap of the referendum supporters and the Catholics. The main organisations and personalities supporting referendum were undoubtedly Christian, especially Slovak Catholic Church. In 2011 census, 65.8% of Slovak population proclaimed themselves to be Catholic.[2]

Methods
Thus, there is an opportunity to research the empathy of Catholics and to compare it with the empathy of non-Catholics, especially non-believers. The respondents were asked to fill in the Baron-Cohen's Empathy Quotient questionnaire in Slovak language. They were also asked for their Catholic religious life and socio-demographic questions. The main criteria for the Catholic religious life are (1) considering oneself Catholic, (2) an attendance at the holy masses, (3) praying, (4) studying of the Bible or also other religious literature, and (5) attendance at the Christian community life. These should ensure that the respondent is truly Christian Catholic, opposed to the common criterion being only the proclamation of one's religious affiliation in the census.

The empathy scores were gathered from both Catholics and non-believers. They were differentiated according their answers to the religious life questions. The empathy scores of Catholics were compared with the scores of non-believers to discover whether there is some connection between the Catholic faith and the empathy.

Results
The author is responsible for the results, as presented in the poster. Since the results are not known at the time of writing this abstract, they are not given here.

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Parallel and Serial Models in Visual Search

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Task-relevant visual events become consciously accessible when the impact they have on visual search arouses attentional processes. This selection mostly depends on their importance towards awareness (such as senses or criteria) but also on their sequential occurrence [1].

Selective attention is redirected to those new visual salient stimuli which specify the goal of the search process: either early filtered for further processing (Broadbent's Filter Model) or as a result of less intensive stimuli discrimination (Treisman's Attenuation Theory). The question is now whether spatial attention can be independently divided to different locations for multiple focuses of attention occurring simultaneously. Whereas Serial Models of attention suggest an unitary attentional focus that is directed to one object at a time and rapidly moves between the others, Parallel Models assume that attention can be simultaneously allocated to several visual objects, but the distribution of attention cannot change rapidly when new objects arrive [2].

An ERP component called 'N2pc' composed of two distinct neural responses (an early parietal source and a later occipito-temporal source), reflects the focusing of attention onto potential target items in the search array. Its contralateral onset latencies appear to respect their objective temporal separation to stimuli which are presented in a very short time to each other [2] but what yet remains unclear is its behaviour regarding tasks that include more than one attentional target at the same time.

We conducted a combined EEG and Eye Tracking experiment in order to implement those two systems described above and so investigate the visual attentional scene on N2pc's activity across different tasks: we compared Single Target Systems (STS), where participants have to determine whether a single target element is or is not present amongst a display of distractors with Multiple Target Systems (MTS), through which subjects have to decide where to guide the focus of attention because the appearance of multiple targets causes a limitation of visual capacity for processing several objects at a time [3]. Our pursuit is to examine whether N2pc effects are similar during the saccadic programming of eye movements between targets' positions on STS compared to MTS [2] and if these eye movements' allocations might be relevant for the attentional preparation of MTS.

Our expectations address a cancelation of N2pc effects as a result of the response for opposite visual fields in MTS compared to STS and so conclude that attention would function in parallel for such processes. We also want to analyse whether significant N2pc effects can be found when eye movements (saccades) are involved in visual search for one target (STS) and/or two targets (MTS) presented.

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Optimizing a Multi-label Natural Language Classifier

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"Web of Needs" (WoN) is a developing infrastructure of the SAT studio that will allow consumers to describe and publish their needs and have them interact with offers in a semi-automatic process, reducing the need for manual search and enabling a wide range of unprecedented applications [1]. This requires a subroutine that categorizes e-mails by topic. My project is to create the prototype of a Machine Learning program to categorize pre-processed natural language inputs by content.

Features of the classifier are labeled data as input, large-scale learning as context, and multi-label as output. The performance measure is mainly to assign every entry to the appropriate category, but a certain error rate is unavoidable. WoN is supposed to be efficient also when it comes to deal with very large datasets. Given the context in which the program will be applied, implementing sophisticated algorithms would render the categorization too slow for practical purposes. After a theoretical research, a Naïve-Bayes model resulted as a good candidate. It is simple and fast, and even if its results are not generally as good as some other algorithms it can be improved by adding more parameters (e.g. stop words, stemming). In precedent applications it has been implemented as a spam filter, performing efficiently.

Two datasets are available to train and test the programs: one of 20000 mails to be divided into 20 categories, the other of 4000 mails to 180 categories. The two datasets will be used to double test the programs in order to compare the results with different mails-to-category ratios. The performance is evaluated with k-fold cross-validation (k = 10), confusion matrix, accuracy, precision, recall, and f1-score. The most successful setup experimented gave remarkable results, with precision above 90%. However the development is continuing and hopefully additional settings and trials will achieve even better performances.

A Machine Learning approach for e-mail categorization is promising, and could become part of the WoN infrastructure. A Naïve-Bayes algorithm, properly implemented, not only would be fast and simple, but can also be a very efficient tool for this sort of tasks. Natural language processing a field of growing importance in Artificial Intelligence. The scientific interest of this project is to test the processing efficacy of a Machine Learning algorithm performing natural language multi-label categorization on large datasets and how it can be optimized. Insights from this study can be useful not only for the field of AI, but to any scientific discipline looking for a functional model capable of simulating language and information processing on the order of humans.

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Induced Emotions Influence the Utilisation of Gaze Direction Cues in a Modified Posner Task

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Human social environment requires an ability to display and detect intentions and other mental states in others. Nonverbal communication covers a number of elements, among which eyes are of a great importance. However, they can carry an ambiguous social meaning, entailing a need of further indications, e.g. emotional expression [1]. Surprisingly, the relations between them remain almost neglected, usually reduced to their co-occurrence and not their mutual influences on perception processes. Most of the studies reporting existence of these influences use designs in which emotional expression is presented in the observed face [2], however, no research inducing emotions in participants and exploring its influence on the utilisation of gaze direction cues has been conducted so far. In this research we designed a two-stage study investigating this problem for the first time.

The first stage consists of a modified Trust Ultimatum game. The goal is to gather the greatest amount of money from all of the players, which requires a cooperation between them. The participants interact with, as they believe, three other players. In reality they face three algorithms designed to induce positive, negative and neutral affect towards the presented faces of the „players". To achieve the neutral affect, the participants were informed that the third „player" was not able to connect to the game and so no interactions were possible between them. After the game they are asked to evaluate their feelings towards all of the players and their own emotional state.

In the second stage participants perform a modified Posner task with EEG recordings. Posner [3] has shown that the subjects' knowledge about where the target will occur helps in shifting the attention to the direction of the target and aids its detection. We present congruent, incongruent and neutral trials, in which the eyes of the game co-players' eyes are used as symbolic cues, aiding, undermining or not influencing the detection of the target. Our analyses cover two dimensions: based on behavioural measures, where we compared reaction times for all conditions (congruency of the cue x emotional affect) and based on event related potentials analysis, where we looked for differences in processing the cues for emotional vs. neutral conditions. We predict that 1) the effect of attentional shifting will be replicated and 2) induced emotion will influence the participants' reaction times.

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SPM for EEG Source Localisation

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Introduction

Electroencephalography (EEG) is a popular technique used to record electrical activity of the brain along the scalp known to provide excellent temporal but poor spatial resolution. It is a direct measure of activity as opposed to indirect indicators such as changes in blood flow (fMRI) or metabolic activity (PET), which are also considerably more expensive.

Source localisation is an umbrella term for a number of methods developed to address the poor spatial resolution by utilising mathematical models to project data from sensor space into three-dimensional brain space. The result is an approximation whose quality depends on a number of factors.

Multiple sparse priors (MSP) [1], the specific approach used in this work, is based on the assumption of multiple dipolar sources spread over the cortex, each with fixed position and orientation, and the objective to estimate the source amplitudes (also called the inverse problem).

Statistical Parametric Mapping (SPM) [2] is a free open source software package featuring tools for the analysis of brain imaging data sequences including source reconstruction, allowing for fairly efficient workflow and additional inferences from EEG data.

Methodology and Results

The data from the 0° and 180° rotation tasks originated from a rotation-related negativity study provided by the author's supervisor [3] were imported and prepared using SPM. Source localisation was performed using the canonical template head model co-registered with the electrodes, normal cortical mesh, and MSP for inverse reconstruction. The process was documented for the purposes of this work and the resulting images were analysed qualitatively. Statistical analysis is still being performed at the time of submission of this abstract.

Acknowledgements

The author wishes to express his gratitude to Dr. Riečanský from the Institute of Normal and Pathological Physiology, Slovak Academy of Sciences, for providing him with the data, valuable guidance, and general goodwill regarding this work.

The author assumes full responsibility for the outcomes.

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Gaze on Pose – The Pose as Embodied Memory and Its Function for the Readability of Images

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How do we recognize visual patterns, read images and ascribe meaning to them? Cognitive Science has embraced the idea of situatedness and embodiment. It seems just consequent to study the "body" in art, the representation of it as figure and line, and the pose as the assuming or holding of a physical attitude exhibited by a figure in a picture or painting [1].

In order to investigate the correlations between pose, perception, gender and affect we employed the method of Eye Tracking. As part of the research strand "The Cultural Eye / The Gendered Eye[2]" the project investigates the depiction of human figure, pose and line via four questions regarding their perception:

- What relevance does image context have for the perception of pose/figure?
- Is there a gender bias in perceiving figure and pose?
- What kind of emotions are elicited in the beholder by poses?
- What impact does a figure or pose have on the navigation of gaze?

First a pre-survey was created with a set of 14 images where subjects were able to freely associate terms. Based on this pre-study we devised sets of categories in correspondence with the NEO-Personality Inventory. For the study subjects will view a set of 20 full-body standing poses (half female, half male) selected from art works. The stimuli are presented either as the original painting/photography, as a technical tracing of the original or as a simplified line drawing produced by an artist as a first-person perspective on a phenomenological level. Subjects tag the images with semantic differentials based on categories developed from the pre-study (e.g. threatened – threatening). Their gaze patterns and fixations on the images are recorded. As the majority of stimuli depict nudes, a Sexual Opinion Survey questionnaire is attached to assess openness and exclude possible bias [3].

First results will be presented that help in clarifying the construction of gender categories as well as the associations of incorporated knowledge with pose. Understanding figure representation (as a large projection field of non-verbal behavior) can help explain human cognition. The goal of our research is to determine the function of poses as emotionally charged visual tropes in the meaningful transference of embodied concepts and the readability of images.

Acknowledgements
Special thanks to Prof. Dr. Raphael Rosenberg, Mag. Mario Tadzio Thalwitzer, Carolin Kallert and the Laboratory for Cognitive Research in Art History, University of Vienna for supporting this project.

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16 Million Shades of Gray: Calculating, Simulating and Visualizing Total Color Blindness

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When it comes to total color blindness, it is very hard for a regular, color-seeing people to imagine the world, where the color information is missing. Because we can not see through the eyes of the other person, we can only assume based on feedback and biological studies. There had been numerous studies with the goal to create the simulation of color blindness, but as we explain in this paper, most of them are not accurate. Moreover, with the help of participants suffering from achromatopsia (one form of total color blindness), we propose our technique for simulating this phenomenon.

The basis of this research is that if a perfect simulation exists, achromatopic (i.e. totally colorblind) person should not distinguish between a normal, colored picture and a grayscaled version of it [1]. This is also the argument, why we think that the current approaches to this problem do not produce correct results – the subjects see a marginal difference and the pictures based on such algorithms look very unnatural to them.

To harness this idea, we have created a simple computer program, which can calibrate the color-to-grayscale algorithm based on the input from the colorblind person. The calibrating phase consists of a series of tests in which the application goes through a set of colors (red, green, blue, etc.) and the subject has to match the provided color with a shade of gray that, from his point of view, corresponds to that color. The data is then fed to an algorithm (weighted average with non-linear weights) that creates the simulation. It can be then applied to either pictures, or visualized on a RGB cube. This particular way of describing colorblindness has advantages, such as selecting the regions that look uniform to an achromat – an area that has constant gray levels (slice of the cube).

We believe that this research will lead to eradication of false and not accurate simulations of colorblindness. Also, it will be great if it can spark more interest in the study of color vision disabilities.

Acknowledgments
Special thanks to my tutor RNDr. Kristína Rebrová PhD. for her advice, guidance and valuable insight into the topic of color vision.

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Offline Optical Character Recognition for Japanese Alphabets

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Motivation

For foreign visitors to Japan, it is extremely difficult to find their way through country in less visited areas, as most signs, menus or warnings are written in either Hiragana, Katakana or as a combination of one of the previous alphabets and Kanji. For people with no education in Japanese, it is near impossible to find one's whereabouts, or which way to go to arrive to the intended destination. As there are almost no applications on mobile phones that could translate such signs offline, this application is supposed to fill the gap and translate any sign from Hiragana or Katakana to its phonetic translation (romaji) in Latin alphabet, so any visitor with no knowledge could at least read the signs and type them into a translator.

Solution

The programming language, which could be considered most appropriate for this task, was decided to by python, as it can be ported to mobile phones and is free with all the necessary libraries. Kanji has to be omitted, because of extreme amount of “characters” as well as internal complexity of each sign. Generally spraking, as [1] provides acceptable guidelines for a much more complex problem, I decided to use their approach where applicable.

The data-set will be created from larger amount of existing computer rendered rasterized Japanese fonts, as there seems to be no usable data-set at the time of writing.

Expected Results

In this phase, the main goal will be building a sufficiently “strong” machine learning algorithm or neural network that could solve these kinds of tasks and then compare the results and success rates. First steps will lead through the kNN algorithm, as this one has acceptable success rates with the MNIST data-set, continuing with a simple perceptron and depending on the success rates, more complex neural network structures will be used.

Future Efforts

After the initial phase, the application could be extended by a text selection from screen and text preprocessing, so the algorithm could identify the characters more precisely.

In the future, the application should be expanded with character recognition of Kanji as well. This feature will require a different approach [1] as this character set contains 13000-50000 unique characters.

Acknowledgments

Special thanks belongs to Kristína Rebrová, Jan Tóth and Matúš Tuna, as without their help, this application would hardly "emerge".

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Artificial Moral Agents: Current Approaches and Challenges

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The task of engineering artificial moral agents (AMAs) has been quickly gaining in importance and urgency, given the steeply increasing demand for and proposals of autonomous services and agents interacting with people. Researchers in the field of machine ethics have begun to develop dedicated strategies for engineering AMAs in a broad variety of scenarios.

As Wendell Wallach [1] notes, this task requires understanding of human moral decision-making, since humans are the only reference in this domain. A significant challenge is constituted by the limited understanding of functions of cognitive mechanisms underlying moral decision-making. In fact, there is even no agreement over the most fundamental questions regarding: the defining criteria for moral decisions (What makes a decision a moral one?); the defining set of cognitive processes for making a moral decision (Which are necessary and sufficient?); and the problem of evaluating moral decisions (What performance measures for AMAs?).

Instead, much effort has been concerned with premature proposals for engineering AMAs grounded in deficient assumptions regarding the processes of moral decision-making, with many of the issues discussed in fact being due to fundamental flaws in the approaches. Still, next to these impasses and frequent focus on irrelevant or secondary issues there do exist serious attempts to identify principled minimal sets of core components that make up moral faculty [2], a key milestone to enable subsequent research on how to instantiate and integrate them within a working AMA architecture.

I argue that improved understanding of the functional role of morality at the computational theory level as proposed by DeScioli and Kurzban [3] is a priority for progress with building AMAs. A sound conception of the role of moral cognition and its components is required for engineers to be instructed with the specific purposes that their models of moral cognition are to serve and design systems fitting such purposes.

Acknowledgements
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Moral Attitudes Towards Non-human Animals and Meat Consumption in Omnivores and Vegetarians under Mortality Salient Condition

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Terror Management Theory (TMT) assumes humans to repress limitations of a physical body and therefore inevitability of death by seeking commitment to social identity (SI) and feeling worth more than others, for instance, status of superiority of humans (SH) over non-human animals. Society and culture are constituted in order to repress death awareness through apparently meaningful (but indeed fragile) values, traits, and beliefs. Under mortality salience condition (MS) or in confrontation with worldview-threatening positions, defence mechanisms enhance status of social constructions, such as SI and SH. Prior research in experimental existential psychology revealed MS primes enhancing ingroups and degrading outgroups, for instance, reinforcement of SH incorporates ingroup bias and prejudices [1].

In order to investigate SH, questionnaire part a) will test if omnivores boost negative judgment of farmed animals under MS, whereas companion animals should be degraded less, due to positive representation in SI. For that purpose death awareness will be primed in MS group, afterwards omnivore subjects may perform worse than control group and diametrical opposed to ethical vegetarians in a 30 items test concerning attitudes towards farmed, companion, and pest animals.

In line with a), also in b) omnivores' performance under MS in judging statements on meat consumption and killing farmed animals may be diametrical opposed to ethical vegetarians' performance under MS, compared to not death-related control groups: Both MS groups may strengthen their specific attitudes.

To verify MS effect, in c) death primed subjects in comparison to control group may boost defence of SI specific diet commitments against worldview-threatening positions that are opposed to own SI.

If hypotheses will be proved true, results may indicate that omnivores' attitudes towards meat consumption and killing farmed animals are primary caused by SI, less by SH. Thereby a basic question [2] in regard to TMT is addressed, testing how enhancing identification with SI and reinforcing SH relate to each other.

My assumption that reinforcement of SH serves SI, supplies theories (e. g., [3]) claiming that acceptance of degradation and abuse of non-human animals, in particular farmed animals, is maintained by socially constituted norms with a potential explanation in terms of TMT.

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Typology of Phenomenology and Physiological Response to the Increase of Difficulty in Solving Mathematical Problems

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Introduction

Individual differences play a significant role in our response to mathematical problems. There are indices that people respond differently to the same problem. The difference is not only in their experience of the problem but also in the way their nervous system responds to that problem. Sympathetic branch of ANS (autonomic nervous system) is activated in stress response. Nervous system response can be measured with electrodermal activity(EDA) [1].

We outlined our research in neurophenomenological manner. In this research we will parallely observe physiological response (with EDA) and experience (with phenomenological interview).

Our study suggests is that there is a correlation between experience and physiological response.

Research Design

We will obtain our data from 12 preselected participants. Abbreviated Math Anxiety Scale (AMAS)[2] was used to select participants that belong in three different response groups; positive, negative and non-response group. According to the methodological requirements of phenomenological interview we had another requirement, participants had to express clear will to do self-inquiry.

Experiment will be conducted twice for each participant. For recordings of skin conductance(EDA) and heart rate, Biopac MP150 system will be used. We will use their non-dominant hand to attach two electrodes for skin conductance to the palm surface of the distal phalanx of the middle and index finger.

Participants will have to solve 4 sets of 5 mathematical problems. They will have 60s for each problem in the first and second set and 30s for each problem in the third and fourth set. After every set, they will have to estimate their mood (relaxed – tensed, content - discontent, present – mind-wandering). At the beginning, in the middle and in the end of the experiment, phenomenological interview will be made to estimate their subjective experience. We conducted our experiment in two phases, clock(third and fourth set) and non-clock phase(first and second set). This was added after pilot testing, where we found out that visual presence to countdown may have essential impact on experience.

At the end, quantitative analyse will be conducted with emphasis to the hypothesis. We expect that this experiment will show whether correlation between physiological response and experience exist and if there are different response groups.

Acknowledgements

Special thanks to dr. Urban Kordeš, izr. prof, assistant Toma Strle and dr. Gregor Geršak izr. prof. for opportunity to work on this project.

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"Effects of Pursed Lip Breathing Exercises on Blood Pressure and Heart Rate"

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Introduction

It is known that breathing affects heart rate, which is viewed as heart rate variability (HRV) and explained as respiratory sinus arrhythmia (RSA). RSA occurs during a breathing cycle via vagus nerve.[1] Additionally slow, relaxed breathing has been used to temporarily reduce blood pressure.[2] Pursed lip breathing (PLB) is a widely known breathing technique that requires subjects to exhale through pursed lips in order to make exhalation longer.[3] Present research represent a good base for further research on the effects short breathing has on our body.

Objective

In the present study we observed ability to reduce blood pressure and heart rate with 5 minutes PLB exercise in healthy adults.

Methods

Eighteen healthy adults (ten female; eight male; mean age 34.3 years; range 23-62 years) were recruited for this research. We measured their baseline (blood pressure, heart rate) three times in a row with the rest of 1 minute in between each measurement. After doing baseline measurement, participants were asked to perform the intervention, which consisted of performing PLB according to Cleveland Clinic's guidelines for approximately 5 minutes. After intervention we measured heart rate and blood pressure again with the same procedure.

Results

Mean percentage of systolic blood pressure change was 0.02 ±0.1. Mean percentage of diastolic blood pressure change was 0.05 ±0.15. Heart rate increased in almost all participants by 0.01 ±0.08. Mean value of mean blood pressure change was 0.04 ±0.12. The correlation of mean arterial pressure change and mean arterial pressure before was -0.2.

Discussion

The values in the data set are farther away from the mean, on average, which may have been caused by distractions from the environment that resulted in variable blood pressure change in various subjects as well as it reflects a large amount of variation in the group that is being studied. The correlation of mean arterial pressure change and mean arterial pressure points out that higher blood pressure leads to greater blood pressure reduction with PLB, meaning all the subjects with mean blood pressure above a certain limit (above normal blood pressure 120/80) at the beginning of the research showed decreased mean blood pressure after intervention.

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Changes in Galvanic Skin Resistance During Voluntary Inhalation and Breath-hold Activity in Healthy Adults

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Introduction

Galvanic skin resistance (GSR) is the most widely used parameter to detect changes in sympathetic nervous activity indicating anxiety or arousal [1]. It has been proposed that in humans the act of inhalation is linked to stress response and may be partly responsible for initiation of fight and flight response [2]. The objective of this research was to observe how voluntary inhalation and breath-hold affect galvanic skin resistance in healthy subjects.

Methods

A total of 16 healthy adults (ages 18 - 52; M = 30,13, SD = 12,25; 5 male, 11 female) were recruited via advertisement flyers. Written informed consent was obtained from all subjects prior to research. Subjects were first asked to wash their hands without soap and dry them carefully. Then they were seated in a relaxed position and attached to Galvanic Skin Response (GSR) sensor connected to Arduino computer that streamed recording data to personal computer at 200Hz sample rate. Two surface electrodes were attached to the index and the middle finger. The room was kept quiet and at a comfortable temperature. Researcher observed GSR data on personal computer and waited for subjects to achieve their baseline. Then researcher asked subjects to perform a voluntary inhalation and hold their breath for few seconds. Change in GSR was noted and afterwards researcher told the subject to relax and waited for baseline to be achieved again. Five consequent inhalations were performed by each subject and changes in GSR were noted accordingly.

16 subjects performed five voluntary inhalations each, resulting in 80 voluntary inhalations. Each subject's mean and standard deviation of change in GSR during inhalation was calculated.

Preliminary Results

Overall, GSR was reduced in all subjects (M = 24, 92%, SD = 6, 38%). None of the subjects' GSR raised. We are planning to expand our sample, after which further analysis will be conducted to determine whether drop in GSR values (already sampled and those to come) is statistically significant.

Discussion and Conclusions

Our preliminary results suggest that inhalation and breath holding affect GSR in a way that GSR values drop, which may indicate increased anxiety or arousal. Such link between inhalation and anxiety may be observed in everyday life when one holds breath due to being exposed to stressful or arousing stimuli. However, it should be noted that upon expanding number of subjects, appropriate statistical tests will be used to determine whether these results are statistically significant.

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Investigating the Impact of Personality Traits on Team Performance Using Agent-based Social Simulation

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Motivation and Research Question

Personality models aim to provide characterizations of systematic differences in the behaviors of human individuals and groups [1]. The goal of this project is to investigate the methodological value of agent-based simulation to predict human social behavior based on personality types in settings that require social cognition and collaborative interaction. The scenario investigated is a teamwork setting, where individuals of certain personality types may interact in order to solve a task. In our research, next to improving our working knowledge of personality theory, we aim to learn about the specific challenges in the specification, implementation, and evaluation (i.e., gaining of scientific insights) of (such) agent-based simulations. Importantly, this will include validation of the simulation model against natural settings, i.e.: are task-solving performances of human teams composed of members with specific personalities predicted by the simulations?

Methods

In order to address these questions, the empirical part of the project comprises specification, evaluation and comparison of the teamwork scenarios in the natural/human and simulated/software agent settings. The personality traits of the human participants are assessed with the NEO-FFI-3 questionnaire that is based on the Five Factor Personality Model [1]. The implementation of personality traits in software agents will be based on a BDI software architecture [2].
In both experiments, team performance in the respective tasks will be measured in terms of completion time as indicator of efficiency.

Expected Results

Based on the preliminary study of the literature, we expect to be able to successfully specify and implement the collaborative task scenarios and to obtain positive validation results. Alongside, we expect to encounter significant theoretical and methodological learning opportunities that should improve our grasp of the intra- and interdisciplinary possibilities, challenges, and cultures of practice, in the involved fields of personality theory, agent-based simulation, computational modeling, and methodological and epistemic scientific analysis.

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Many thanks to Paolo Petta for supervising this project.

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What Is the Pattern of Brain Activation During the Orthographical Repetition Suppression Task in the Blind People Reading Braille?

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Reading as an relatively young cultural ability gives us insight into how brain organizes itself. About 5600 years ago, brain tissue started to reorganize itself in order to process written language. Nowadays, we try to understand the processes that drive such plasticity and the nature of results of these processes. One of the methods to get insight into brain's functions consists of using repetition suppression paradigm during fMRI scans.

Orthographical repetition suppression refers to a decreased neural response when the target stimulus (e.g. ROAT) is preceded by the prime stimulus similar in orthographical structure (MOAT). The facilitation of the targets' processing can be used to study the nature of processing in a given brain region. In sighted subjects, orthographic repetition suppression (MOAT-BOAT) is observed in the occipitotemporal cortex, named Visual Word Form Area [1].

The presented study is intended to determine the repetition suppression patterns in blind Braille readers. We expect to find an orthographical repetition suppression without semantic suppression in the ventral occipitotemporal cortex of the blind, analogously to the sighteds' activation. This would be the evidence in favour into a supposition that the VWFA is a metamamodal operator for word form (irrespective of sensory modality). On the other hand, a different experimental outcome is also possible, as the blinds' V1 becomes a high-level amodal language region.

In our study we plan to collect a behavioral and a fMRI data from a representative group of congenitally blind people reading braille. As we plan to investigate an ortographical aspect of stimuli, we developed a braille analog of task used by Binder et. al. [2]. The subjects will be presented with pairs of four letter strings (prime-target) in which they are asked to determine if any of letters is an only-two-dot-letter. The experimental conditions are based on manipulation of similarity between prime and target. There are three main conditions – identical (ARTW-ARTW), one-letter-different (ARTW-ARGW) and all letters different (ARTW-EFIK). We use only pseudowords, due to ortographical focus in our hypothesis. Moreover, there is one auditory control condition planned. In the behavioral part of study we plan to track finger movements in order to control if subjects scan through the end of all letter strings.

Acknowledgments
I am grateful to my supervisor dr hab. Marcin Szwed for opportunities he gives me and for his support.

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Friends with Benefits: Effects of Social Support on Stress-coping Abilities in Pigs

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Background

There is strong evidence that social interactions can be a positive factor during times of stress and that social support can attenuate the negative effects of stressful experiences in gregarious species [1]. In humans, it increases health, stress-coping abilities, and well-being [2]. Thus, it is reasonable to assume that social support promotes welfare in farm animals as well. Yet, very little is known about the influence of social partners on stress responses in farm animals. In this study, we examine the influence and effects of social support on stressors in domestic pigs as well as the potential implications for animal husbandry and welfare.

Methods

A total of 18 adolescent pigs was tested in ten conditions each. In order to assess the pigs' relationships, their behaviours were evaluated and a hierarchy was established on the basis of a social network analysis, using extensive video footage. Afterwards, subjects were tested in two successive settings, an open field task and a novel object task, whereby the former served as a control condition. In the open field test, the animals' locomotor activity and willingness to explore an unknown field was measured. Each subject was tested in five different scenarios: (i) alone; (ii) with the mother; (iii) with a human caregiver; (iv) with a preferential partner; (v) with an actively avoided partner (the order was not counterbalanced). In the ensuing task, the animals' behaviour towards a stress-inducing novel object was observed in the same five conditions and assessed by means of focal observations.

Results

Final results have not been obtained yet as testing is still in progress. We expect the results to show a significant difference in the animals' demeanour towards a stressful novel object in all five subconditions. We hypothesize the pigs to be less stressed in the presence of a group mate they like, as opposed to a group mate they dislike, as well as significantly higher stress responses in the asocial condition. Furthermore, we presume significant differences between the open field and the novel object test.

Conclusion

The study is believed to demonstrate the importance of social support in stress-induced experiences. The results are expected to indicate a more pronounced buffering effect in the presence of a preferred conspecific than in the asocial condition. The insights gained are intended to lead to a better understanding of pigs and their consequent needs. However, further research in the possible implications of social support is needed in order to improve farm animal welfare.

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A Taxonomy of Language Games: Methodological Differences and the Influence of Feedback

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The field of language evolution is marked by interdisciplinarity and immense methodological variety. Within the last decade, a new paradigm has been used extensively to investigate potential mechanisms which underlie the origin of language: language games. Language games are laboratory experiments in which human or robotic participants are confronted with a task whose solution requires cooperation and communication, as explained by Scott-Philips and Kirby [1]. As the use of conventional forms of language is prevented, subjects are required to generate novel systems of communication.

Numerous language game designs have been developed and applied so far (for instance by Galantucci [2], and by Smith, Fehér and Ritt [3]), but due to the high number of factors which potentially contribute to the outcome of the language game and the general methodological diversity of the research designs, a comparison and integration of the results is often challenging. It is the aim of the present review to identify the principal paradigmatic and methodological differences of a broad selection of language games, and to create a taxonomy. Of particular interest are contrasts in feedback processes and other social dynamics observed in the different language games. The resulting classification serves as a basis for unveiling now hidden or neglected factors, for relating and interpreting the obtained results and for creating new and improved language game designs in the future.

The results obtained so far show that language game designs exhibit a number of crucial methodological differences. These are found in particular with respect to the assumed motivation of subjects to create a communication system, and with regard to whether the experimental set-up allows for feedback to be exchanged between participants. The fact that certain designs enable or encourage feedback, sometimes by resorting to pre-established signs, while feedback is impossible in other set-ups might have an effect on the results of the experiments. It can be concluded that the development and use of language game designs requires keen awareness of the influence of the specific method, and that motivation and feedback processes in the creation of communication systems represent an important area for future research, which might be conducted using further language game experiments.

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Golden Rule and Tit for Tat Simulation Scenario

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Introduction

Computational ethics is a computer simulation mechanism that incorporates the ethics theory. The aim of computational ethics is to generate populations of artificial agents which are capable of adopting patterns of behavior. There are two types of norm implementations into an agent's environment. They are either the central control where emergence of norms is under the coordinator's control, or the open systems which are more autonomous [1]. There are three phases of norm creation and spreading: the norm formation, propagation and emergence. This three-stage model is called the life-cycle of the norm. There are numbers of ways how to implement it [2].

The ethics is a moral framework defined by duties like obligation [3]. We can illustrate this with a situation where an agent has no other moral choice than the one represented by obligation, not to perform this specific action in contrary to morality. The other duty is responsibility. The agent does not have to act on the specific action, but he performs actions contributing to the desired results. In addition to duties, ethics is defined by the set of rights and liberties, and these determine the level of the agent's freedom. But it is important to distinguish the differences between norms, conventions and laws [2].

Aim of the Project

The aim of this work is gaining knowledge of computation ethics and prepare a scenario for multi-agent based simulation in NetLogo (modeling environment). Compiling of the scenario consists of definition of agent's types, their cost functions, properties and strategies. This simulation reflects the societal behavior controlled by norms of Golden Rule and Tit for Tat. Golden Rule, or Ethic of Reciprocity is a norm essentially claiming the following [3]: If the agent likes the action to be done to it, then the agent may perform the action towards another agent. The other norm - Tit for Tat - is similar. The agent's attitude is based on experience with another agent - simply he returns exactly what he gets. The scenario must reflect interaction of both norms and their changes in the society with “parasites”- those who violate the norms. The interaction between students and their tendency to sharing their homework is the suitable scenario. We are exploring the average agent's costs and percentage of sharing which are the important factors. This scenario and theoretical findings will be used by the author in his master's thesis.

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Defining Music Induced Pleasure and Reward in the Current Neuroscientific and Psychological Literature – a Systematic Integrative Literature Review

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By now the influence of music on human affect has been widely researched from a variety of perspectives: it is known that music can cause a large range of emotions [1], even seemingly contradictory ones [2]. Research is conducted with focus on rewarding and pleasurable effects of music especially in the fields of musicology, experimental psychology and in the various sub disciplines of neuroscience, such as affective neuroscience and neuroaesthetics. As a matter of fact, music is a valuable means in the field of affective neuroscience since it can be used to gain more profound knowledge on human emotions on a more general level [3]. While interdiciplinarity leads to a more comprehensive understanding of phenomena, it can also lead to an incoherent manner of using the most crucial terminology. The primary goal of this project is to clarify the major terminological differences and similarities between music studies from the fields of psychology and neuroscience. Awareness of the terminological differences and similarities is hoped to make the comparison of different studies in the respective fields easier.

The research question of this project is what are the major differences underlying the terms of reward and pleasure in psychological and neuroscientific literature? For this purpose a comprehensive literature research is being undertaken. Seven crucial databases from the fields of psychology and neuroscience are searched for articles from the past 20 years concentrating on terms of music and reward or pleasure in various combinations. In order to be able to answer the research question, the use of the terminology in the articles is evaluated according to the following three criteria: Which cognitive processes (such as memory, attention and evaluation) and psychological concepts (such as wanting, valence, arousal and emotion) underlie the researched phenomena of pleasure and reward; how are reward and pleasure researched in experimental conditions; and finally, how accurately are the terms defined in the literature. Also the major differences and gaps where more research is required are pointed out. The results will be reported in a tabulated and in a narrative form.

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The Influence of Bimodal Bilingualism on Attentional Processes

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It has been hypothesized that bilingualism provides a specific form of attention training, which enhances the efficiency of attentional control. Results of many studies seem to support this hypothesis, showing, e.g., a smaller cost of conflict in bilinguals than monolinguals in tasks involving resolution of cognitive conflicts. [1][2] However, a specific, unique type of bilingualism, a bimodal bilingualism, has remained a relatively unexplored and poorly understood. Bimodal bilinguals are able to communicate using languages in two different modalities: vocal (in the case of spoken language) and visual (in sign language). It leads to a phenomenon called code-blending, when bilinguals at the same time produce signs and spoken words.

We will present an overview of a previous studies on the effects of bimodal bilingualism on cognitive control and attention processes, with particular emphasis on spatial attention. This aspect of attention is especially engaged in signers, and thus may be particularly trained, compared to no-signers. [3] We will also present our own study on attentional functioning in bimodal bilinguals. The aim of the study is to examine effects of sign language on the efficiency of spatial and executive attention. A variant of arrow-flanker task with three different visual eccentricities of the target and flanker stimuli was used, so that the efficiency of conflict resolution on less and more peripheral locations of visual field could be measured. Two groups of spoken-sign adult bilinguals participated in the study: hearing children of Deaf adult (CODA), who grown up in Deaf families using Polish Sign Language and Deafs who know Polish Sign Language and Spoken Polish (in written form). The data collection is underway. We will discuss findings in relation to models of attention and experience-based modulations in attention efficiency.

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Movement Mental Imagery to Groovy and Non-groovy Music in Dancers and Non-dancers

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Many experts would like to understand movements and actions of people that are expressed as a way of generating rhythm to music [1]. The aim of our project was to explore possible differences in dance mental imagery between professional dancers and non-dancers to groovy and non-groovy music. The main research question was: are there differences between dancers and non-dancers in mental representations of movements to music.

We recruited 17 healthy young volunteers professional dancers and 18 non-dancers. We combine two different methods to acquire the data: (1) functional magnetic resonance imaging to capture the BOLD signal during blocks of spontaneous and dictated movement mental imagery to music, and (2) self-assessment of participant experience to music during mental visualization tasks. Three different conditions were created with instructions preceding each mental imagery task to test (1) participants' spontaneous mental imagery response to blocks of music, (2) participants' passive mental imagery response to blocks of music (when instructed to ignore the music), and (3) participants' active mental imagery response to blocks of music. Groovy (with Latino-inspired tunes) and non-groovy (with parts of the national anthems) music clips were instrumental and were combined into random pairs for every listening condition in every participant. Immediately after each listening task participants used a joystick and a non-graduated linear scale to express the degree to which they mentally respond to music during different listening conditions.

Due to ongoing data analysis only preliminary behavioral results are reported here. Our behavioral results suggest some potentially significant differences between professional dancers and non-dancers in responses to music. The listed result suggests that the pattern of movement visualization to music during spontaneous and instructed maximal response (in active condition) to music differed according to training experiences. Overall, non-dancers reported more emotional engagement in all music but comparable dance-visualization responses to dancers. When instructed to respond maximally, non-dancers surprisingly reported differentially increased emotional and movement-visualization responses to both blocks of music. On the other hand, dancers reported low emotional engagement across all listening conditions, more spontaneous response to non-groovy music with a pronounced differential increase in dance-visualization to groovy music when instructed to respond to music maximally. Further research of dance and dance mental imagery can enrich our understanding of music induced generation of movement and dance.

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Classification of Images into Categories Based on Content and Popularity of Images Using Artificial Neural Networks

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Motivation

Object recognition and classification is the basis for the understanding of the world around us. Only in the past several years have we acquired necessary software and hardware tools that are at least partially capable of replicating some of our cognitive capabilities. Developing algorithms that mimic human capability of object recognition and categorization may tell us how our own visual system works. These algorithms also have numerous practical applications, for example they can be used for automatic classification of photographs based on their content or in the robotic vision. Judging from the results of ILSVRC 2014 image recognition challenge, neural networks are currently the most powerful image recognition algorithm available [1]. Neural networks were also successfully used for predicting of the popularity of the images on image sharing websites [2].

Method

Our main goal is to test the performance of simple artificial neural network on two main tasks. The first task is the classification of photographs downloaded from image sharing site into four different categories. These categories are landscapes, wild animals, architecture and portraits. The second task is predicting whether a certain image belongs to two distinct categories of images based on their popularity, in other words if certain image belongs to category of popular images or regular images. For both tasks we have divided our image dataset into two sets, one for training, and one for testing.

For both tasks we have used our own implementation of multilayer perceptron in Matlab. Our neural network has been trained using stochastic gradient descent algorithm with weight decay and momentum on Nvidia GTX 770 GPU. The network has three hidden layers with sigmoid activation function and one output layer with softmax activation function. We have tested different combinations of network parameters to determine the most effective combination of parameters.

Preliminary Results

With our model we have achieved a 62.4% accuracy on category classification task, which is 37.4% above chance (25%). On popularity prediction task we have achieved 72.6% accuracy, which is 22.6% above chance (50%). Considering the simplicity of our model we think that using a more advanced neural network, as convolutional neural network or bigger dataset a much higher accuracy is achievable. In the future we plan to test more advanced neural networks on these tasks.

Acknowledgements

I would like to thank my supervisor RNDr. Kristína Rebrová PhD., prof. Ing. Igor Farkaš, Dr. and Mgr. Tomáš Kuzma for their support and advice.

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Some "Internal" Problems of Normative Theories of Thinking and Reasoning

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Generally speaking, the basic difference between normative and descriptive theories of thinking and reasoning is the approach used to describe these two processes. Normative theories try to determine how people ought to think or how reasoning should be carried out. On the other hand, the goal of descriptive theories of thinking and reasoning is to investigate a real nature of these processes - what they really are and how they are actually carried out. While the former approach is most commonly associated with process of reasoning being modeled directly within certain formal system (e.g., logical calculus, probability theory or rational choice theory), the latter utilizes the aparatus of natural sciences - one builds a model, which is then subjected to the test of empirical research.

Taking into account a sufficiently broad perspective one can claim that normative theories of thinking and reasoning have been developed for centuries. Moreover, such theories were a starting point for research on thinking and reasoning carried out within contemporary cognitive science. They provided the theoretical framework allowing to conceptualize or even operationalize the notions of thinking and reasoning. They have also been treated as a source of research hypotheses about the nature of these two processes. Nowadays, the normative approach is not a popular one. For example, in Oxford Handbook of Thinking and Reasoning published in 2013 only one [1] out of forty chapters is devoted to normative theories. In the contemporary literature they serve rather as a "strawman" or at least as a counterexample or suitable background for presenting theories of different kind (descriptive ones).

In my presentation I would like to indicate some problems in which normative approach to modeling thinking and reasoning is involved. In the title of this work I called them "internal", because they stem from the very properties of formal systems. Remarks I would like to present concern problems of idealization (the price for the accuracy of formal languages is the loss of the enormous realm of content included in our mental states), adequacy (the variety of logics is very great to the extend that it rises the problem of adequacy of utilizing tools), inconsistent yet non-trivial logics (normative theories require our beliefs not to be contradictory - paraconsistent logic weakens such criterion), logical omniscience (the claim that the set of beliefs is closed under the operation of logical consequence is too strong requirement for cognitive systems, at least for the human mind) etc. Despite the above criticisms I argue that normative theories of thinking and reasoning are still relevant for the cognitive science.

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Relationship Between Performance on the Iowa Gambling Task and Personality Characteristics

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Introduction

The Iowa Gambling Task is a valid neuropsychological decision-making task which was designed to predict decision deficits in patients by their altered response patterns across individual blocks of trials and their final cumulative scores. The aforementioned response pattern is characterized by altered adaptive decision-making and a different sensitivity to expecated value differences between risky choice options for either achieving gains or avoiding losses. Performance on the IGT has also been associated with certain personality traits. There are statistically significant correlations between IGT performance, SSS-V, and the Anxiety factor of the BIS/BAS scale [1]. Furthermore, Neuroticism, assessed by EPQ-J, negatively predicts IGT performance [2]. Moreover, there seems to be a difference in IGT performance between the sexes [3]. The aim of our study was to replicate the previously mentioned findings and include additional personality measures to expand the body of knowledge in this field.

Method

Healthy, young adults (N = 29, 15f; Mage = 22.57 years, SDage = 1.74) were asked to fill out four personality questionnaires. These included The Big Five Inventory (BFI), Zuckerman's Sensation Seeking Scale (SSS - V), the BIS/BAS scale, and Barratt's Impulsiveness Scale (BIS). Additionally, the subjects completed the Iowa Gambling Task (IGT). Both the questionnaires and the IGT were completed in a single individual session.

Result

Different measures of risk taking gathered with the IGT will be correlated to the measured personality traits to determine if there is an association between personality and patterns of risky or impulsive behaviour, and what the nature of this relationship is.

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Consciousness and Cognitive Control – Investigating Bottom-up and Top-down Attentional Selection in Vision

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Although most classical theories of cognition highlight cognitive control as one of the key functions of consciousness, research in the past decades of cognitive psychology suggests that unconscious processing is involved in cognitive control in different ways (e.g. [1]). This development begs the age-old philosophical question whether consciousness is a pure bystander without causal influence in cognition.

In the present project, we work on this topic by investigating the role of visual awareness in the top-down control of visual attention. There is a big debate in this field of research as to whether attentional selection is at early stages independent of the top-down control (bottom-up) or whether it is top-down contingent, that is, whether attention capture only occurs when the features of the impinging stimuli matches current search templates. A recently proposed hypothesis is in line with theories that highlight the role of consciousness in cognitive control (e.g. [2]). It holds that, with stimulus awareness, attention is captured in a top-down contingent way, without awareness, attention is captured in a bottom-up way.

We test this hypothesis in a series of attentional cueing experiments with either clearly visible stimuli (cues) or with subliminal stimuli (cues). We predict that visible cues only capture attention when they resemble the searched-for target (top-down contingent attentional capture). In contrast, invisible stimuli will capture attention even without a match between the features of the target and those of the cue (bottom-up attention capture). We measure behavioral correlates of attentional capture: 1) reaction time and accuracy in manual responding and 2) effect on the eye gaze behavior (target fixations and saccade parameters).

Results obtained so far support the view that attentional capture is bottom-up when the impinging stimuli are subliminal.

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A RAT Paradigm to Find Neural Correlates of the Aha!-effect

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Insight is a specific process in the brain, which sometimes is involved in creative problem solving by linking established knowledge in an original manner. Former EEG and fMRI studies revealed cortical activation patterns of insightful problem solving. [1,3] However, none of the studies assessed the effective processing of hints during the tasks. The aim of this fMRI study is to find the neural substrates involved in integrating new information for problem solving.

A common paradigm to test insightful problem solving is the remote associates test (RAT) [2]. For this study a compound RAT was chosen, in which the task is to find a word that makes three compound words with three stimulus words. Since the original and validated RAT is only available in English, we developed a German version as all the participants are German native speakers. Moreover, after translating the task we conducted a preliminary study using the translated RAT to show the adequacy of the words used in the task with 5 subjects, which yielded similar results as the original test. Another outcome of our work is an online version of the German RAT, an easy applicable and publicly accessible test.

In the fMRI study 24 subjects were tested using the German RAT. Every trial consisted of a randomly selected item of a set of 135 quadruples. They were instructed to press a button as soon as they had found a solution to the given task and subsequently were asked to provide the last letter of their solution word. After every run they had to rate their level of self-perceived insight and impasse. Their performance was measured on a 7T Siemens scanner; the analysis was performed in SPM12.

At the event of finding a solution with insight the activations showed significant increase in the language areas, right anterior temporal regions, medial areas (i.e. ACC) and subcortical structures. Nucleus accumbens showed stronger activation when a task was solved with insight than without and showed no significant change when no solution was found. During the task period the activation of DLPFC and ACC was linked to the successful use of the hint given after 20 seconds.

These results not only endorse the former findings [1,3], but reveal for the first time activations in subcortical areas that are associated to insight, which have not been found in previous studies.

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Simultaneous Detection of Dopamine and Ascorbic Acid in Organotypic Brain Slices Using Carbon-fiber Microelectrodes

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Introduction

Dopamine (DA) is an important neuromodulator, but its ability to form quinones also makes it cytotoxic. Quinones are highly reactive molecules, which inactivate proteins by binding to cysteine groups [1]. As an anti-oxidant ascorbic acid (AA) has a possible neuro-protective role against DA cytotoxicity. Introducing different amounts of AA into the cells, we want to determine its effects on DA auto-oxidation. Therefore the primary goal of this project is to establish a protocol for simultaneous DA and AA measurements utilizing rat nigro-striatal organotypic brain slices (OBC) to study DA and AA functional and dynamic interactions and pharmacology in vitro.

Method

To measure DA and AA we will use overoxydized poly(1,2-phenylenediamine) coated carbon fiber microelectrodes (OPPD/CFME) [2]. OPPD/CFME electrodes will be placed inside the 300-400 μm nigro-striatal OBC maintained in culture medium, while an Ag/AgCl pseudo reference and a Pt counter electrode will be placed inside the culture medium.

To test the hypothesis of AA preventing the auto-oxidation of DA, we will perform a pharmacological experiment using the above described setup. Organotypic brain slices (OBS) will be treated with reserpine that inhibits vesicular monoamine transporter, which transports DA into the synaptic vesicles. Metabolism of DA will be inhibited by treating the cultures with tranylcypromine and tolcapone that block monoamine oxidase and catechol-o-methyl transferase, respectively. Further production of DA in the OBS will be prevented by α-Difluoromethyl-DOPA. Because of the described treatment of OBC DA will stay in the cytoplasm of the pre-synaptic cells and be therefore auto-oxidized. At this point we will treat the OBS with AA where it will ex hypothesi lower the amount of DA auto-oxidation. Afterwards the OBC will be treated with amphetamine that will reverse the DA transporter which will transport the remaining DA into the extracellular space, so that it can be detected.

Expected Results and Conclusion

Treating the slices with different concentrations of AA and measuring DA we will be able to investigate of AA effect on DA auto-oxidation. We expect that higher amounts of AA will decrease DA auto-oxidation, leaving more DA intact. The results of this study will contribute to the further understanding of AA's neuro-protective role in relation to DA.

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MEi:CogSci Conference 2015, Ljubljana, Slovenia

List of Participants

The affiliations mentioned in the list of participant refer to the home university of the students.