MEi:CogSci

Middle European
Interdisciplinary Master Programme
in Cognitive Science

Proceedings of the
MEi:CogSci Conference 2014

Kraków, Poland

Editors:

Peter Hochenauer, Cornell Schreiber, Elisabeth Zimmermann
University of Vienna, Austria

Igor Farkaš
Comenius University in Bratislava, Slovakia

Proceedings of the MEi:CogSci Conference 2014

The conference took place at Jagiellonian University in Kraków, on 12-14 June, 2014.

Welcome!

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

This is the 8th MEi:CogSci Conference, the first one at our new partner university in beautiful Kraków. We are happy to see the MEi:CogSci programme prospering, growing in student numbers and expanding to involve new partner universities.

We want to express our gratitude to the Jagiellonian University, particularly to Adam Chuderski and his team (Kasandra Heredia, Magdalena Matyjek, Katarzyna Poczebut, Agnieszka Zniszczoł), for hosting and organising this event.

The conference was supported by the European Union within the European Social Fund (project POKL.04.01.01-00-171/2009).

We want to welcome our invited speakers and presenters of workshops, Roman Rosipal (Bratislava), who will open the conference with his keynote, Penka Hristova (Sofia), Sabine Tebbich (Vienna) and Michał Wierzchoń (Kraków). 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 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 second publication of these proceedings under an ISBN number.

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

And last but not least it is you, Coxies, who make it happen. Your posters, talks, and initiatives will make the MEi:CogSci Conference 2014 an exciting and joyful event!

Thank you all for coming! Enjoy the 8th MEi:CogSci Conference!

Peter Hochenauer

Cornell Schreiber

Fransisca Tan

Elisabeth Zimmermann

Eighth Middle European Interdisciplinary Conference in Cognitive Science
Jagiellonian University in Kraków, Poland
12-14 June, 2014

MEi:CogSci

Middle European
Interdisciplinary Master Programme
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Thursday, June 12, 2014

12:30 – 13:00	**Registration**	
13:00 – 16:00	**WORKSHOPS (registration required)**	
	1.) Penka Hristova: The paleontologist metaphor for human memory. Paradigms for studying constructive memory.	
	2.) Sabine Tebbich: What's on your mind? How to design an experiment in Cognitive Biology	
	3.) Roman Rosipal: Multi-way Data Analysis for Advanced Processing of EEG in Cognitive and Motor-related Tasks (14-16h)	
	4.) saCS:workshop (Student Association for Cognitive Science)	
16:00 – 16:30	**COFFEE BREAK**	
16:30 – 16:45	**Welcome**	
16:45 – 17:55	**Track A:** Motor learning	**Track B:** Executive functions and working memory
	Effects of TMS Protocols on the Neuroplasticity of the Primary Motor Cortex *Miroslav Henry Heriban*	Adults Pretence and Executive Functions - Acting and Live Action Role-Playing *Florian Bögner*
	Mu Rhythm Modulation as a Result of Hand-movement Observation *Peter Kovár*	Can People Drop Objects from Their Visual Working Memory *Işıl Uluc*
	The Persistency of Motor Programs as a Source of Difficulty in Motor Learning *Dayana Hristova*	The Influence of Concurrent Cognitive Tasks on Balance, Step Initiation and Gait in Healthy Young Adults *Ondrej Spevák*
18:00 – 19:00	**Keynote:** Modulation of sensory-motor rhythmic activities for improving BCI training in neurorehabilitation *Roman Rosipal*	
19:00	**Reception**	

Friday, June 13, 2014

9:00 – 10:00	**Invited Talk**: Why do woodpecker finches use tools? *Sabine Tebbich*	
10:00 – 11:10	**Track A:** Cognitive deficits I	**Track B:** Serious games
	The Phonological-phonetic Interface in the Brain. Insights from Acquired Language Disorders *Simon Sollereder*	Using Folk Literature in Designing Serious Games for Psychotherapy *Bojana Vuković*
	Confabulation in Patients with Neurodegenerative Disorders and Brain Lesions *David Sakić*	Serious Games and Dementia *Darja Skrt*
	Towards a Sensorimotor Account of Schizophrenic Self-disorders *Oliver Lukitsch*	Serious Games in Child Psychotherapy: Ethical Considerations *Špela Lesar*
11:10 – 11:40	**COFFEE BREAK**	
11:40 – 12:50	**Track A:** Cognitive deficits II	**Track B:** Innovation – HCI – experience
	Placebo Effect Triggers and Their Possible Merit in Effectiveness of Complementary and Alternative Medicine Practices *Iva Rajović*	Towards a Framework for Understanding the Adoption of Innovations in the Context of a Social Setting *Thomas Grisold*
	Analysis of the EEG in Patients with Alzheimer's Disease *Bruna Pikš*	Supporting Awareness and Interaction Across Distributed Scientific Work Groups via Technology *Noemi Steitz*
	Spatial and Temporal Distribution of GABAa Receptor Subunits in Cortical and Subcortical Regions of Normal and Down Syndrome Developing Human Brain *Tamara Stojanović*	U-Experience 1.0: Open Mobile Platform for Experience Research *Gregor Žavcer*

12:50 – 14:30	LUNCH BREAK	
14:30 – 15:15	**Invited Talk**: How can we measure conscious experience? *Michał Wierzchoń*	
15:20 – 16:30	**Track A:** Cognitive skill acquisition and consciousness	**Track B:** HCI
	Generating Problem-Behaviour Graphs of Conceptual Change *Benjamin Angerer*	Interactive Tool for Experimenting with Neural Networks *Milan Lajtoš*
	Complex Skill Development with Starcraft 2 *Andrej Čičmanský*	User Experience Design for the "Web of Needs" *Mišel Cevzar*
	Who Cares? – Zen and Cognitive Science *Peter Hochenauer*	What Is Design? *Žiga Korent*
16:30 – 18:00	**POSTER SESSION + COFFEE**	

Saturday, June 14, 2014

10:00 – 11:10	**Track A:** Spatial representations	**Track B:** Emotions and rationality
	Decoding Spatial Position of an Object in Working Memory - fMRI Study *Richard Dinga*	Multi-agent Model of Crowd Emotion Propagation *Matej Fandl*
	Representation of the Spatial Structure of Visual Scenes in the Primate Hippocampus *Luka Katić, Mihaela Mitrović*	Rationality Enhancement as Political Ideology *Vasco Marques Queirós*
	Representation of the Spatial Structure of Visual Scenes in the Primate Hippocampus *Luka Katić, Mihaela Mitrović*	Towards a consolidated approach: Overcoming cognitive biases in medical decision-making. Integrating cognitive training for enhancing executive functions into bias-specific de-biasing techniques *Theresa Schachner*
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	Experimental Semiotics via the Embodied Communication Game (ECG): Processes of Grammatical Evolution and Convergence in a Population of Humans *Timo Ahlers*	Social Factors in Decision Making about Vaccination *Martin Turček*
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14:30 – 15:40	**Track A:** Language	**Track B:** Aesthetics and prediction
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	The Origins and Evolution of Language *Valentina Oblak*	The Emotion of Interest in Storytelling – A Cognitive Narratological Investigation *Michael Krendl*
	Which Animal Chases the Dog? Neural Correlates of Language Transfer in German-English Late Bilinguals *Stella Serena Grosso*	The Aesthetic Reset – Mechanism and Function of the Aesthetic Experience in the Predictive Mind *Thomas Wolf*
15:40 – 17:20	**POSTER SESSION + COFFEE**	
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Workshops

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Invited Talks

The paleontologist metaphor for human memory. Paradigms for studying constructive memory

Penka Hristova

Cognitive Science Department,
New Bulgarian University,
Sofia, Bulgaria

The storehouse vs. the paleontologist metaphor of human memory would be contrasted in searching the unique sequences of constructivist approach to human memory. The main paradigms for studying constructive memory processes will be presented and discussed based on specific examples.

Multi-way Data Analysis for Advanced Processing of EEG in Cognitive and Motor-related Tasks

Roman Rosipal

Department of Theoretical Methods, Institute of Measurement Science,
Slovak Academy of Sciences,
Bratislava, Slovakia

We applied and developed new multi-way data analysis algorithms for physiological advanced estimation of cognitive status, which significantly improved the estimation of cognitive workload and shed new light on the estimation of mental fatigue. More specifically, atomic decomposition of parallel factor analysis (PARAFAC) and multi-way partial least squares (N-PLS) can identify unique sources of brain electrical activity as measured by the EEG recorded in human participants as they performed tasks that induced different mental states, including engagement, mental workload, and mental fatigue.

During the workshop I will briefly describe the concept of multi-way data analysis and the used algorithms and I will demonstrate the methodology on real data using the proprietary software environment. Next, I will in an interactive way introduce the concept of mirror-neuron based training aiming to enhance oscillatory sensory-motor brain rhythms and I will demonstrate how the methodology of multi-way analysis can be applied in this context. The workshop aims providing practical insights to the topics that I will present in my conference talk.

Workshop 3
What's on your mind? How to design an experiment in Cognitive Biology

Sabine Tebbich
Department of Cognitive Biology,
University of Vienna ,
Vienna, Austria

One of the main problems in Cognitive Biology is that we have to infer mental processes from behaviour. The workshop should provide you with the necessary background to design a simple behavioural experiment. You will design your own experiment in a small group and discuss it with the other workshop participants.

Workshop 4
saCS:workshop (Student Association for Cognitive Science)

Student Association for Cognitive Science
(Peter Hochenauer, Fransisca Tan, Klemen Trupej)

The hosts of this workshop simply offer the time and space to share their experiences as »cogscis who know« - for though every single one of us can state this, we feel there is a need for an enabling space to act it out! Thus, we want you to be part of saCS, encourage you to share your opinions and ideas in order to both envision and carry a student association that will add to your life within the cognitive sciences – even beyond your graduation.

Can we blend superficially dissimilar episodes while remembering?

Penka Hristova

Cognitive Science Department,
New Bulgarian University,
Sofia, Bulgaria

The talk will go through different mechanisms that are supposed to underlie the constructive memory (i.e. schematization and blending). The focus will be on blending of superficially dissimilar episodes based on a shared structure. Empirical evidence demonstrating that people prefer to blend structurally rather than superficially similar episodes will be discussed in order to clarify the process of reconstructing our past.

Invited Talk

Modulation of sensory-motor rhythmic activities for improving BCI training in neurorehabilitation

Roman Rosipal

Department of Theoretical Methods, Institute of Measurement Science,
Slovak Academy of Sciences,
Bratislava, Slovakia

The brain–computer interface (BCI) technology using motor imagery evoked brain signals has been proven to be a promising novel neurorehabilitation tool. This includes not only ability to train and improve functioning of impaired motor-related brain structures and signals, for example after stroke, but also building compact systems where the BCI technology combined with robotic devices allows the construction of systems where physical robot-assisted rehabilitation is driven by the subject's own mental processes manipulation. This represents the novel neurorehabilitation concept where the important loop consisting of physical movement, sensory information and mental motor-related intentions is closed. However, several critical issues need to be addressed before using BCI in this setting, namely, the issue of selecting the proper BCI paradigm providing responsive and precise control without requiring excessive attention or high cognitive load on the part of users.

In this talk I will discuss novel neurorehabilitation training paradigm, including the electroencephalogram (EEG) biofeedback (neurofeedback) and mirror-neurons based training, aiming to less strictly and more unintentionally modulate sensory-motor-related brain oscillatory rhythms prior to the BCI training procedure itself. In the context of testing the validity of mirror-neurons training and the neurofeedback training protocol improvement, I will discuss advanced multi-way EEG data analysis approaches allowing decomposing multichannel EEG into elemental components or "atoms" defining spatial, spectral and temporal sub-elements of EEG. Finally, I will report of experimental and analytical results obtained so far and I will discuss some further research directions.

Why do woodpecker finches use tools?

Sabine Tebbich

Department of Cognitive Biology,
University of Vienna,
Vienna, Austria

Woodpecker finches belong to the famous Darwin's finches and use twigs to pry arthropods out of tree holes. Why they do that, seems obvious. However, in a famous quote the Nobel Prize laureate Niko Tinbergen stated that "why does an animal do that?" can be answered in four different ways (focusing on causation, function, ontogeny or phylogeny). In my talk I would like to exemplify why it is important to integrate all 4 Tinbergen's levels, when we study the cognitive aspects of animal behaviour.

How can we measure conscious experience?

Michał Wierzchoń

Consciousness Lab (C-lab), Department of Psychology,
Jagiellonian University,
Kraków, Poland

The aim of this talk is to present an overview of research methods that could be applied in context of consciousness studies (i.e. verbal reports, objective and subjective measures of awareness, behavioural index of subjective experience, phenomenological methods as well as neuropsychological and psychophysiological markers of consciousness). All measures will be discussed in context of the current model of consciousness, discussing to what extent they help us to understand the mechanisms of consciousness as well as to measure awareness accurately.

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Talks

Experimental Semiotics via the Embodied Communication Game (ECG): Processes of Grammatical Evolution and Convergence in a Population of Humans

Timo Ahlers
University of Vienna,
Vienna, Austria

Recently, it has been shown that humans, when engaging in dialogical communication in media that do not allow using oral or written language, are able to come up with new signal and communication systems [1]. It has also been shown that through interaction in communication games grammar may evolve [2]. There has been also work on the complexity of communication systems – at what point can be stated that a "grammar" is comprised? – and their functional use for cognition, claiming that grammatical communication systems only evolve in detached contexts [3]. It is now time to combine these strands of research. It will be presented an adapted version of the ECG (embodied communication game) [1] in which it shall be referred to different kind of stimuli in detached mode: varying from simple ones – reference to "colours" – to more complex ones – reference to "colours and shapes" or even "interactions of coloured shapes". The stimuli are presented corresponding to the classification of communication systems in [3]. It will be investigated if three groups of human players (six literature students per group) – starting out in the ECG from different complexity levels – take the same road to the most complex level ("interacting coloured shapes") when building up individual communication systems. In addition, it will be figured out if and how the populations "grammars" converge, when speakers of a group interact with new communication partners. It is also accounted for grammar "acquisition" by exposing a new player to the converged communication system of a group. The computer-based ECG will be refined by using additionally eye-tracking. This will allow for a more reliable interpretation of attention to the communication partner's signalling and the player's own goals. The analysis is carried out with the video transcription software ELAN.

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P3 Topography from Different Sensory Modalities in Oddball Tasks: Testing the Common Pathway Hypothesis of P3 Generation

Benjamin Angerer

University of Vienna,
Vienna, Austria

Newell's Problem Space Hypothesis states that "[t]he fundamental organizational unit of all human goal-directed symbolic activity is the problem space", where a problem space is defined as a set of knowledge states together with a set of operators over these states [1]. Proceeding from this hypothesis, he argues that all of cognitive activity is implemented in problem spaces and that the cognitive architecture consists of problem spaces "all the way down" [2].

Psychological research on problem solving in Newell's tradition employs protocol analysis of verbal reports and subsequent computational modelling, trying to cast human behaviour in terms of problem spaces. However, instead of aiming to corroborate the bold claims about the universality of the problem space concept, this research has largely confined itself to very clear-cut task types and problem domains that arguably do not cover the whole range of cognitive activity.

This kind of protocol analysis [3], based on generating "Problem-Behaviour Graphs", assumes the problem space(s) employed by the subject to remain virtually unchanged throughout the experimental session, making it difficult to capture phenomena like conceptual change.

Taking the problem space hypothesis seriously, these phenomena could probably be modelled by assuming a hierarchy of problem spaces, the higher ones being spaces which are about finding or inventing operators for lower ones, or about re-representing the knowledge states of a lower problem space into those of another one. While there are computationally sound conceptualisations of these processes, they have not yet been applied to psychological data from verbal reports.

Over the last few years we developed an experimental paradigm designed to allow for the collection of comprehensive process-level data from introspection about the gradual development of knowledge and domain-specific problem solving skills, using a task in mental paper folding. The project presented proposes to conduct our experiment with several subjects and to apply Newell's protocol analysis technique to the verbal reports gathered. This will involve inferring the progressive problem spaces involved, tracking their respective changes and generating Problem-Behaviour Graphs for each subject, identifying where the problem space approach might have problems and proposing changes where necessary.

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Adults Pretence and Executive Functions – Acting and Live Action Role-Playing

Florian Bögner
University of Vienna,
Vienna, Austria

Pretending and Executive Functions

How does play influence our cognition? The present study examines a subgroup of play behaviour, namely adults pretence. Adults pretences is characterised as transparent, when the pretender has no intent to deceive [1]. Pretending is transparent when evidence is available for other people to clarify role-playing as role-playing. For example, theatre audience knows that actors and actresses are pretending, due the convention of the theatre. Participants of a live action role-playing event also know that everybody is role-playing. We are going to look at both pretence groups. The difference that actors perform in front of an audience whereas live action role-players perform for themselves might be seen within the acquired data.

During pretence, a pretender has to hold the reality and the pretence-layer in mind, and also has to be aware of this distinction. A set of specific cognitive abilities, called executive functions, which are including three distinct interrelated functions: mental set shifting, updating and monitoring working memory and inhibition of prepotent responses [2], resembles these tasks for a pretender. They are likely also boosted during pretence.

Method

Three adult groups participate in the present study: (a) actors, (b) live action role-players, and (c) control group. All participants are being tested with three computerised executive functions tasks: (1) Dimensional Change Chard Sorting Test (DCCS) to measure cognitive flexibility;(2) Flankers test to measure inhibition; and (3) n-back test to measure working memory. Using self reports about their amount of participation in pretend scenarios participants in groups (a) and (b) are are categorised as beginners or experts. Expert pretenders are compared to beginners as well as the control group.

Results

It is hypothesised that expert pretenders have a higher score on the DCCS and Flankers test compared to beginners and the control group. Furthermore, we are testing if expert actors and actresses outperform the other groups on the working memory task, because previous research has shown positive effects of action on long term memory [3]. Preliminary results will be presented.

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User Experience Design for the "Web of Needs"

Mišel Cevzar
University of Ljubljana,
Ljubljana, Slovenia

The main focus of the project is to find out how people structure their needs and how we can use this knowledge to build cognitive and intelligent user-interfaces for an "owner application" (a web-based graphical user interface - GUI) that should allow user to create, publish and manage need objects) for of the Web of Needs (WoN) - which will be online need management app. The name might change in the future but the purpose won't. The goal of WoN is to be an extension of your needs on the world wide web where you can see mostly offers of various goods and services. What WoN would do differently is that it would add a personalized layer between you and the offers online. Thus in a big part eliminating the need for searching for whatever it is you need.

Literature research was done in order to come up with the "need" definition and hopefully a need classification system we could use for categorizing and managing needs. We tried to be as broad as possible in our research, looking into theories from different research fields (economy, psychology, sociology etc.) One of the most famous examples we were looking into is Maslow's need theory [1], which was later extended by Alderfer [2]. We decided to give our main focus to the Human Scale Development and Needs theory from a Chilean economist that goes by the name of Max Neef [3]. He divided human needs into four broad categories of Being (qualities), Having (things), Doing (actions) and Interacting (settings). In his book titled "Development and human needs" he also provided a 36 cell need matrix which we found was the most appropriate for us to use as a concept on which we would try to build our Web of Needs software.

Later we developed a paper GUI prototype which was based on the concepts of Max Neef´s Need Theory. We performed a qualitative user experience test with five participants using a paper GUI prototype. The feedback was recorded by three observers using the rainbow spreadsheet method which is often used in these type of UX (user experience) tests. The data was then analyzed, summarized and served as a guideline for further GUI improvement.

To gather more empirical data about how people manage their needs we designed a online questionnaire on what do people think they need, are they conscious about their need, how do they manage needs etc. The results of the questionnaire will help the computer scientist and designers to develop the software for Web of Needs which will be efficient in managing people's needs and have a vibrant community of regular users.

We are now in the process of translating the questionnaire into multiple languages (Slovenian, South Korean, English, German, Croatian etc.). As we want to build a global Web of Needs management system we would like to have broad pool of empirical findings about how is need management different through continents, countries and cultures. The findings will be analyzed and hopefully contribute in building the software that would allow us to manage our needs more efficiently and effectively.

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Complex Skill Development with Starcraft 2

Andrej Čičmanský

Comenius University,
Bratislava, Slovakia

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 extraordinary speeds. Player choose one of three races and to win the game he must command his units, prepare defenses, build base expansions to gather more resources while build bigger armies to outmanoeuvre his opponent. Players have to act simultaneously and continuously to accomplish their goals. The GUI of the game environment creates a game of incomplete information where efficiently distributing one's attention is paramount. Top players issue hundreds of actions per minute navigating around the terrain at prodigious speeds and maintaining their forces. Optimized attention to the environment allows for proper navigation and the coordination of global and local information for real-time decision making.

Data for this study was obtained by analyzing the replay files. These replay files are records of the actions that players took and the time that each one occurred, so we can precisely see the every interaction of player with game environment. Every replay file creates a lots of behavioral data – most of the games contained more than 1000 moves per player. Using measures of attentional, cognitive-motor, and perceptual processing of players at 7 different levels of expertise we can show that variable importance is not static across these levels. This is done by creating statistical classificators to distinguish players from different leagues. Author tries to introduce new types of variables in order to expand previous work in field.

Author is introducing different approach to classification of these variables, as he believes that leagues directly besides each other can be separated with usage of other classifier than used in previous researches [1].

Author is also trying to correct overlooked fact that, each of playable races have unique design, so they are played differently and produce different kinds of data. This fact is based on author's previous work in field, game experience and on 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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Decoding Spatial Position of an Object in Working Memory – fMRI Study

Richard Dinga
Comenius University,
Bratislava, Slovakia

Traditionally, univariate analysis of fMRI data is done by comparing average activities of relatively big brain regions obtained by spatial smoothing of the data. Although this increases signal-to-noise ratio, fine-grained information about pattern of activity is lost. On the other hand, multivariate pattern analysis (MVPA) uses machine learning techniques to analyze fMRI data; and functional brain activity is the input to machine learning classifier with a goal to train a classifier to recognize different pattern of activities in regard to different classes of stimuli. This is not possible by using univariate methods [1].

The goal of this study is to decode content of working memory from functional activity of the brain. I will try to predict position of the presented object using MVPA methods. Subsequent goals are to localize parts of the brain from which this information can be obtained and gain information on the nature of spatial representation in the brain.

The dataset that is used was collected at Neurology Clinic in Ljubljana for another study. Functional activity was recorded by 3,5T Phillips MRI scanner. 144 stimuli were presented in 8 blocks. Every block consisted of one response condition with 4 different response conditions. Subjects responded by moving the probe stimulus with the help of a joystick. Stimuli consisted of grey circle that appeared in pseudo-random position, within the periphery of the subject's visual field. Subject was instructed to remember the position of the object; and after a delay period, respond by moving joystick as indicated to them. For the analysis, I used PyMVPA toolbox [2].

Using fMRI data for machine learning is a challenging task mainly due to small signal-to-noise ratio, mixed signals of no interest and curse of dimensionality – high number of features compared to usually low number of trials. In addition to the problems mentioned, I also expect to encounter some more because the study from which the dataset is acquired wasn't designed for MVPA analysis, and the difference in representations of different spatial positions is thought not to be as distinguishable as the difference in representations of different objects, as it was done in previous studies [3]. Despite the stated problems, I expect to obtain higher than chance classification performance for at least some subsets of positions.

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Multi-agent Model of Crowd Emotion Propagation

Matej Fandl

Comenius University,
Bratislava, Slovakia

Crowd dynamics is name for a widely observed phenomenon [1], where people in a crowd behave differently than they would do alone. Behavioral patterns of individuals involved in crowd situations appear to converge in a short time and reach consensus, making the crowd itself appear as a single organism. These patterns seem to propagate across members of a crowd. This can be observed in various group sizes, ranging from relatively small groups to even nation-wide level. My aim is to design and implement a computational model capable of providing believable behavior of groups of artificial agents, whose physical proximity would-be small enough to allow for "face to face" encounters. Motivation for such model is its future use in real-time simulation and animation, such as computer games or interactive drama.

By reviewing works from fields of psychology, social psychology and multi-agent simulation, I identified many factors that are assumed to influence the crowd behavior. With respect to my goal I chose emotions as the driving force of this phenomenon. I build on assumptions, that

- emotions are contagious and spread across members of a group,
- emotions are an output of a process, in which an individual appraises current situation from his or her point of view,
- emotions influence action tendencies of individuals.

Taking into account the need of heterogeneity of individual agents, the proposed model is multi-agent. An agent consists of

- a physical module, responsible for perception and action execution,
- a cognitive module, responsible for evaluation of events happening in the environment and choosing the action to be executed,
- an emotion module, serving as an input for the cognitive module's evaluation processes
- and a personality module, influencing the capability of an agent to "infect" or "be infected" by other agent's emotions.

Individual agent's emotional level is influenced by the weighted average of emotional levels of other agents in its perception range, inspired by [2]. The development of a simple virtual scenario is currently reaching its final state. A user-controlled character can move in a group of artificial agents and take actions. These increase the anger level of nearby agents, which can cause them to attack. With growing number of agents attacking in the perception range, the tendency of an agent to attack increases. Attacking of a group of agents is expected to be a result of emotional contagion between them and the number of other agents involved in the attack, rather than by individual reactions to threatening stimulus itself.

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Towards a Framework for Understanding the Adoption of Innovations in the Context of a Social Setting

Thomas Grisold

University of Vienna,
Vienna, Austria

Innovation as being defined as a product or process that incorporates a feature that is new to the perceiver constitutes a well-researched topic in various scientific fields including economics and cognitive science. The need for innovation becomes increasingly important for organizations in order to ensure their long-term success. [1]
While there is a lot of research on how to foster the emergence of new knowledge there is little understanding of how it is adopted.

Traditional assumptions in the research on innovation adoption referred to innovations in terms of their intrinsic properties, such as newness and relative advantage; however, little attention has been given to the perception of new knowledge in relativity to social life, reflecting the fact that it occurs in social context. [2]

Social identity theory and self-categorization have been shown to have clear implications for the perception of new knowledge within the context of a social group. Utilizing techniques to prime either the private identity or a social identity, it has been found that subjects judge and evaluate the degree as well as the usefulness of innovations differently. These findings suggest several implications, such as a bias towards ideas that come from in-group members and a shared perception of issues and topics relevant to in-group members. [2]

Elaborating on these findings, further concepts are being investigated that may contribute to the understanding of consensual domains between group members and thus, their perception and attitudes towards new knowledge. One example is the concept of Group Tacit Knowledge by Nonaka. [3]

In combining these insights, this project opts for making relevant common knowledge and belief structures of social groups accessible to acquire an understanding of how new knowledge is adopted and spread.
Results are expected to reveal practical insights into the construction of knowledge as well as enabling its implementation.

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Which Animal Chases the Dog? Neural Correlates of Language Transfer in German-English Late Bilinguals

Stella Serena Grosso

University of Vienna,
Vienna, Austria

In a globalized society where mastering foreign languages is becoming ever more important, the study of acquisition and neural processing of second language deserves necessary attention. How much native language influences our understanding of a second language?

Competing Grammars and Language Transfer

Aim of the research is to find neural evidence in support of a comprehension phenomenon occurring to highly proficient second language speakers of English whose native language is German. In a behavioral study conducted by Rankin [1], it has been seen that an interpretational mismatch between the answers given by native speakers and learners of English occurs in presence of ambiguous subject/object WH questions similar to the one mentioned in the title. In particular, advanced German learners of English significantly showed an object interpretation of subject WH questions, while object WH questions had target-like interpretations. How is this possible?

Such a phenomenon has been explained in terms of the different parsing systems used by English and German grammar: while English grammar strictly relies on word order for interpretation, German grammar uses verbal agreement features on nominal constituents to extract semantic meaning from interrogative questions. Following the Variational Learning hypothesis [2], when the surface structure of a second language does resemble the one of first language, as in case of subject WH questions, English structures may still be parsed by proficient German learners of English with a German parser, leading to non-target interpretations.

The Experiment: Procedure and Expectations

In order to find neural evidence in support of this hypothesis, the project has been divided in two steps. Initially, a pilot test consisting of a visual animal interpretation task preceded by grammatical or ungrammatical subject/object WH questions has been administered to 30 German and 15 control English speakers. Secondly, 15 German speakers selected on the basis of their grammar sensitivity (measured with MLAT IV Test for Grammar Aptitude) participate as subjects to an EEG session in which event related potentials are recorded during the previous task.

Main psycholinguistic hypothesis is that highly proficient German speakers should generally process grammar violations in a way similar to native speakers, presenting a similar P600 waveform, i.e. the ERPs component interpreted as index of neural processes connected with reanalysis and repair of syntactic violations. [3] Nevertheless, in case German speakers process grammar violations of English structures using their native language parsing system, as in the case of subject WH questions, P600 component should be weak or even absent.

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Effects of TMS Protocols on the Neuroplasticity of the Primary Motor Cortex

Miroslav Henry Heriban

Comenius University,
Bratislava, Slovakia

The study is a part of an ongoing project focused on transcranial magnetic stimulation (TMS) and depression ("Influence of different transcranial magnetic stimulation protocols on biomarkers and symptoms of depression"). This project is concerned with TMS acting as an alternative treatment (besides electroconvulsive therapy (ECT)) mostly in cases of treatment-resistant depression (TRD). Since ECT, highly effective, but associated with various adverse effects, is considered as a last-resort treatment, emphasis has been put on exploring TMS as a safer, less invasive, but on the other hand also (yet) less effective treatment [1].

One method of administration of TMS in major depressive disorders (MDDs) is the application of inhibitory TMS protocols on the right dorsolateral prefrontal cortex (DLPFC) [2]. Our study focuses on the partial goal of comparing various inhibitory TMS protocols in their efficiency in inducing neuroplasticity of the primary motor cortex (M1), which would indicate (assuming the possibility of a generalization of the M1 response also to other brain structures) its applicability and efficiency as an MDD treatment.

The activation of the M1 will be assessed by means of motor-evoked potentials (MEPs), short (SICI) and/or long intracortical inhibition (LICI). We will employ a serial experimental design, introducing all participants to all experimental conditions (standard 50 Hz continuous theta burst stimulation (cTBS) and modified 30 Hz cTBS) sequentially [3]. The measures of M1 activation of a certain muscle by means of electromyographic (EMG) electrodes will be elicited through the application of single or paired TMS pulses before and after the application of the inhibitory protocols. The EMG data will be then analyzed in a within-subject form.

To conclude, we would like to state some of the perceived potential limits. First of all, it should be noted that our experiment is going to make use of healthy subjects, whose response may be different from that of potential TRD patients due to differences in their brains and possible age mismatch. The practical problems associated with carrying out this experiment may include our general inexperience and placement issues of the TMS coil and EMG electrodes, recruitment of participants and the threat of subjects dropping out of the experiment (since multiple sessions during a prolonged period of time will have to be scheduled).

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Who Cares? – Zen and Cognitive Science

Peter Hochenauer
University of Vienna,
Vienna, Austria

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The Persistency of Motor Programs as a Source of Difficulty in Motor Learning

Dayana Hristova, Gregor Geršak, Jure Žabkar

University of Vienna,
Vienna, Austria

Introduction

This paper explores how classical ballet-specific motor programs impact the process of movement acquisition for ballet dancers of different expertise. Learning a dance style consists of modification of the motor rules established during developmental phases [1]. In ballet, the shape of the movements is uniform and has to be internalized through ongoing training which implies strong priming of the motor system. Hence, ballet-related kinaesthetic patterns are expected to be persistent and, according to our hypothesis, can be detected across contexts. For example, if an everyday life move requires lifting a leg, the probability is increased for a ballet dancer to perform it with stretched feet, despite of doing a non-dance move.

We are looking into the implications that these ballet-related patterns can have in the process of the acquisition of movements from a new dance style. Due to the degree of priming of the movement system, implied by the increase of expertise of the ballet dancer, an effect equivalent to negative transfer [2] for motor learning is expected to be observed.

Methods

In a feasibility experiment three groups of participants (n = 12) will be recorded with AnimaZoo (a 3D motion capturing suit): 1) professional ballet dancers; 2) lower intermediate ballet dancers; 3) and non-dancers. The first part of the study consists of attempting to detect dancers' style-specific motor schemes in ballet and in everyday life moves. The 3D recordings will be analyzed through different state-of-the-art methods for movement analysis, such as slow feature analysis and dynamic time warping. We will test for the anticipated specifics of movement implementation in the test subjects as compared to the control group.

In the second part, participants will learn moves from dance styles, very different from ballet. The movements will be selected according to the following criteria: 1) alien – no scheme is developed for such a movement; 2) discrepant – using motor activations similar to a familiar move with minor difference. The success in acquiring the movements by the ballet dancers will be graded by professionals from the respective dance style. The degree of perceived difficulty of learning the move for the experiment participants will be assessed through questionnaires and in semi-structured qualitative interviews.

Concluding remarks

In the second part of the experiment, we will attempt to find out more about the types of difficulty our participants encounter. We expected that movements that contradict the logics and aesthetics of ballet will be perceived as more difficult by the dancers. We are also interested in the implications that learning dance style movements has for the subjective sense of agency of the participants.

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Representation of the Spatial Structure of Visual Scenes in the Primate Hippocampus

Luka Katić, Mihaela Mitrović
University of Vienna,
Vienna, Austria

Our aim is to investigate visually-guided learning, specifically to find out how the brain translates visual input from the environment into a spatial model of the world. Understanding spatial relations, grasping spatio-visual scenes and switching between local and global frames of reference within an environment are necessary behavior guiding skills. In order to further study the topic of visually-guided learning, we explore how the primate brain learns to represent the spatial structure of visual scenes.

In particular, some neurons in the primate hippocampus encode information about the position of a visual target within a localized environmental frame of reference regardless of the position of the frame itself [1]. These cells responses have been found and experimentally confirmed in previous single unit recording neurophysiology studies [1, 2, 3] Our goal is to reveal some of the underlying computational mechanisms of representing the spatial structure of visual scenes.

Using visually guided learning in a self-organized neural network, we present how these cells in the hippocampus could develop. Our model is biologically plausible in that it consists of a hierarchy of competitive neural network layers with associative local learning rules which modify the feed-forward synaptic connections between successive neuronal layers during visual training. More specifically, our model employs trace learning- a modified Hebbian rule that encourages neurons to learn to respond to visual input patterns that tend to appear close together in time. In other words, trace learning, as a biologically plausible synaptic learning mechanism, incorporates a memory trace of recent neuronal activity. Using an idealized two-dimensional visual training environment, a biologically realistic neural network and a trace learning rule, we modeled the basic experimental findings of previous studies [1] which demonstrated the existence of neurons in the primate hippocampus which encode the position of a visual target within a localized frame of reference.

Our computer simulations confirm the assumption that such synaptic learning mechanisms could be responsible for the development of these and similar spatial representations and neural responses. Initial computer simulations have successfully replicated the development of neurons that respond to the presence of a visual target at one particular position within a local reference frame. More importantly, the neuronal responses were invariant as the images of the reference frame and the visual target were shifted across different retinal locations. The simulation results have therefore demonstrated the viability of our principal computational hypothesis.

Finally, we assume that these localized frames of reference, together with reference objects and other representations may form a densely woven tapestry of overlapping spatial representations in the brain, thus building a model of the spatial structure of the world.

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Representation of the Spatial Structure of Visual Scenes in the Primate Hippocampus

Matúš Konečný
Comenius University,
Bratislava, Slovakia

Framing the same outcome in terms of gains leads to more favorable evaluations than framing it as a loss. Present research investigated differences in framing effect on certain and risky outcomes. Event-related potential (ERP) technique was used to examine analogy between framed and objective gains and losses in evaluative processing indexed by feedback related negativity (FRN). FRN represents rapid motivational and affective outcome valence evaluation [1]. Compared to gains, losses and ambiguity elicit a negative deflection in the ERP waveform [2].

Our experiment (N= 17) consisted of 2 similar parts. Trials began with monetary endowments. Subsequently, participants learned how much of the endowment they can keep or how much they lose. In the certain "always something" part, participants kept/lost only a part of the endowment. In the risky "all or nothing" part, they kept/lost the whole endowment or nothing. We utilized the differences between the 2 parts to examine FRN responses to ambiguity in new contexts.

We hypothesized that loss descriptions of objective gains will be reflected in FRN [3]. Ambiguity was previously only examined in situations, where valence of the outcome was unknown. Magnitude related ambiguity in "always something" part was not expected to result in FRN, since the valence of the outcome was known to be positive.

Results indicated no framing effect on favorability evaluations of known outcomes, while responses to ambiguous outcomes indicated significant framing effect. ERPs in the "always something" part revealed no FRN differences related to outcome descriptions. On the other hand, magnitude related ambiguity resulted in FRN independent from framing manipulation.

Contrary to our expectations, no FRN effects were observed in the "all or nothing" part. We conclude that the experimental task elicited unexpected processing, rendering it inapplicable for FRN investigation.

Absence of FRN and behavioral differences between framed outcomes of known magnitudes could be indicative of outcome processing unbiased by description. The observed FRN associated with magnitude related ambiguity suggests an unexpectedly profound effect. Significant framing effect consistent responses to ambiguous outcomes dissociated from FRN suggest that other cognitive processes might be involved.

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What Is Design?

Žiga Korent

University of Ljubljana,
Ljubljana, Slovenia

The aim of this paper is to present a view on design. The world is full of man-made things, and design has a central role in envisioning them. People often need to be reminded that design is not restricted to the surface of things, that design is not something best used at the end, when everything was already made. On the contrary, design decisions are essential throughout the development process, juggling between different interests, solving aesthetic and technical problems, turning concepts into something viable. Design "takes over where natural evolution leaves off" [1] improving all things one is surrounded within an environment.

In the last 50 years, there were lots of different definitions written in order to explain what design is and to provide an understanding. Theories somehow varied from those that were very scientific and strict as Simon's [2] to those that preferred the creative part of it as Glanville's [3]. Some of them were more general, other more specific, but they all somehow failed to introduce a single definition. A description that would survive the test of time, and that would be widely accepted by scholars. Partly, they failed because each definition had its own focus, emphasizing the importance of some aspects of design and neglecting others. However, mainly they failed because the meaning of design was (and still is) constantly developing. The concept is growing, getting bigger and wider, and it is driven by the need to meet the requirements of a complex world, where nothing is truly isolated, where everything is interrelated.

Nevertheless, the absence of a single and clear definition is not a problem by itself; no one expects a final answer. Far more significant, especially for design practice, is the inability to recognize and capture the development of the concept through time. Practice needs a global overview of design, they depend on it in order to be able to identify and minimize designs unwanted results in a constantly changing world. One can't identify or detect an unwanted result, when the problem is outside one's scope of looking and understanding.

Let's conclude with a suggestion for a definition. Design is as a creative, open-end process that initiates changes and envisions the outcome to satisfy needs. The outcome of design is a balance between initiator's intentions and users' needs and perception.

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Mu rhythm modulation as a result of hand-movement observation

Peter Kovár

Comenius University,
Bratislava, Slovakia

Intro

Motor resonance, as demonstrated by mu rhythm attenuation around motor cortex, has been linked to the activity of mirror neurone system in humans. The basic idea - the activation of neurones in human brain normally detected when subject executes motor action is also present when subject observes particular action being executed by someone else. [1]

Pilot experiment

In this pilot experiment, participants (healthy males and females aged between 20 and 30 years) observed various movements of a hand from the profile. Four conditions in total (flat hand without movement, object-oriented grasp, grasp without the object and social grasp) were presented on a screen, separated by the baseline condition.

Hypotheses

Hypothesis stipulates that mu rhythm should be desynchronised while observing hand movement, and also that flat hand should exhibit the least amount of rhythm modulation, followed by the pantomime condition (missing object grasp). [2]

Social condition should also result in statistically significant desynchronisation, although the amplitude with respect to the other conditions is questionable, given the more complex nature of this particular stimuli. [3]

Preliminary results from the pilot (N=9) are well in line with hypothesis (p<.001) and currently the data is being analysed with a different approach (3 conditions with respect to the flat hand - no hand movement condition).

The pilot gave rise to another interesting aspect of the study - contralaterality - which has been addressed in previous research. This led to adding of two new conditions - where the subjects observed horizontally inverted videos of the same hand movements. Updated list of hypotheses then includes the contralaterality hypothesis - given that all the subjects were right handed, significant difference should be observed in lateral electrodes C3 and C4 between the same movement (e.g. object oriented movement), but different conditions (right to left hand movement vs. left to right).

The data acquired during the actual research experiment is being analysed and will be presented at the conference.

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The Emotion of Interest in Storytelling – A Cognitive Narratological Investigation

Michael Krendl

University of Vienna,
Vienna, Austria

In Romeo and Juliet, Juliet fakes her death by drinking a sleeping draught. When Romeo mistakenly beliefs that his beloved Juliet is dead, he poisons himself to put an end to his life. When Juliet awakes and sees what Romeo has done, she takes Romeo's dagger to follow suit.

What is it that makes this scene so compelling? And what can we as cognitive scientists learn from fiction? The cognitive psychologists Mar and Oatley argue that narrative fiction creates a deep and immersive simulative experience for readers and fictional stories are therefore "informative in that they allow for prediction and explanation while revealing the underlying processes of what is being modeled (in this case, social relations)" [1:173]. Due to this simulative nature, fiction would allow us to study cognitive processes involved in fictional and non-fictional understanding. This exemplifies how narratology and cognitive science enjoy a fertile interaction with mutual benefits.

In my talk, I will interweave insights from the field of narratology with insights from the scattered field of the psychology of interest, which has its roots in Daniel E. Berlyne's theories of aesthetics [2]. Empirical studies suggest that interest, which is associated with an increased pupil diameter and a decreased heart rate, is a positive emotion distinct from enjoyment. According to Berlyne, interest is primarily aroused through the variables uncertainty, information conflict, novelty and complexity.

In particular, I argue that it is not just the emotion of pity or sadness that makes the scene in Romeo and Juliet so compelling, but also the emotion of interest, which I assume to be the driving process that motivates us to read stories. This is in line with the universals of narrative as proposed by narratologist Meir Sternberg, who refers to the triad of suspense, curiosity, and surprise [3:327], which are different phenomena of the emotion of interest. I propose that stories arouse emotions like anxiety or sadness in a blend with the emotion of interest, which might explain why we engage in horror stories and tragedies.

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Interactive Tool for Experimenting with Neural Networks

Milan Lajtoš

Comenius University,
Bratislava, Slovakia

The ultimate goal of the field of artificial intelligence is to create an artificial mind. This mind must act as a perfect black box. No adjustable parameters, no tuning, and no tweaking — a truly independent thinking machine. Of course, this will take some time... Meanwhile, we need better tools to create and understand systems that are becoming predecessors to this ultimate machine.

The field of deep artificial neural networks is a promising path, which yields outstanding results on many machine learning tasks, comprising of visual object recognition, speech recognition, molecular activity prediction, and others. [1] However, to create and understand such system is a tedious task. It requires a mathematical understanding of neural networks, and an ability to write computer programs that carry them out.

These obstacles could be avoided by using a tool that enables us to create and understand neural networks in a more natural way than the symbolic approach used by math and code. This novel approach must appeal to all three stages of mental representations — enactive, iconic and symbolic. [2]

Visual programming lets users create programs by manipulating program elements graphically rather than by specifying them textually. Such environment is based on the idea of "boxes and arrows," where boxes represent entities and arrows correspond to the relations between them. However, the traditional visual programming is nothing more than a blind manipulation of symbols in a more pleasing way than the textual programming.

A solution to the problem of the visual programming can be eliminated by visualizing the behavior of the system by showing the data flowing through the network. One can think of this as an analogy to MRI vs. fMRI brain scans. Visualizing only the architecture of the neural network is just not enough to understand behavior of the system as a whole.

We verified presented principles on a working prototype, but there is a lot to be done in terms of design and implementation decisions which will require a careful evaluation from an interdisciplinary audience.

Let's have a transparent box before we paint it black.

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Serious Games in Child Psychotherapy: Ethical Considerations

Špela Lesar
University of Vienna,
Vienna, Austria

In the last decade game industry experienced exponential development. It expanded also into other directions outside the entertainment industry. With the development of technology and its accessibility, novel affordances and potential of games came forward. Some of newly established fields of research in computer game application are education, advertisement, politics, health care and training for serious purposes e.g. training of soldiers for their missions on the battlefield [1], [2] [3]. One of newly proposed applications, are serious games (SG) used in psychotherapy for children. The aim is to present the current position of SG applications in child psychotherapy and to reconsider possible ethical challenges of its use.

The field of SG is still in its developmental phase. The term itself was broadly recognized with the emergence of the Serious Game Initiative in 2002. There have been different attempts of taxonomies that are congruent in the definition of differences between entertainment games and SG. Latter represent the gaming agency that offers also entertainment components, but their primary purpose is of more "serious" nature and therefore represented by e.g. education, prevention, rehabilitation, advertisement etc. [1], [2], [3].

The majority of pro arguments for the use of computer console in child psychotherapy collide in the common property of games: the entertainment factor. This, as reported, ensures good communication with the psychotherapist, the maintenance of patient's awareness and the agency that enable positive outcomes of the therapy [1], [2]. Serious games in psychotherapy represent a connecting link between a psychotherapist and his patient. In this mediator form the computer program holds the possibility to interfere in their communication in a way that depends on the game design.

The psychotherapy itself in practice represents a sensitive matter. Its consequences can represent as much as successful as destructive outcomes. Before an implementation of a novel method it is necessary to foresee possible negative outcome(s) and provide suitable preventive measures. Ethical standards from classical psychotherapy in broader aspect determine the beneficence of psychotherapist's interferences, his relationship with the patient and further with his relatives. They determine standards for record keeping, privacy, confidentiality and many other aspects that in any perspective protect patients well-being.

I will try to answer what are the ethical considerations, beside ones from classical psychotherapy, that rise from the uniqueness of the applied method. The goal is to provide a list of guidelines to support efficient and successful development and application of serious games for child psychotherapy.

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Acquisition of Slovene Adjective Inflection and Semantics

Maja Ljubič Pavalec,
Valentina Oblak
University of Ljubljana,
Ljubljana, Slovenia

Besides grammatical descriptions, there was not much written about Slovene adjectives. The aim of our research was to investigate the parent-child input-output relations in the acquisition of adjectives in Slovene. We considered the hypothesis that in first language acquisition adjectives emerge later than nouns and verbs and that their use increases before age 3;0. We analysed 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 Petrič (2002), Dressler, Kilani-Schoch, Klampfer (2003), Korecky-Kröll and Dressler (2013) and on the empirical data, provided by the first author We described the formal aspects of Slovene adjectives, we presented and interpreted the acquisition data and analysed it from a morphological and syntactic perspective, looking also for the semantic and lexical relations (word fields, antonyms and synonyms). The predominant method 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. This supports also the thesis that adjectives are produced later than nouns and verbs.

Keywords:
language, acquisition, development, adjectives, child's speech

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Towards a Sensorimotor Account of Schizophrenic Self-disorders

Oliver Lukitsch

University of Vienna,
Vienna, Austria

In my thesis I am going to propose a neurophenomenological approach to schizophrenia by mutually elucidating Frith's neurocognitive account [1] and the phenomenology of the disorder (e.g. [2]). Frith argues that schizophrenia is an aberration of self-monitoring resulting in dysfunctional metarepresentation, whereas the phenomenological tradition emphasises that a basal Self-disorder is found at the core of the disease rather than a disorder of higher-level cognitive skill [2]. According to phenomenological psychiatry the indistinct background of experience is at stake: Objects appear against this backdrop of a non-representational horizon so as to gain their meaning in the first instance.

In my thesis I am going to stress the phenomenological scope of the sense of agency in schizophrenia. This is standing to reason because in order to know that I am self-identical it is necessary to distinguish (perceptually) between my movement and external motion. It is argued that in order to have a sense of ownership I need to have a sense of agency in the first place, otherwise I will experience objects in the world and especially my body as self-detached and objectified. This intuition does, however, in part relate to the original proposal by Frith [1]: Frith argues that an absent sense of agency is explained by aberrant metarepresentation.

Bayesian neurocognitive models (cf. "predictive coding") of schizophrenia can conceptualize this claim. It is a key feature of self-initiated action that it is predictable and consequences for perception are anticipated by the same token. In schizophrenia, a failure of top-down prediction of self-initiated action enables prediction-errors to propagate upwards although they would have been "explained away" by higher-level predictions [3].

As a result of this I suppose that phenomenology and predictive coding can inform themselves mutually by emphasizing the pre-thematic aspects of anticipation and their role in understanding the sense of agency in schizophrenia. Thereby we can gain a profound insight into our conception of cognitive top-down processes (constitutive of self-monitoring), which at that point cannot be understood as the basis for representation any longer. Top-down prediction can be rather understood in its role in projecting a tacitly meaningful background against which we engage in the world.

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Intersubjective Meaning Transfer in Cognitive Agents

Matúš Marton

Comenius University,
Bratislava, Slovakia

Introduction

Meanings or concepts are traditionally accepted as results of function mapping words into their content. Building on situated and embodied cognition theories, we believe that the creation of meanings is a prerequisite for language acquisition and is a condition for successful communication even without language in a classical sense [1,2]. We want to discuss meaning transfer and communication on a wider field of agents, including humans, infants, animals and artificial agents. Their representations may differ in basic characteristics/qualities even during the communication of the same type of agents depending on their sensory channels and experience (e.g. blindness, religion vs. science). Therefore, we need to identify widgets that are able to create mutual understanding between agents. The result should be applicable in problems of philosophy of science or education.

Sketch of solution

Agents do not have direct access to another agent's meanings. We represent meanings via the semantics of distinguishing criteria as image schemata [2], what is for us also a solution of symbols grounding. Agents in our abstract conception basically consist of their behavior, current perception, intentions and the whole knowledge representation gathered through experience, where the meanings are rooted/embodied. However, just behavior is observable. The other parts are just partially accessible with the help of abductive reasoning. To get common synchronization of meanings agents need to build on communally accepted truths [2].

Toward formalization

Based on [2] we represent agent's perception as a schema where vertices represent entities and edges represent relations. Agent can operate on them to get more detail or more general view. We abstract of language and take behavior as a kind of information transfer and accept it as only activity of agents. Main contribution of work is replacement of missing vertices or edges that represent the problem or question and formalization of them with a probability distribution of possible results, so the schema becomes a Bayesian network [3]. Information theory tool, such entropy seems to be valuable tool for describing vagueness and uncertainty of agent's representation of current situation. Entropy grows with rising amount of unknown facts missing for understanding a situation and pushes the agent to get more information and useful tools to gain from the information as much as possible.

In the communication and misunderstanding of two agents an agreement is reached via identifying of basic concepts that minimize entropy. Such medium can be some authorities, algorithms or measurements. We call them instruments. An instrument represents some point of view on the world and new can be based on more simple ones.

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The Origins and Evolution of Language

Valentina Oblak
University of Ljubljana,
Ljubljana, Slovenia

One of the yet unresolved questions in the field of cognitive science is how and when human language as we know it emerged and evolved. Being a problem for which we are not able to get direct information or tangible evidence, it is a topic that is to a great extent studied on the basis of theoretical assumptions. Several scientific tools from different fields can help to outline the hypotheses regarding the possible origin of human language, such as the research done on fossils, archaeological evidence, the comparison between humans and other animals, the studies of language acquisition and the contemporary language diversities.

Historically, the discussion concerning the origins and evolution of language is a long debated, yet unsolved issue to which several scientists have contributed, including Charles Darwin, who is one of those who posed the theoretical basis for the evolutionism of human language. Unfortunately, not long after Darwin's theory, there was a big temporal gap due to the 1866 Société de Linguistique de Paris' ban to discuss the issue [1]. The topic was then rediscovered in the scientific circles in the late 20th Century [2]. Since then it has divided scientists between several positions, the two extremes are either arguing for or against the evolutionism of language. Nowadays, several linguists and other scientist have defended their standing points in the debate. In the constellation of different theories and hypotheses, two of the most prominent opposite standpoints are strongly defended on the one side by Noam Chomsky, who supports the discontinuity theory, which indicates a single and sudden gene mutation being of key importance for the arising of human language, and on the other by Steven Pinker and Paul Bloom, which defend the continuity theory, that considers language as being developed with a gradual evolution [2].

Since the debate is still open, I found it interesting and useful to do an accurate review about what was already written to provide a starting point for further research. I decided not to take a position in the debate, in order to remain open-minded regarding the issue and treat equally all the different positions and theories. My work is theoretical. Considering the existing theories and supporting scientific discoveries, I trace the historical development of the issue and consider the neurophysiological basis of the centre for language formation in the brain. I analyse the current theories regarding the subject, trying to provide a broader insight into in the question of the origin and evolution of human language itself.

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Change Detection in Peripheral Vision Using Art Paintings and Snapshots

Eliška Pätoprstá

Comenius University,
Bratislava, Slovakia

Peripheral field of vision provides a better concept and understanding of the environment in which the person is located. It gives us the ability to grasp the whole scene at once without the necessity to look at everything separately. One of its purposes is to catch one's attention. [1] We were interested in the question whether is the processing of visual perception inside the peripheral field of vision influenced by the top-down information processing of the brain. We approached this question by testing the detection of changes on art paintings and on the snapshots of real life.

The hypothesis was that there will be a significant difference in detecting the changes between these two types of visual inputs. There are scientific proofs [2, 3] that art has certain impact on human psyche, but is this impact so strong that it could influence the visual processing of information in the brain? Are people better prepared to notice a change that will happen in the environment that is more natural to them, or are they going to be distracted by the art and won't be able to notice the change at all? There is of course also possibility that there will be no difference at all.

We have decided to split our research into two parts. During the first part we created our own version of the previous experiments on the size and shape of peripheral field of vision that is involved in cognitive processes. We have found it to have elliptic shape of certain size that corresponded with settings and equipment in our laboratory.

The finding of the size and shape of this ellipse was important for the second part of our experiment, where we measured the detection of changes itself, on digitised paintings and on snapshots. We mapped the acquired ellipse to the image and determined whether the change occurred inside or outside of it. This information was compared with the results of successfully/unsuccessfully detected changes. As we were interested in top-down processing, we determined that successfully detected change was the one when the participant answered what exactly changed on image, not that just a change occurred.

The preliminary results show that the probability of wrongly/no detecting of the change outside the ellipse is larger than correctly detecting the change inside the ellipse. The lower number of processed results didn't allow us yet to get more detailed conclusions, or possibility to confirm or disapprove the hypothesis.

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Analysis of the EEG in Patients with Alzheimer's Disease

Bruna Pikš
University of Ljubljana,
Ljubljana, Slovenia

Introduction

The number of patients diagnosed with the most common form of dementia, neuro-degenerative disease Alzheimer's disease, is estimated to triple within the next 50 years [1]. Although no known cure to treat AD exists, some medications seem to delay the symptoms if prescribed during the time frame they are most effective. Since neurological changes start before any behavioral or psychological changes are evident it is therefore of great importance that the disease is diagnosed in its nascent stage. Nowadays, diagnosis is normally performed by eliminating other possible causes for the symptoms with the help of psychological tests (Mini Mental State Examinations), blood test, spinal fluid and neurological examinations. Increasingly, imaging techniques, namely electroencephalograms, proved their potential in diagnosing the AD.

Advantages of EEG in diagnosing AD

Inexpensive, fairly uncomplicated to use and potentially mobile EEG is appreciated for its high temporal resolution which is important in spotting the slowing, enhanced complexity of the EEG signals and perturbations in synchrony when screening effects of AD [2]. However, in the context of diagnosing AD, there is no consensus yet as to what measures are the most effective. It is therefore our aim to empirically research all possible measures and define which would distinguish between AD patients and healthy controls most efficiently.

Method

The study sample will consist of 30-40 subjects with AD. The healthy control group will consist of 30-40 subjects as well with no history of heart attacks, strokes, Parkinson's disease, multiple sclerosis, depression or brain surgery.

The 64-channel EEG data (digital average reference and 0.15-30 Hz band-pass) will be recorded while subjects will perform the 3-stimuli oddball task that is mostly used to evoke the P3. In terms of required response, subjects will have to mentally count infrequent targets during the visual and auditory oddball task (large blue circles and high pitch tones). The two groups will be compared in different data sets: frequency bands, spectral power, ERP latency and amplitude, reference electrode choice, etc.

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Rationality Enhancement as Political Ideology

Vasco Marques Queirós

University of Vienna,
Vienna, Austria

In this thesis the following argument is made: a) there have been schemes to improve the human condition [1], b) the current movement in rationality research to enhance human rationality [2] is such a scheme, c) this perspective opens new fertile grounds for exploration.

Firstly the field of Judgement and Decision-Making is reviewed [3], with special emphasis on rationality and the cognitive science of rationality. Then, "schemes to improve the human condition" are explored, in historical and conceptual forms. Evidence is presented leading to the conclusion that Rationality enhancement is being treated as a scheme to improve human condition. The importance and fertility of this approach is made explicit by demonstrating a) potential failures of the rationality enhancement scheme, b) how to prevent these failures, and c) future directions for research into rationality enhancement. These are interdisciplinary application both in cognitive science and public policy.

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Placebo Effect Triggers and Their Possible Merit in Effectiveness of Complementary and Alternative Medicine Practices

Iva Rajović

University of Vienna,
Vienna, Austria

Contrary to Evidence-Based Medicine (EBM), Complementary and Alternative Medicine (CAM) is any practice that supposedly exhibits healing effect, yet claims are not based on scientific evidence. Main idea on which the most CAM practices are grounded is the concept of innate self-heal capacity. Controversial as it may sound and unproven as it can be, popularity of alternative methods is on the rise. According to the research carried out in 2011 in Austria, 46% of participants had at least one experience regarding the complementary medicine, whereas 91% of them were satisfied with the treatment. Homeopathy, as one of the most popular practices, has around 500 million users according to the World Health Organization. Although scientifically valid evidence of efficacy might be missing, profound number of users worldwide is evidence per se that should not be disregarded.

Expectation, belief, trust, hope and suggestibility are some of the fundamental properties cultivated in CAM practices. As our understanding of the placebo effect and its mechanisms expanded, it became clear that the already mentioned properties are also the influential factors of the placebo effect itself, and its manipulation [1]. Placebo effect is not only observable on the level of patient's subjectivity, but on the physiological level as well. As it is already known, there is no a single mechanism for the placebo effect. Rather, there are many [2]. Those mechanisms recruit different brain regions and circuits, depending on the placebo being administered. Crucial question that arises is how an inert substance, by being contextualized, has such a profound effect on the body.

Objectives: 1. Systematical description of possible cognitive and emotional processes that could be involved in the initial phase of the placebo administration (phase preceding placebo-specific physiological changes); 2. Through the systematic literature research, aim is to determine the possible correlation between the efficacy of selected CAM practices and psychological mechanisms involved in the initial phase of placebo effect, i.e. whether same mechanisms could be involved in triggering the healing process.

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Confabulation in Patients with Neurodegenerative Disorders and Brain Lesions

David Sakić

University of Ljubljana,
Ljubljana, Slovenia

Confabulation is a relatively common behavioural phenomenon in patients with some kind of neurological disorder. Confabulatory patients make false claims when asked a question or they talk in a stream of consciousness that makes no apparent sense. Researchers have classified the former type of confabulation as "mild" or "provoked" and the latter as "severe" or "spontaneous" [1].

Because confabulators usually give blatantly false answers, one might think that they are lying. But physiological tests have shown that is not the case, therefore the conclusion is that confabulators believe what they say, without intending to deceive. Another curiosity is that many confabulators cannot be or are not easily convinced that their statements are ill-grounded.

The neurological disorders that cause confabulation are varied, thus it can be a symptom of many different syndromes (e.g. Korsakoff's syndrome, aneurysm of the anterior communicating artery, anosognosia for hemiplegia, Alzheimer's disease, Capragas' syndrome). What most syndromes seem to have in common is a lesion in the frontal lobe. Researchers therefore believe that confabulation can only occur if there is a frontal lesion or if the communication of a part of the brain with the frontal lobe is disturbed [2].

However, the definition and classification of confabulation are highly disputed. Some believe it is merely a memory-filling mechanism that helps amnesiacs make sense of the world (a notion that was disproven by temporal amnesiacs, who show no confabulation tendencies). An alternative explanation says that confabulators lack the cognitive capabilities to assess the validity of a response – ideas are epistemically ill-grounded because they have not passed a review process. A third theory combines the two, saying that confabulation emerges because of memory and executive disfunction.

Other topics are also heavily disputed such as if confabulations can really be dichotomously classified into provoked and spontaneous, or are they on a continuum? Some researchers believe that confabulations are only verbal (i.e. expressed as sentences) while others believe that certain non-verbal behaviour can be classified as a confabulation.

The conclusion is that the scientific community is heavily divided on what confabulations are, what are the underlying mechanisms and what do these findings tell us about neurotypical individuals. In my master thesis, I will attempt to answer some of these questions or at least provide information to help resolve the conflicts. I will use a standardized, structured questionnaire on patients with various neurological disorders, not only the ones who are expected to be confabulatory. This will show if confabulation is more widespread than previously believed and CT or MRI scans provided by the neurological clinic will give insight into what part of the brain is damaged. My goal is to test as many patients as possible (100+), since most other similar studies [3] use very narrow inclusion criteria and consequently test much fewer patients, resulting in a lack of raw data. By providing this data, I hope for a clearer insight into the epistemic problems of confabulations.

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Towards a consolidated approach: Overcoming cognitive biases in medical decision-making. Integrating cognitive training for enhancing executive functions into bias-specific de-biasing techniques

Theresa Schachner
University of Vienna,
Vienna, Austria

This work is located at the intersection of the fields of executive functions, medical decision-making, and cognitive biases. It aims at integrating insights from cognitive training for improving executive control into existing techniques for overcoming cognitive biases. The focus will be on diagnosis as cognitive errors are especially costly here [1]. The thesis will consist of three main parts and is purely theoretical. The first step is selecting the prevalent cognitive biases in making diagnoses and outlining the involved cognitive abilities according to pre-set criteria by the author. Second, executive functions relevant to these cognitive biases will be introduced and connected to an existing cognitive training approach for improving executive control. Finally, already proven successful de-biasing techniques will be linked with this cognitive training. The neuroscientific processes of executive functions and cognitive biases will also be outlined in order to support the main claim of this work.

Executive functions such as attention, decision-making, and problem solving are presumably involved in cognitive biases that deter human decision-making from a rational outcome [2]. Further, it is hypothesized that executive functions are related to the ability to diminish the detrimental effects of cognitive biases; i.e., the better executive functions are trained and controllable, the more successful are bias-specific de-biasing techniques. The main line of reasoning is that the underlying cognitive processes between executive functions and the processes involved in overcoming cognitive biases are similar and should thus be trained together in order to achieve better outcomes for decreasing the detrimental effects of cognitive biases. This proposed approach for tackling the problem of cognitive biases that can have an especially negative influence on the process of diagnosis has not been proposed before; traditionally, cognitive biases are attempted to be diminished by developing bias-specific techniques that should be implemented in the ongoing decision-making process step-by-step. Thus, the underlying cognitive abilities that are involved in this task – administered by the executive functions – are left out. However, in order to achieve best outcomes for decreasing cognitive biases, I hypothesize that bias-specific techniques have to be combined with concrete cognitive training for executive functions in order to increase the decision-maker's abilities to efficiently cope with the detrimental effects of cognitive biases.

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Serious games and dementia

Darja Skrt
University of Ljubljana,
Ljubljana, Slovenia

Serious games are considered games, which main purpose of design is not an entertainment, so serious games can be used in education, health care, and management. However, some digital games which were primarily designed as an entertaining have been adopted to serious gaming on account of their good gaming experience [1]. Games for health represent an important subfield of serious games and its application in the health domain could significantly influence the quality of elderly people's lives. Several studies have been documenting the use of serious games in the health domain and these games are designed with the intention of improvement player's cognitive, social and physical abilities.

The research in this project consists of literature review, with the research question being the considerations in game design and benefits of the use of serious games in dementia patients. There is a variety of risk factors for Alzheimer's disease (AD) and at least some of them (e.g. cardiovascular disease) could be taken into account in design of serious games [2]. Thus the games could support physical activity and educate people about fitness and healthy lifestyle in general (including diet). Such games represent a pleasant leisure activity for elderly people and could have a positive impact on the overall well-being of institutionalized elderly. Moreover, playing physically engaging games may reduce the risk of depression among elderly.

Current research suggests that serious games could help patients to cope with the symptoms of the brain deterioration and compensate for certain losses because of the plasticity of the nervous system which denotes the possibility of nervous system to create and modify neural connections [3].

With exercises which enhance attention, orientation, memory, and reasoning, elderly could benefit and have their quality of life improved.

As in any other research field, more research in serious games for dementia is needed and since the world's population is aging, there arises a market opportunity for game developers. Different experts have to contribute and cooperate in such a project so that games are as beneficial as possible. In the field of cognitive science serious games for dementia represent an important area of research concerning a great amount of the population.

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The Phonological-phonetic Interface in the Brain. Insights from Acquired Language Disorders

Simon Sollereder, Wolfram Ziegler

University of Vienna,
Vienna, Austria

Introduction

Major theories from the 20th century linguistics created abstract and purely symbolic units without any motor or acoustic substance to categorize speech sounds. This idea was also implemented in more recent computational models where words are constructed as linear strings of abstract segments, implying a clear boundary between amodal phonological units and motor mechanisms involved in phonetic encoding. Modern neurophonetic theories attempt to overcome this dualistic approach [1]. Neurogenic speech disorders provide an opportunity to observe the neurolinguistic phonological-phonetic interface when learned speech motor patterns break down. Two syndromes are of particular interest: apraxia of speech (AOS) and conduction aphasia (CA). Both appear after strokes to the left anterior and middle artery including different cortical and subcortical regions. AOS is considered as a disorder of speech motor planning, while CA traditionally represents an impairment afflicting the long-term storage of phonological units. This study investigates different types of speech errors to reveal the mechanisms of phonetic-phonological encoding stage in spoken language [2].

Methods

Participants: 5 participants with purely AOS and 5 participants with CA are examined. Both groups are pre-tested with different clinical assessments to confirm their clinical diagnosis, to test for their primary cognitive locus of impairment and to exclude further conflicting neuropsychological handicaps. 5 healthy control speakers are also included.

Procedure: All groups are confronted with two speech production tasks: (1) a verbal repetition task including the whole set of stimuli (n = 200 ~ 240) in normal speech rate with casual articulation and (2) a confrontation naming task with a concentrated set of stimuli (n = 50 ~100) in reduced speech rate with careful articulation. The stimuli consist of disyllabic, initial stressed (i.e. trochee) words with different phonetic properties which elicit a natural elision of the /ə/ sound – the most used vowel in German. All stimuli are recorded by trained radio speakers (1m, 1f) and presented in a controlled setting. The answers are recorded digitally, transcribed phonetically and analyzed spectrographically [3].

Expected Results & Discussion

Expected results center around the qualitative and quantitative properties of errors between the groups. Traditional accounts postulate categorical (whole) phoneme errors for CA and continuous (phonetic) errors for AOS. Interaction effects are expected for the different phonetic stimuli environments, the tasks, the speech rate and the gender-specific imitation. The results imply insights into (1) the phonological-phonetic encoding stage, (2) the mapping process from auditive perception to speech production, (3) the nature of phonological errors and (4) the similarities and differences in the error patterns of both groups.

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The Influence of Concurrent Cognitive Tasks on Balance, Step Initiation and Gait in Healthy Young Adults

Ondrej Spevák
Comenius University,
Bratislava, Slovakia

Introduction
The most often noticed and performed locomotor task is none other than walking. In a scientific way, it is recognized as a very complex task requiring a multitude of systems simultaneously. Although locomotion is one of the main matters of the study, cognitive domain, no less significant, will also be addressed. As a matter of fact, our research could be considered the interface of these two phenomena. This area of research is still only at the beginning and more and more discrepancies are arising with the expansion of the explorations concerned with the topic.

Motivation and Impact
Quality of life is strongly dependent on the ability to walk and maintain balance. Fall-induced injuries as a result of reduced postural control constitute high costs and a major public-health concern of the elderly, with an increasing trend in the future. Recent studies revealed that human locomotion is not a pure motor function but that it is tightly connected to cognitive processes [1,2]. Attention and executive functions are recognized as the main cognitive influencers of gait [2,3]. Recent studies have suggested that accuracy and speed of walking are affected if cognitive tasks are performed concurrently [3]. Additional research in the field of cognitive-motor interference would be of great importance for enhancing our understanding of gait, as well as for clinical purposes.

Methods
Subjects performed motor and cognitive tasks under a single and dual task condition. Experiment consisted of four blocks, focused on posturography, step initiation, gait and single mental tasking. Each of the motor tasks was combined with a mental one that demanded working memory resources, namely N-back and Brooks spatial memory task. Blocks and trials were randomized. The distribution of pressure during the motor tasks was acquired using two force plates, installed beneath a treadmill's belt, at the interval of 100 Hz. Relevant parameters from all the trials were subsequently extracted and analyzed. The data are being processed. We are expecting to find the significant influence of cognitive tasks on gait parameters.

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Supporting Awareness and Interaction Across Distributed Scientific Work Groups via Technology

Noemi Steitz

University of Vienna,
Vienna, Austria

Motivation & Background

Awareness (of others, their activities) can set the ground for informal interactions and connections which in turn are important for initiating or maintaining collaborations [1]. Physically distributed groups do not have this by default. Here technology can come into play.

Research around that has been done within the field of Computer Supported Cooperative Work, starting in the 90s, in conceptual, ethnographic and system-driven ways [2]. One early and prominent example for the latter would be the Portholes project [1], where media space technology was used to offer awareness information across distance.

By this time, new technological possibilities (e.g. touch displays, sensors, social networking tools) exist, design tensions (e.g. regarding availability, privacy, conventions (e.g. individual freedom vs. shared group arrangements) and tailoring (e.g. consistency vs. adjustability to situation) [2]) are prevalent, and the challenge to support awareness and interaction between distributed groups (e.g. in science) in an acceptable, practical and engaging way remains topical.

Approach & Methods

Therefore the goal of this thesis will be to explore the user perspective and human factors in a specific scientific context, gather new technological options, and investigate the interrelations/range of possibilities in between. This will be done by drawing on literature and a case study within an Institute of TU Vienna (IGW) consisting of three distributed work groups. In order to take a both user-centered and technology-informed approach in the field, the following mix of (qualitative) methods will be applied:

- Observation and semi-structured Interviews across the groups: to investigate how awareness and interaction unfolds, what support is wished and needed, and what connections are found acceptable in this setting.
- Technology probes using available touch screens and simple applications (allowing to interact across groups): to learn about patterns and forms of usage and draw out further issues for discussion.
- Participatory Design sessions: to address possible scenarios and potential sensitive issues based on the former investigations, and stir further reflections and design ideas.

Outlook

The investigations shall result in a map/schema offering an integrated view of involved aspects, possibilities and tensions that can serve as basis, not only in the specific context of investigation, for reflecting on balanced design options fitted to the everyday work life.

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Spatial and Temporal Distribution of GABAa Receptor Subunits in Cortical and Subcortical Regions of Normal and Down Syndrome Developing Human Brain

Tamara Stojanović
Medical University of Vienna,
Vienna, Austria

Introduction
GABAa receptors represent the major inhibitory receptor system in the adult mammalian brain [1]. There are 19 different subunits (α1-6, β1-3, γ1-3, δ, ε, π, θ, ρ1-3), which can assemble into functional receptors [2]. The characterization of the GABAergic inhibitory system, could give not only insights into better understanding of normal development of the brain, but also in better understanding of human neurodevelopmental disorders. Here we provide a detailed histological investigation of four GABAa receptor subunits (α1, α2, α3 and γ2) in the hippocampus (CA1, subiculum), basal ganglia (putamen, globus pallidus ext. (GPe), globus pallidus int. (GPi)) and corical layers (marginal zone (MZ) and subplate) in Down syndrom (DS) and age-matched controls (from 14 GW to birth).

Methods
On specific regions of 28 human fetal brains of subjects with DS and 28 controls, immunohistochemistry was performed. Glass slides were converted to digital slides, from which 3 images with high magnification were exported from every brain region. Quantitative measurements of immunoreactivity (IR) staining followed. Statistical tests Two-Way ANOVA and Quasi linear regression model (QLRM) were performed to acquire the results.

!! Results
We observed differences in dynamics according to time period of four GABAa receptor subunits (α1, α2, α3 and γ2) in all observed regions in both DS and control group. Delayed onset of all GABAa receptor subunits was noted in DS in subcortical and hippocampal regions. Differences in levels of IR between the groups were observed in CA1 (α3 and γ2), MZ (α3), subplate (α3), putamen (α3 and γ2) and GPe (α1). In all regions (except in MZ) we noted higher levels of IR in control group.

Conclusion
Different amount of subunits between normal and DS developing brain, relationship between amount of specific subunits and early brain developmental period and different spatial and temporal distribution are findings which support the possibility of GABAa receptor subunits being an important factor in human neurodevelopmental disorders, including ones with cognitive impairment.

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Social Factors in Decision Making about Vaccination

Martin Turček

Comenius University,
Bratislava, Slovakia

We examined the influence of emotional subtleness of different messages about vaccination on participants' willingness to get vaccinated. The aim of our study is to deepen our understanding of how vaccination decision
making process works and what kind of messaging is the most effective with respect to vaccination.

Previous research has found that out of four different types of messages regarding
vaccination, none were successful at increasing participants' vaccination willingness [1]. The authors have subsequently highligted the role of emotional impact of vaccination
messages, hypothesizing that the inefficiency of vaccination messages might have been caused by high level of emotionality in the vaccination messages. They claimed that if emotional information were presented in a more subtle way, this would not lead to participants' rejection of vaccination. Therefore, we manipulated the level of emotional subtleness in order to see whether this factor would indeed have an influence on vaccination willingness.

Experimental design
Two of the four types of messages from [1] were used:
- Message about research disproving particular alleged adverse effect of a particular vaccine
- Message emphasizing risks of a particular vaccine-preventable disease

Each message type has 4 different levels of emotional subtleness, which was manipulated by emotionally charged adjectives in the text of the messages.

Higher level of emotional strength is established by adding new emotionally charged adjectives, or providing stronger emotionally charged adjectives. All participants were presented with both types of messages, and randomly assigned to one of 4 possible levels of emotional subtleness per message type. After reading a message, participants were asked to report their willingness to vaccinate themselves and willingness to vaccinate their children, both on a scale between 0 and 10.

Participants have been recruited online, via several discussion fora on Slovak websites.

Results
Preliminary results indicate that in line with hypotheses:
- Emotionality of vaccination messages does change participants' willingness to vaccinate
- There is a peak of emotionality, after which adding emotional strength becomes counterproductive, concerning the message acceptance.
- Significant difference exists between the willingness to vaccinate self and (potential) child.

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Can People Drop Objects from Their Visual Working Memory

Işıl Uluc, Anka Slana, Grega Repovš

University of Ljubljana,
Ljubljana, Slovenia

Recent studies show that an average healthy young human adult can successfully keep 3-4 objects in their visual working memory (VWM). Ikkai, McCollough and Vogel [1] have further shown that in a lateralized change detection VWM task, it is possible to observe a negative deflection in EEG over parietal cortex, which is stronger on the side contralateral to the hemifield in which items to be remembered were shown. The difference between the amplitude measured over ipsilateral and contralateral hemisphere—termed Contralateral Delay Activity (CDA)—is assumed to reflect the current working memory load. Further experiments have shown that the magnitude of CDA is closely related to individual's VWM capacity; i.e. the CDA amplitude increases when the number of objects remembered increase and reaches its limit when the working memory capacity reaches its limit [2]. As it tracks VWM load, it has been successfully used to study the ability to filter unrelated information from VWM, leading to results that show people who have low VWM capacity also have poor performance on filtering unrelated information from their VWM [3]. Analogue to observing active filtering of items from VWM, the current study aims to investigate, whether people can drop (forget) objects from VWM during the maintenance period.

25 healthy young adults participated in the study. Each participant performed 288 trials of a change detection task. Participants were instructed to memorize 2 or 4 objects and later either keep all of the objects in their VWM or drop half of them. Event-related potentials (ERP) from 32 channel locations were recorded during the performance of the task.

Similar to the earlier studies, we expected to find a positive relationship between VWM capacity and the ability to drop objects from working memory. Behavioral data confirmed the hypothesis at the load of 4, but not at the load of 2 items, possibly reflecting the ease of performing the task at the VMW load of 2 items.

ERP analysis will provide further information about the progression of the task performance. We are specifically interested in whether CDA decreases once the subjects are instructed to drop the irrelevant items, or does it stay the same throughout the trial.

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Inter-agent communication as a mean of achieving objectives

Peter Vlk

Comenius University,
Bratislava, Slovakia

Introduction

This paper investigates whether a group of cognitive agents may learn to use simple communication and apply this acquired knowledge to be more successful in achieving their objectives.

Environment

Environment is a squared grid map. Agent can move inside of an area with dimensions of 13x13. There are no obstacles inside this area. Beside agents, the environment contains multiple types of fruit. The agent receives rewards for collecting fruit.

Agent

Our agent is an entity placed in a simple virtual environment. Its goal is to maximize the average reward gained per action. Agent receives a reward if it picks up the fruit and gets a minor additional reward if it responds correctly to a help signal. It perceives squares within certain distance around it. There are two types of actions which it can perform.

Movements
It can move around its environment in any direction (horizontal, vertical or diagonal), or it can choose not to move without performing any other action.

Communication
Agent can try to communicate with other agents within its percept. There are three types of signals:

- Help: agent should try to send this signal if there is no fruit object within its percept

- There is a fruit in my percept

- There is no fruit in my percept

Learning mechanism
As a learning mechanism we have chosen model free actor-critic reinforcement learning approach.[2]
"The neural actor-critic architecture usually consists of two neural networks(NN):

- the value NN (critic)
- the action NN (actor)

The value NN approximates evaluation functions, mapping states to estimated values, whereas the action NN generates a plausible (or legal) action mapping states to actions. The adaptive critic receives external (primary) reinforcement from the world and transforms it into internal (heuristic) reinforcement. The critic is adaptive because its predictor component (value NN) is updated using temporal difference methods. The action NN attempts to learn optimal control or decision making skills. It does so by choosing actions probabilistically to produce exploration hopefully converging to optimal actions with probability one. In this framework an actor-critic agent attempts to find both optimal actions and optimal values."[1]

Agents learning process starts immediately after it is placed into a virtual environment. Exploration mechanism is implemented in its action selection. This means that at first, agent will perform completely random actions and the more steps it will take the less random will the action selection become.

Experiment

We have compared an average reward gained per action in three groups:

- Agents that were performing only random actions

- Learning agents

- Learning agents with communication

Our experiment is divided into two phases:

- Search for the most suitable configuration of learning mechanism parameters by comparing results of first and second group

- Comparing results of second and third group with main focus on analysis of communication actions

Using Folk Literature in Designing Serious Games for Psychotherapy

Bojana Vuković
University of Ljubljana,
Ljubljana, Slovenia

Serious games have become an interesting research field and they are used in various application areas. Virtual games have already become part in individual's life, and this has enabled them to become part of culture. Serious games are used in military, government, education, corporate business, healthcare [1]. Nowadays, they are also applied in psychotherapy. Although games that could support psychotherapy have already been developed [2][3], this is still a new field of research and the aim of this study is to present some new ideas – especially from the cultural point of view – that could help improve games for psychotherapy.

I propose a new idea of using folk literature in designing serious games for psychotherapy. I will discuss beliefs underlying folk literature, as well as different uses of this type of literature, especially fairy tales, in psychotherapy and approaches that are dealing with them. It will be presented possible differences between folk stories, as well as their use in multicultural and non-Western environments. I will present different approaches to cultural influences in psychotherapy, the use of folk literature, metaphors and process of imagination. These approaches should lead to more effective designing of serious games for psychotherapy and emphasize the significance of not overlooking cultural impacts.

It is suggested that using fairy tale characters could facilitate process of identification in patients and help them successfully cope with problems. It is recommended in deep research of patients' cultural background, and when selecting a relevant fairy tale character from their tradition. One of the aims of my work is to raise awareness about the importance of culture in designing serious games for psychotherapy.

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The Aesthetic Reset – Mechanism and Function of the Aesthetic Experience in the Predictive Mind

Thomas Wolf
University of Vienna,
Vienna, Austria

Introduction

The theory of the aesthetic reset aims to provide a predictive coding account of aesthetic experience (AE). This is attempted through a theoretical analysis on possible connections between the phenomenology of AE, as for example described by Martin Seel [1] and the predictive coding framework (PCF) [2]. This should deepen our understanding of AE and eventually provide us with testable predictions for empirical aesthetics. Martin Seel describes the AE as a particular mode of perception. This mode is: not restricted to art, different from everyday perception, closer to raw sense data, less structured and not guided by interest. The PCF rests upon the idea that the brain is a hypotheses-testing machine, which spans multiple hierarchically structured levels. Prediction error minimization lies at the heart of the PCF. Our brains constantly try to minimize the prediction error between our top-down predictions about the world and the bottom-up, incoming sense data, on all levels of the hierarchy. This happens either through a revision of our predictions or by changing sense data through action.

Mechanism

The theory of the aesthetic reset proposes a simple mechanism behind AE: A suspension of top-down predictions without a loss in prediction error gain that entails implications for the organism that could cause the phenomenology of an AE. Two of these implications are: 1) Pure and mostly unstructured sense data: If the predictions are suspended, and the upward prediction errors are nevertheless compared to them, the residuals suddenly become much larger. These large prediction errors cascade upwards through the hierarchy unfiltered and unstructured by downward predictions. This signal resembles raw sense data substantially more than the residuals usually held at the most minimal level. 2) Exceptional nature of AE: The suspension of predictions is clearly far from the everyday status of the system, since large prediction errors are exactly what the system usually tries to avoid.

Function

Prior beliefs about the world are continuously formed and used to generate better and better predictions. During this process the organism might get stuck in local minima, where the generated prediction seems to be the most accurate, when in fact it is inferior to a prediction at the global minimum. To overcome local minima it is crucial to allow for a temporary increase in prediction error to investigate whether a minimum on the other side of the slope is actually lower. In order to achieve this, it could be functional to equip the organism with a tendency to occasionally suspend all predictions and allow itself to be flooded by incoming data, exactly as described in the previous paragraph, leading to a resetting of models at various levels of the hierarchy. This resetting could help the organism to develop more accurate and precise predictions over time resulting in overall lower prediction errors and might be what happens during an AE, hence the aesthetic reset.

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U-Experience 1.0: Open Mobile Platform for Experience Research

Gregor Žavcer

University of Vienna,
Vienna, Austria

U-Experience is a personal data collection system that uses mobile phones to collect experiential data, complemented with multimedia and GPS data. The main goal is to develop ecologically valid environment that enables researchers to create and deploy customised experience sampling research protocols, optimise researchers' time and allow an in-depth understanding of phenomenological processes while providing research participants with insights into their experiential landscape.

Currently, the application's used and copied method is DES (Descriptive Experience Sampling) together with the beneficial aspects of yes/no questions method. DES (Descriptive Experience Sampling) is a method, first developed by R. T. Hurlburt, where research subject is "beeped" on random occasions throughout the day, while the subject's task is to write down her ongoing experience from the moment right before the beep. A DES investigator then meets with the subject for an interview on collected beep notes within 24 hours [1]. Another alternative to such a method is a so-called Just Ask Approach, where the subject is given a series of yes/no questions and answers accordingly. As the application allows participants to describe their experiences in various ways – by taking a (portrait) photograph, by open text and/or by creating new key words – the user doesn't need to give a phenomenological insight and there is no need for a time-consuming interviewer's guidance in a dialogue, for this task is done by the app itself.

The platform has gone through first testing by researchers and needs for upgrades have been identified. Future plans include to make experience sampling more customisable and context-aware, complemented by additional data streams in order to enable more specific research. Furthermore, an advantage of automated context-aware experience sampling is that for research protocols which don't require random sampling, user interruptions are minimised while the "value" of data gathered is maximised [2], thus making the research process more effective. In addition, such experience sampling tools can be used for user modelling and could be integrated in various adaptive applications in domains such as for example serious games and health care applications for assessing patient's current state and guiding therapies accordingly. Further research on this topic is needed.

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Seeing Through Music: Effect of Music-induced Arousal on Visual Attention

Sergej Žižek
University of Ljubljana,
Ljubljana, Slovenia

Music can influence our mood, a fact well known from the domain of folk psychology. Studies had also shown that music can elicit physiological responses, including increased blood pressure, dilation of pupils and body movements. However, unresolved question of whether music can influence our cognition directly provides a space for further research.

One reason why music has maintained its importance to humans can be found in its emotional rewards – it is capable of being as rewarding as food, sex and even drugs. Emotions contained in and induced by stimuli from the environment therefore play a crucial role in the information contained in the stimulus will be processed. Regarding the studies indicating the crossmodal integration of the auditory and visual cognitive systems [1], I am focusing on the transfer of arousal, one of the primary dimensions of emotion, from musical to visual domain. As attention provides information crucial for reacting to changes in the environment, attending to visual information could play an even more important role, when the information is emotionally arousing. For instance the sudden appearance of a fearful face in the peripheral area of one's vision probably indicates an impending threat or danger, which calls for immediate attention. Considering the notion that emotion also facilitates early visual processing [2] I hypothesize that transfer of emotional arousal from musical domain will influence the celerity with which visual stimulus will be detected and the probability that visual information will be processed.

I will test my hypothesis by applying a crossmodal priming paradigm in which auditory primes (Romantic piano solo music) varying in arousal [3] will be followed by a visual search task. In Experiment 1 participants will be, after the presentation of the auditory stimulus, ask to detect the target stimulus and report it by pressing the button on the keyboard. As the response speed also depends on the arousal levels, I presuppose that reaction time will be shorter when the auditory prime will be more arousing, compared to low arousing excerpts. In Experiment 2 similar setting will be applied. Participants will be asked to fix their gaze on the cross in the middle of the screen. After the presentation of the musical stimulus the task will comprise of shifting the gaze in the direction of the target while ignoring the distractors. Measurement of the direction and the velocity of the gaze movement will be performed.

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MEi:CogSci Conference 2014, Kraków, Poland

Posters

Deriving the Drivers of Decisions in a Financial Portfolio Optimisation Scenario

Shahrzad Afroozeh

University of Vienna,
Vienna, Austria

Adaptive user interfaces are recent topic of research. The merit of these interfaces lies in their adaptability to different users in different contexts and use cases. T. Torsney-Weir, M. Sedlmair, and T. Möller from University of Vienna, conducted a user study on two almost identical user interfaces, one with and one without a risk bar, designed to facilitate financial investment. The result of the study showed that people can be categorised into two groups when interacting with these interfaces. First group, risk fixers, seem to have a predefined notion of tolerated risk in terms of investment. The second group, sweet spotters, will interact with the user interfaces to find the optimum point to maximise return versus risk. The question arises why people act in these two different ways and, given a limited knowledge of the personality of subjects, is there any distinguishing features to decide to which group they belong. Such knowledge can help the interface to adapt to the interacting person for the best user experience.

There are in total 23 subjects, male and female university students. There are 21 recorded audio interviews, basic demographic data (age, sex, etc), self assessed investment experience, and interface usage questionnaire available. To begin, a literature survey was conducted to see how experts make decisions which involve risk and whether or not that could help us coming up with explanations of the two groups. it was concluded that experts tend to use their expertise to identify a path to the desired outcome rather than comparing different options against each other[1]. Unfortunately, this information is not very useful since this study's subjects were not experts.

Each subject gave a semi-structured interview after interacting with two interfaces, where they explained how they placed their investment and which interface was the most useful. Since the interview recordings were in audio format, we coded them using grounded theory methods[2]. We, my supervisor and I, initially listened to the interviews and identified important parts of the interviews. Then, we went over the phrases, came up with descriptive short phrases coding the content of the real phrase, compared codes to devise the final set of codes, went through the interviews again, and coded them with the final codes. Afterwards, similar codes were grouped into axial codes. Both axial and subset codes went through Krippendorff's alpha[3] inter-rater reliability test to measure their reliability. In the last phase, decision tree learning was used to find the most distinguishing features between the two classes of risk fixers and sweet spotters.

In conclusion, the top distinguishing features in decision trees will be our desired set. Based on this set, people can be classified and the user interface can then adapt to the target group. This study can be the basis for future work on using questionnaires and limited psychological data for adaptation of user interfaces.

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Novel versus identical distractors for P3 assessment in Alzheimer's disease

Ines Anžej, Daša Ozimek, Andreja Emeršič, Jurij Dreo

University of Ljubljana,
Ljubljana, Slovenia

Introduction

Since EEG is a sensitive, noninvasive method of assessing brain function, it is suitable for neurophysiological monitoring in Alzheimer's Disease (AD) [1]. Using EEG the P3 (also called P300) wave can be measured, which is an event related potential (ERP) [2]. Neural changes and neuronal cell loss, associated with AD, cause lower P3 amplitudes in oddball tasks [1]. The P3 wave can be evoked with the oddball paradigm, where two or three stimuli types are presented with different probabilities in a random order [2]. P3a is a subcomponent of the P3, which reflects frontal lobe function [2]. The aim of our study was to investigate the P3 difference obtained with novel and non-novel (repeating) distractors in a visual oddball task in AD patients. We additionally used two levels of difficulty in discriminating between target and frequent stimuli.

Our hypotheses were: (a.) Visual oddball with novel distractors will elicit P3a (b.) Visual task with novel distractors will show larger P3a amplitudes (c.) More difficult oddball tasks will produce larger P3a amplitudes compared to easier ones.

Methods

EEGs were recorded while 12 healthy young adults, performed a three-stimulus oddball task with either novel distractors or non-novel repeated distractors. Visual stimulus categories were defined as the standard (filled small circle), target (filled big circle), repeated distractor (chessboard pattern) and novel distractors (different geometric shapes). P3 amplitude, latency and variability were calculated and compared visually on all topographies of participants.

Preliminary results

When target/standard discrimination was difficult, the novel distractor stimulus elicited a larger P3a over the frontal-central areas compared to non-novel distractors in both conditions.

Conclusions / Discussion

The P3a is generated when attentional focus, engaged for a difficult sensory discrimination task, is disrupted by the occurrence of an infrequent distractor stimulus [3]. The distractor generated P3a reflects the neural operations associated with changes in frontal lobe mechanisms [3]. Suggested applications of the 3-stimulus visual oddball task include the neurophysiological assessment of frontal lobe function in cognitively impaired patients such as AD. Our assumption is that the best oddball to achieve this might be an easy discrimination 3-stimulus oddball with non-repeating distractors. Previous studies reported [3] more significant differences between and therefore better discrimination between healthy participants and patients in easy task condition. While easy oddball produces slightly smaller P3a potentials, this can be compensated by non-repeating distractors, which additionally seem to make the task subjectively less tiresome, an important consideration in cognitively impaired patients.

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Proneness to Uncritical Acceptance of Information

Vladimír Barus

Comenius University,
Bratislava, Slovakia

Introduction

Something we could call "not thinking critically" is currently being scientifically studied more as a cognitive phenomenon in regards to biases and cognitive errors. I personally believe that at the moment, it is crucial for us to study it as a character trait [1], as well as to study its social impacts and correlating factors. Whilst understanding the value of diversity of thinking amongst people, when dealing with problems concerning humanity as a whole, a scientific approach to understanding and solving them is absolutely necessary. That is why I want to try and find some factors correlating with it, as well as get a picture of a non-scientist's attitude towards and understanding of science.

Methods

To acquire needed information, an online questionnaire with a total of 20 questions (plus demographics) has been administered. It consists of three parts, first are demographic data such as one's age, religious views, and whether or not they work in a field related to science.

Second part attempts to measure their style of evaluating new information – whether they apply skeptical criteria (5 questions presented with skeptical criteria) or not (different 5 questions presented with non-skeptical criteria). It does so in the form of presenting a hypothetical situation (one at a time) and letting the participant rate the presented evaluation criterion. Participants have been asked to rate the presented criterion as "highly" or "not at all" relevant to judging an information's credibility on a 5-point Likert scale.

The third part is aimed at measuring participant's own attitude and knowledge regarding science. Questions and statements presented in this part consist either of popular myths about science or short descriptions of how science works (5 questions), or various attitudes towards science (other 5 questions). Participants have been asked to express if they identify themselves with these statements or not.

Subsequently, I analyze acquired data for correlations between various part of the questionnaire.

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Automatic Annotation of Disease Entities from Patient Information Leaflets

**Ina Ho Yee Bauer,
Soheil Khosravipour**
Research Studios Austria - Studio SAT,
Vienna, Austria

Information Extraction (IE) is applied in computational linguistics to automatically extract relevant information of a specified domain in an unstructured text. The present study applied IE to extract diseases from Patient Information Leaflets (PIL). Approaches from Artificial Intelligence and Cognitive Science are combined with the aim to support medical professionals in detecting diseases targeted by a drug in a less-time consuming manner than by reading the entire PLI. Previous work applying IE in the medical domain can be categorized in rule-based, Machine Learning and hybrid approaches. Beginning with the extraction of specific drug features, the trend shifted towards working on whole drug characteristics. Studies on drug interactions have been rare but are an increasing trend. Recent work predominantly focuses on extracting information from clinical narratives [1]. This study uses a hybrid approach.

As a platform the General Architecture for Text Engineering (GATE, see gate.ac.uk) was used. Developed as a powerful open source text processing application, GATE provides IE tools and automatic evaluation. In the first step the entries of the most recent German Modification of the International Statistical Classification of Diseases and Related Health Problems (ICD-10 GM) were stemmed to form a gazetteer list. In the second step adjectives related to the disease names were extracted to guarantee completeness, for example "chronische Niereninsuffizienz" (chronic renal insufficiency) required the disease name "Niereninsuffizienz" and the adjective "chronisch". For this purpose a stemmed list of german adjectives was used. In both steps a stemmer enabled the annotation of all adjectives and names even if they did not appear in their base form. In the final stage a machine learning processor was trained to extract whole disease blocks consisting of adjectives and names.

The result of the project is a novel GATE application capable of automated annotation of diseases from PLI corpora. Each step in the development process was followed by an evaluation phase. For this purpose a corpus consisting of 40 PLIs was manually annotated and compared with the automatically created annotations to calculate the recall, the precision and the F-score. Improvement in each phase was obtained by tracing back the errors of the application. Categorizing the causes of wrong or missing automatic annotations led to solutions improving the results. Future work could focus on the extraction of indications and contraindications of drugs.

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Influence of alternative education on cooperativeness

Eugénia Belková
Comenius University,
Bratislava, Slovakia

The PISA 2012 (Programme for International Student Assessment) survey organized by OECD every 3 years gives us a basic idea of the extent to which 15-year-old students have acquired key knowledge and skills that are essential for full participation in modern societies. Even though PISA testing methods and the choice of participants are often criticised, the following results should not be ignored:

- Slovakian students have shown significantly worse literacy level in all 3 tested fields than the OECD average
- students with the lowest socioeconomic status in Slovakia were the most affected by their social background compared to the other tested countries
- students from Slovakia show significantly lower persistency in solving difficult tasks, as well as lower confidence in their own abilities[1]

Why is Slovakia performing so badly? Could it be caused by current knowledge-driven educational system in Slovakia lacking interest in other components of intelligence (Gardner's theory of multiple intelligences)? Why do students keep memorising facts without actually learning something useful to prepare them for the future? Does alternative education solve these problems?

According to the report from the National Centre for Clinical Infant Programs almost all students who do poorly in school lack one or more of following elements of emotional intelligence: confidence, curiosity, intentionality, self-control, relatedness, capacity to communicate or cooperativeness. [2] In my semestral project I decided to do research on cooperativeness, the ability to balance one's own needs with those of others in group activity.

"Experimental design"

I set up an experiment consisting of 3 cooperative games chosen carefully to be able to measure cooperative abilities of children and keep them motivated to participate at the same time. Those games were presented to 4 main groups of young people:

- students of traditional educational system, 4th grade (age 9)
- students of traditional educational system, 9th grade (age 14)
- students of Waldorf education, 4th grade (age 9)
- students of Waldorf education, 9th grade (age 14)

Since Steiner's pedagogy (Waldorf education) supports the whole person's development – head, heart and hands and emphasises team work, mutual help and cooperation, my hypothesis was that children influenced by Waldorf education would perform better. [3]

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Radioligand Binding to Nmda Receptors: Addition of NaCl- One Step Closer to Natural Conditions

Ole Jonas Boeken
University of Vienna,
Vienna, Austria

The NMDA-receptor contains binding sites for the excitatory neurotransmitter glutamate (Glu, NR-2 subunits) and for glycine (Gly, NR-1 subunits) [1] and is highly concentrated in the hippocampus and the cerebral cortex. This receptor forms an ion channel permeable for Na+ and Ca2+ ions. Usually this channel is blocked by a Mg2+ cation. When Glu and Gly are binding on the receptor and simultaneously the membrane gets depolarized, the Mg2+ block is removed and the Ca2+-ions reach the intracellular space. The influx of Ca2+ can activate several second messenger systems that are important for activity-dependent synaptic plasticity, but on the other hand excessive influx of Ca2+ can cause excitotoxicity that can lead to neuronal degeneration (e.g. stroke, traumatic brain injury, Alzheimer disease)[2]. Dizocilpine (MK-801) is an allosteric blocker of the NMDA-channel [3]. Hence, it can close the ion channel. Several studies reported its neuroprotective benefit toward excitotoxicity. By adding Tritium to MK-801 it can be applied as a radioligand ([3H]MK-801), hence, it can be used to label the NMDA-receptor in neuronal membranes [3].

In binding experiments the question is whether and in which concentration different test substances can alter the binding of the radioligand. To do so the test substances are delivered in increasing concentration. In 15 consecutive experiments the antagonists D(-)-2-Amino-5-phosphonopentanoic acid (D-APV, competes with Glu at NR2 subunit) and Dichlorokynurenic acid (DCKA, competes with Gly at NR1 subunit) where applied in different buffers (HEPES/3mM Na+ pH 7, BisTris/30mM NaCl pH 7) at rat cerebral cortex membranes in combination with increasing concentration of Glu and Gly. Both D-APV and DCKA are also associated with neuroprotective effects towards excitotoxicity. The two buffers differed strongly in the concentration of sodium to investigate the influence of this physiologically important cation on receptor binding.

As expected for competitive inhibitors, inhibition by D-APV and DCKA was strongly influenced by the presence of the respective neurotransmitters Glu and Gly. Inhibition by D-APV and DCKA was also influenced by raising the sodium concentration from 3 to 30 mM. In the presence of 30 mM sodium D-APV and DCKA were better inhibitors than with 3 mM.

In conclusion any future search for NDMA-receptor blocker should take in consideration the physiological milieu of the receptor.

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Suffix Combinations In English: a Conceptual and Cognitive Semantics Approach

Alastair Lawrence Brown

University of Vienna,
Vienna, Austria

The debate concerning the boundary of language and 'general' cognition remains to be heated in the field of cognitive science today. This frontier can be explored within the realm of morphology, a discipline where form and meaning combine at an observable level. Take, for example, the words lead and leader. The addition of the morphological affix, -er, indicates that there is a change of syntactic category from verb to noun. The syntactic change also implies a change at the semantic (meaning) level. Does this additional morpheme thus hold the semantic value itself, or is it a mere structural vessel implemented to express the change occurring within the base word?

To answer this question, we must delve a little further. Consider another pair: open and opener. They fall into the same syntactic categories as before, although here the lexical semantics differ. An opener is an object, whilst a leader intimates a person (or at least something living). Nothing strange so far, however; the -er morpheme can simply indicate the syntactic change from a verb to a noun, independent of the root's semantic value. The interesting findings occur when we begin to examine second suffix combinations (SUFF2) for both words. It is initially observable that there is a constraint upon which morpheme can assume the SUFF2 position here (we cannot have *leadering / *openering, for example). More interestingly though, is that there are SUFF2 constraints which affect "object-type" but not "person-type" words, such as – ship: lead-er-ship / *open-er-ship. This resembles a conceptual distinction that we humans make when perceiving people or objects. This distinction echoes through our linguistic parsing of the above examples, which in turn intimates that morphological elements themselves also lie at a conceptual level. Thus, from this primary inspection, we can see emerging evidence revealing general cognitive principles at play in language processing.

The current research project being undertaken concerns precisely this phenomenon. I aim to implement evidence such as the above in an argument for the semantic/ conceptual value of morphological elements under the usage-based framework of cognitive semantics. This school of linguistics defines grammatical elements through their distribution within a given language. The data is collected predominantly from written English, in particular corpus language sites such as Onelook.com, the Oxford English Dictionary and the British National Corpus. I will be disambiguating the semantically homophonous suffixes that derive persons and objects, resulting in a full list of suffix combinations for the data.

Time Makes the Difference! Uncovering the Nature of Aesthetic Experience

Elena Cesnaite
University of Vienna,
Vienna, Austria

The project I am assisting in, and that I am going to present further, is ran by a group of scientists of Psychology and Art History departments. This study combines psychological and aesthetical knowledge together and aims to capture the relation between an art expertise and aesthetic experience. Our hypothesis states that the dynamics of cognitive and affective processes are influenced by the viewer's level of knowledge of the artwork he is perceiving.

The theoretical background proposes that aesthetic experience is an active process in which the metacognitive structures (involving knowledge and cognition) of a viewer is modified by the perception of a work of art [1]. Little research is being done under this topic, therefore, we aim to provide more evidence concerning this phenomenon. We hold the idea that the perception of an artwork is particularly affected by the expertise and knowledge of the perceiver, as it emerges from both: cognitive and emotional processes. In this way, aesthetic experience is affective, or even emotional, so it could be captured by measuring psychophysiological responses to an artwork. In order to collect this data in our study, we introduced several measurement techniques to the participants. Psychophysiological responses, such as eye-movements, skin conductance level (SCL) and facial EMG (fEMG) are captured simultaneously during the experiment while a participant is observing paintings. Facial EMG and SCL is expected to provide us with valuable information about the emotional excitability, while eye movements (or to be more specific, fixations of it, captured by the eye tracker device) can show us how the viewer is analysing the painting.

The Experiment consists of three stages that each participant has to complete. In the first one, a subject is introduced with various artworks of Kandinsky and Picasso, after which few questions about the liking and complexity of the painting are provided. The second stage of the experiment is called the "training session". Here participants are split into few subgroups that are introduced with some more explicit knowledge either about Kandinsky or Picasso. In this stage participants are expected to learn more about the particular artist. Finally, the third stage of the experiment mirrors the first one: subjects are asked to evaluate the artworks that they are perceiving, giving them some questions to answer. During the first and the third stages of an experiment, psychophysiological responses and eye movements are measured. Data is still being collected, but the expected results are that subjects will show a bigger affective arousal to the artworks of the painters that they have learned about after the training than before it.

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Life after Death? A Terror Management Account

Ivana Dragicevic

University of Vienna,
Vienna, Austria

Terror Management Theory (TMT) posits that anxiety over death is the driving force behind a range of seemingly unrelated social behaviours. It is based largely on the works of cultural anthropologist Ernest Becker who claimed that this anxiety was due to humanity's superior intellectual capabilities which allow human beings to recognise their inevitable mortality. On the other hand, like other animals, human beings also possess the biological drive for self-preservation. Thus, it is this drive coupled with the knowledge of one's mortality that creates the potential for terror and comes to pervade many aspects of one's social interactions. According to TMT, this terror is managed by seeking protection through identification with a cultural worldview, which can provide either literal (religious beliefs in an afterlife) or symbolic (contributing to something permanent and death-transcending) security. Thus, when individuals are primed with death, they are more likely to react defensively to outside threats to their protective system - their worldviews.

The primary aim of the present study was to investigate whether it is death or alternatively the prospect of meaninglessness that is at the root of the 'terror'. Participants were assigned to read one of three bogus scientific articles which either (a) discussed a non-death related topic (control), (b) presented evidence refuting belief in an afterlife but supporting belief in the meaningfulness of life (no afterlife + meaning) and (c) presented evidence supporting belief in an aferlife but emphasising that it is devoid of meaning (afterlife + meaninglessness). Participants then received a bogus personality description, which was very positive in nature and were asked to rate how much they agree with it or not. Self-esteem striving was used as a measure because previous studies have indicated that following a MS induction, participants are more likely to agree with the validity of such positive personality descriptions [1]. However, results indicate no significant difference between the three groups on self-esteem striving ($p > 0.05$). Participants across all three conditions rated the positive personality descriptions as being generally true.

Owing to the fact that neither of the two conditions differed significantly from the neutral condition, it is possible that the classical MS effect observed in other TMT studies was not induced here. Furthermore, it is possible that the combinations of (no)afterlife and meaning(lessness) eliminated the effects either of them may have had individually. Thus, a valuable follow-up study would be a 2 (MS vs. Neutral) x 2 (Meaning vs. Meaninglessness) design, in order to rule out the likelihood that it was the lack of MS induction that contributed to the insiginificant results as well as to separate any conflicting aspects within the combinations in the two experimental conditions.

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Relation Between Learned Helplessness and Locus of Control

Barbora Genšorová
Comenius University,
Bratislava, Slovakia

Introduction

The theory of learned helplessness was developed in 1967 by Martin E.P. Seligman. At first, he applied his theory only on dogs while doing a research on classical conditioning. Later on, the theory was expanded to human behavior as well. The expectation that consequences of our actions are not under our control decreases our motivation to try and control the sequence, while interfering with our knowledge regarding the fact that through our reaction, we can actually control the situation. It is a kind of an inadequate evaluation of the previous repetitious experiences that leads to a feeling and a conclusion that an individual can´t control the result of his behavior, not even in a situation where having control would be possible. His theory was later expanded by John Teasdale by his hypothesis that connected learned helplessness with locus of control. Locus of control is a concept formalized by J.B Rotter and it is a generalised expectancy for internal as opposed to external control of reinforcements [2].

Subjects

120 high school students divided into 2 groups. Group A (control) and group B that was studied for learned helplessness.

Method

In my experiment, a test that consists of five cryptograms for group A and five for group B has been formed. Group A had five solvable cryptograms, group B had four unsolvable cryptograms and the fifth one was the same as the fifth in group A. After administering this test to the class the students have been warned that they always have to finish a cryptogram before they move to another one. Every time they finished a word they had to wait for the rest of the class. Under pressure of group A being always finished sooner, it was expected that learned helplessness will be observable in the B group. By the time they got to the last cryptogram, most of the students in group B were not able to solve the last cryptogram (an effect of learned helplessness). After this test I explained my intentions and the goal of this test to the students and administered them a five-item Locus of control questionnaire. An abbreviated version of Rotter's (1966) Locus of Control scale was used. My hypothesis was that students with externalised locus of control will succumb to learned helplessness more easily, because there are many stimuli in their environment that they may perceive as restricting to their performance. For people with internalised locus, their own abilities and effort are their attributions of control, on the contrary to externalised locus, where attributions of control are, for example, luck, coincidence and difficulty of given task.

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Consciousness as cortical complexity

Urszula Górska
Jagiellonian University,
Kraków, Poland

According to Giulio Tononi's theory of consciousness as integrated information [1], being conscious requires thalamocortical networks to be highly integrated and differentiated at the same time. This is determined primarily by the presence of an effective connectivity between cortical areas and makes it possible for the thalamocortical system to be able to generate complex patterns of activation. One method of estimating the information content (algorithmic complexity) of the EEG signal involves perturbing the cortex with a transcranial magnetic stimulation (TMS) impulse and then recording the evoked EEG response across the whole scalp. A special algorithm run on the EEG data acquired in such a way can yield a parameter called the perturbational complexity index (PCI). The value of this parameter in principle can help to discriminate between conscious and unconscious states.

The principal aim of such a study is to create a method for the reliable diagnosis of consciousness in patients after severe brain injury. During the talk TMS/EEG approach will be disscussed in addition to partial results obtained from 8 patients with disorders of consciousness. The results published by Massimini group will be described [2,3] and they suggest that during states of uncounsciousness such as deep NREM sleep, anaesthesia or vegetative state, thalamocortical integration breaks down. Low perturbational complexity index value correponds to the situation when TMS stimulation triggers a simple local response. In contrast, in minimally conscious state the evoked EEG response displays rather complex pattern and spans across distant cortical regions, which corresponds with the high perturbational complexity index value.

Taking all together, estimation of information complexity in thalamocortical system may be a promising tool for diagnosing consciousness on the basis of EEG signals. It seems possible that on the base of presented theory also other experimental approach may be developed.

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Virtual Enabling Space: Value Creation in Networking Events

Lidija Grujičić, Rahil Hosseini
University of Vienna,
Vienna, Austria

Introduction
Conferences are knowledge-intense events that create opportunities to bring experts from different fields together and open spaces for communication. Different human-computer interfaces, e.g. web-tools and apps, have been designed to moderate communication in a conference setting based on cognitive science, computer science, and phenomenological philosophy [1].
Developed by Danube University Krems, Event Network Advancement (ENA) is a web based platform with the goal to enhance conference experience in terms of networking and knowledge sharing by visualizing both conference and participants' information in an interactive manner.

Objectives of ENA
ENA pursues two main objectives; Virtual Event Explorer and Enabling Event Space, whereas our project pursues the first objective.
Virtual Event Explorer focuses on visualizations that is claimed to enable the individual exploration and identification of potential communication targets during and after the conference.

Goal of the Project
The goal for this project (MEi:CogSci SS2014) is to enhance human-computer interaction mediated by the first prototype which was designed prior to the current project. The resulting product will be applied at Wima conference held by Danube University Krems on 27 and May 28, 2014 to provide participants a tool to easily navigate and contact people of their interest.

Project Structure
The first step was to conduct literature research to get acquainted with the history and current state of the art in the field of human-computer interaction with regard to event management tools.
Next, comparison research was carried out to assess ENA's competitiveness with features offered by other available tools in the market.
Further, a usability test was conducted as in line with human-computer interaction design to evaluate a product by testing it on users. The test consisted of a task-oriented questionnaire which is specifically designed to fit ENA's features and objectives. Ten usability experts participated in the test to evaluate the tool to find any inconsistencies associated with the usability standards [2] and report on their experience and impression [3].
The final report, encompassing all these steps, respective findings, and analysis of the results, shall be presented to the ENA development board for further possible modification to the tool.

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Economic Decision-making in Neuroeconomic Knowledge Production, an In-depth Analysis

Christine Harrer
University of Vienna,
Vienna, Austria

With the groundbreaking study by Sanfey et al in 2003 [1], which found emotions to have a major influence in the economic decision-making process, not only did the view of the rather rational based "homo economicus" change but also many standard economic models. When the global financial crisis hit its peak in September 2008, great debate about possible causes broke loose. Interdisciplinary research of neuroscience and economics pointed at the biological make-up of human kind determining gendered brain processes such as "the male rationality" versus "the female emotionality" [2]. In consequence, neuronal processes involving emotionality and rationality in economic decision-making were heavily focused on in neuroeconomic brain research studies.

However, results of brain research seem to be very controversial. Some research groups determine structural differences in the brain of females and males [2] which seem to be the reason for causing difference in behavior, decision-making and cognitive processes while other research groups report individual variation in empathy among same gender [3] .

This project researches whether and what discrepancies in findings among different brain research studies on emotionality and rationality in decision-making can be found via comparative analysis of articles and research findings which emerged in the last ten years in neuroeconomic research. This poster presents the results of an in-depth analysis of four recently published articles on the neural basis of economic decision-making, on the empathy for pain, and on genetic determinants of financial risk taking. The assessment of the setup of categories, the experimental set-up, result presentation and interpretations, and the analysis of result validity uncovered discrepancies among not only other research groups but also within one study. In conclusion, the state of the art in these issues can greatly be identified indicating that the results currently presented by neuroeconomics are by no means conclusive, in particular with reference to gender aspects. This is important as currently concepts of neuroeconomics take influence on not only politics and economics but also on the society.

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Making a Case for Theta Burst Stimulation in Treatment of Depression

Matjaž Hegedič, Jure Bon
University of Ljubljana,
Ljubljana, Slovenia

Over the last 7 decades, the role of electrical brain stimulation in treatment of depression has been well established, most prominently in the form of electroconvulsive therapy (ECT), a method where direct current is applied to wider areas of the brain, stimulating both its cortex and its deep structures. There is significant evidence of ECT's efficacy, however due to its associated social stigma and, more importantly, many adverse cognitive effects (most commonly memory loss), its use remains controversial. [1]

One of the alternatives available is Repetitive Transcranial Magnetic Stimulation (rTMS), which is (unlike ECT) a non-convulsive localized stimulation of brains' cortical areas. Conventional rTMS protocols consist of several trains of stimulation with frequencies up to 20 Hz and have been shown to be effective in treatment of depression. [2] A more novel approach are Theta Burst Stimulation (TBS) protocols, which use a lower stimulation intensity and have shorter application times. [3]

We have conducted a literature review focusing on a comparison of conventional rTMS and TBS. In order to examine TBS's viability as a superior alternative to the established rTMS protocols, we reviewed both the theoretical literature highlighting its possible advantages, as well as the empirical research studying its effects and efficacy.

Most of the TBS research done so far does not deal with depression treatment efficacy directly. It focuses instead on studying how TBS affects the primary motor cortex (M1), exploring its facilitatory/inhibitory effects and its capacity to induce neuroplasticity. In the domain of M1, TBS seems to induce aftereffects that are comparable to (but last longer than) any other rTMS protocol. As TMS is generally considered unpleasant to subjects, TBS's lower voltage and shorter stimulation times would be advantageous in therapeutic use even if its efficacy was only comparable to rTMS.

Unfortunately, so far there is little confirmation that results of studies on M1 are also applicable to other cortical areas (namely the dorsolateral prefrontal cortex, stimulated in the conventional rTMS treatment). Only preliminary studies have been done so far on linking TBS with depression treatment directly, and produced mostly heterogeneous, inconclusive results.

The literature also suggests that the neurobiological mechanisms of TBS are currently poorly understood. It is hypothesized that processes similar to long-term potentiation and depression are involved, modulating the synaptic connectivity of cortical neurons.

Although the case for TBS in depression treatment seems to be promising considering its advantages, additional research needs to be conducted to establish a consensus on its actual efficacy, its underlying mechanisms, as well as the optimal stimulation parameters.

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Cognitive Models of Multi-attribute Decision Making

Matthias Hofer
University of Vienna,
Vienna, Austria

In this research project, we want to investigate contributions to decision research from the perspective of cognitive modeling. Traditionally, decision research was dominated by normative economic theories and has developed mostly in separation from the cognitive sciences [1]. This historical divide has led researchers to focus on outcome rather than process models of decision making. However, a better understanding of decision making, instrumental to the goal of understanding human cognition at large, requires models of intra-agent processes that explicate the kinds of representations and mechanisms proposed to be involved in decision making [2]. In this work, we want to reflect on a selection of models that are currently being discussed in the literature and investigate a potential for their unification or reconciliation.

Based on [1, 3], we will (i) describe dimensions that we assume to be important in order to characterize models, including: aspects of the decision process; differing levels of abstraction and process granularity; model assumptions and boundary conditions. We will then (ii) place selected models within this multi-dimensional framework and (iii) assess possibilities for their integration and reconciliation. Three types of models will be discussed: (a) Rule-based (heuristic) models are modular, assuming a number of evolved decision strategies consisting of simple rules for information search exploiting core psychological capacities such as recognition memory. This approach entails an ontological commitment to rules as representational structures. (b) Evidence accumulation models, such as decision field theory, focus on the deliberation process. Decision makers are assumed to sequentially direct their attention at evidence for or against decision alternatives until a decision threshold is reached. This approach proposes a single decision process, obviating the metacognitive task of strategy selection. (c) Lastly, intuitive process models focus on more sophisticated computations and mimic automatic, i.e. cognitively "effortless", processes. They have been used to model compensatory strategies that require the weighing and adding of large quantities of information.

Our current analysis indicates an incompatibility of evidence accumulation models and rule-based heuristic proposal, while models addressing different aspects under the dual-process paradigm (see e.g. [1]) seem to be amenable to integration. In addition to that, the fact that some of the models may be empirically indistinguishable points at deeper epistemological questions of model selection.

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Parasomnia versus nocturnal epilepsy: use of video as a diagnostic tool

Jasna Jarc, Amela Rakanović, Leja Dolenc Grošelj
Institute of Clinical Neurophysiology, Ljubljana, Slovenia

Introduction

Sleep is a cyclical process of repeated non-rapid eye movement sleep (NREM) and rapid eye-movement sleep (REM) phases with distinct characteristics. Disrupted sleep may lead to motor and cognitive dysfunctions and can have serious consequences [1]. Parasomnias are undesirable physical events during sleep and may have similar representation as nocturnal epilepsy. Distinguishing these paroxysmal events during sleep is difficult but essential for determining appropriate therapy [2]. Nocturnal polysomnography (PSG) with simultaneous video recording is the gold diagnostic standard. The diagnosis is made on the basis of electroencephalographic activity (EEG) and video recording. Diagnosing paroxysmal events on the basis of PSG is time consuming and expensive. Paroxysmal events during sleep involve a range of motoric movements that can be seen on video-EEG-polysomnography and are therefore recognizable by watching and analyzing behaviour of a person while asleep.

We present here a study of paroxysmal events during sleep, in which we discuss if it is possible to distinguish, based only on videotapes, between parasomnias and nocturnal epilepsy. The aim of the study was to test how precise and accurate can we predict the right diagnosis with just the video as a diagnostic tool.

Methods

After a broad research of literature we decided to study only patients suffering from parasomnia or nocturnal seizures. We gathered and retrospectively analyzed 20 videos of patients of which 16 are suffering from parasomnia and 4 from nocturnal epilepsy. All patients underwent video-PSG at the Clinical Institute of clinical neurophysiology at the University medical center, Ljubljana, Slovenia. Retrospective analysis of the recordings were made using a diagnostic decision tree generated by Derry et al. [3]. The video analysis were double blind (without knowing any of their EEG, health history details or outcome diagnosis).

Results

We correctly identified 2/4 or 50% of patients diagnosed with epilepsy. One patient was incorrectly diagnosed with parasomnia and for one we could not determine the diagnose. Also 15/16 or 93,75% of patients suffering from parasomnia (NREM and REM) were rightly identified. The other one was incorrectly diagnosed with epilepsy.

Conclusions

Results of our small retrospective study show that video analysis may represent a simple diagnostic tool with a good chance of a correct diagnosis for parasomnia and less reliable for nocturnal epilepsy. Video analysis does not replace PSG recording, but can assist in making accurate diagnosis of these serious neurological disorders. Further studies with large numbers of patients are needed to confirm our results.

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Is Beauty Objective? An Experimental Study of Aesthetic Distance

Dalibor Jurášek

Comenius University,
Bratislava, Slovakia

Introduction

According to many authors, beauty has an objective component. In order to perceive this component, one must take aesthetic distance. [1] Aesthetic distance is a mental stance where the viewer must screen out subjective prejudices, preferences, desires, etc. and look at the object as objectively as possible. People differ in how well they can do this.

Methods

I set up a research design to test if taking aesthetic distance enables the viewer to perceive the objective component of beauty. The objectivity of beauty is a metaphysical issue and can not be proved empirically, but the data may indicate it indirectly. Mainly, if beauty were objective, people should independently agree on what is beautiful. If an ability (such as aesthetic distance) is needed to perceive the objective component of beauty, people should agree more if they are better in this ability.

As there is no prior research in this area, I had to make some assumptions. First, there is no direct measure of aesthetic distance. I therefore assumed that the personality trait openness to experience is an indicator of this ability. Open people are generally aesthetically sensitive and less prejudiced, [2] roughly matching the descriptions of aesthetic distance. Second, if aesthetic distance enables to perceive the objective component beauty, people more apt in this ability should agree more on what is beautiful. Therefore, more open people should have a smaller variance in their beauty ratings, which was my hypothesis.

I created an online questionnaire in which I asked the participants to:

* rate the beauty of 30 pictures (classical art, modern art and popular culture)
* fill in the Big Five Inventory (a personality test measuring openness and 4 other traits)

Results

I evaluated data from 182 participants (73 % female; ages: $15 - 58$ (M = 26, Mdn = 24, SD = 6.85)). Openness to experience significantly correlated with beauty ratings (r = -.31, p < .01). People more open tended to rate the pictures as less beautiful. People in the top quantile of openness had a significantly greater standard deviation in their beauty ratings (SD = 2.55) than other people (SD = 2.34; F = 12.14, p < .01). Such relationships were not found for any other of the Big Five traits.

Discussion

The results contradicted the hypothesis and can be interpreted variously. Perhaps more open people tend to be more independent in their opinion forming. Maybe openness is only a prerequisite of aesthetic distance, and this ability has to be specifically trained (similarly, more intelligent people do not necessarily agree more, though they have a better disposition to reveal scientific truth). It is possible that a different set of pictures would yield different results (no preliminary research was done).

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Efficiency of Cognitive Control in Second Language Learners

Patrycja Kałamała, Joanna Kolak, Zofia Wodniecka, Jakub Szewczyk, Joanna Durlik
Jagiellonian University,
Kraków, Poland

Many recent studies on bilinguals report bilingual advantage over monolinguals in cognitive control tasks [1]. In the present study, we focus on context of second language acquisition as a factor influencing language and cognitive processing in bilinguals. There is an evidence suggesting that students in immersion education programs (i.e. programs in which second language is acquired not only by formal instruction, but mainly by content learning in a second language) might enjoy cognitive benefits of bilingualism in a similar way that bilinguals do [2]. Immersion students perform better than their monolingual counterparts in tasks requiring engagement of executive control [3]. Moreover, the length of time spent in an immersion program determines the extent to which executive control is enhanced [3].

In the present study, an experimental group consisted of 31 Polish students who were enrolled in a partial immersion English program at high school (i.e. they had some of their classes taught in English;), whereas students from the control group (N=35) attended regular secondary schools and learned English in a normal classroom setting. We tested impact of the intense second language learning on cognitive control functioning in two waves of a longitudinal assessment. Here, we will report results from participants' performance in a task that taps onto particular component of cognitive control, i.e. the inhibition of interference.

We used a modified version of the Flanker task (Eriksen & Eriksen, 1974). Five arrows appeared in a horizontal line at the center of the screen. The participant's task was to decide whether the arrow in the middle (stimuli) was pointing to the right or to the left. Four other arrows in a line (the flankers) were pointing either to the same direction as the stimuli (congruent condition) or to the opposite direction (incongruent condition). The task was devided into 2 blocks, 36 trials in each (50% incongruent) and lasted approximately 20 minutes. Both reaction times and error rates will be measured. The difference between congruent and incongruent trials in reaction times and in error rates (the flanker effect) as well as the mean reaction time and mean error rate will be compared between the groups and between the two waves of testing.

We predicted that (1) the experimental group would enjoy smaller flanker effect than the control group (2) and would react faster and (3) more accurately than the control group [2]. We will present preliminary results of our study and will discuss insight into the ongoing debate about the benefits resulting from the intense second language learning.

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Preliminary Results of A Systematic Review of Papers Citing Libet's 1983 Study

Simon Knez, Sabina Skubic, Jurij Dreo, Zvezdan Pirtošek
University of Ljubljana,
Ljubljana, Slovenia

Agreement of Libet's Conclusions in Science

Libet et al. [1] showed that electrical activities in the brain, measured by EEG, precede conscious decisions, measured by the reported position of a time related moving visual stimuli. These results proposed the question whether consciousness is a product of brain activity or vice versa. A controversial debate about free will and mind-body problem was raised. Their results could be interpreted in a way that conscious will is an illusion, and that actions are initiated by neural processes not under conscious control. Many authors replicated the experiment, used their results as a fact or their methodology in the researches. On the other hand, this experiment was criticized in many perspectives, from methodology to the interpretations of its results.

My colleague and I are a part of the ongoing project which replicated the Libet's [1] experiment. Our task was to find a general opinion in science on the conclusions of the original paper. We were provided the database with the papers citing Libet's experiment [1]. Our search for papers was based on three main search engines: CMK library, PubMed and Google Scholar. We found around 90% of all the relevant papers (463 from 509). After that we read and assessed the most informative parts of all papers (abstract, parts of paper where Libet was cited, where keywords such as conscious, free will, readiness potential were mentioned and the paper's conclusions). The assessment included the evaluation of the following attributes: journal type, paper type, relatedness (similarity of paper's content to Libet et al.'s paper [1]: scale from 0 to 3) and agreement (expressed opinion of Libet's conclusions: scale from -2 to 2) of each assessor. Final relatedness and agreement of each paper was the average evaluation of both assessors. If the absolute difference of both evaluations was greater than 2, the article was reassessed.

Our preliminary results show that most of the citing papers (65%) agree (i.e. the average agreement is greater than 0) with Libet et al.'s [1] conclusions. The vast majority of articles paper's conclusions from neuroscience & cognitive science which in 65,4% agree with Libet's conclusions. Agreement of other disciplines are as followed: psychology 67,8%, other natural sciences 59,26%, philosophy 66,67%, medicine 71,43% and other social sciences 50%. However, agreement of papers is declining with their relatedness. Deeper analysis shows that replications (papers which average agreement is above 2.5) have only a 50% rate of agreement. This indicates a state of indifference in today's science about Libet's conclusions and as a consequence a still on-going free will debate.

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Towards Different Prediction Mechanisms in Words and Chords

Zdenko Kohút

Comenius University,
Bratislava, Slovakia

Introduction
In natural language comprehension, the next unit of speech is often predicted based mainly on statistical regularities and context. Analogous mechanisms were previously observed in music, at the level of whole melodies [1]. This study tried to find out if there is possibility of such a mechanism at the level of single broken chords.

Methods
The main hypothesis was that when the critical tone for major/minor scale decision is presented earlier in the sequence of tones, the participants will decide faster than when this tone is presented later. This would suggest a predictive mechanism is in operation. To test this, broken chords consisting of three tones were used in two conditions – in the first condition the critical tone was on the second place and in the second condition, it was on the third place. For instance, for D major/minor, where the critical tone is F#/F, the sequences were D, F#/F, A for the first, and D, A, F#/F for the second condition. The whole sequence lasted 1 second. To assure that every next tone is of higher pitch than the previous one, they had to be spread through two octaves. Thus, they didn't technically fall under the exact definition of a common chord, although based on number of error trials, it seems that their affective value was unchanged. Chords (simultaneously played) served as a control condition. Additionally, every chord was preceded by a presentation of an emotional photography, to introduce affective priming. Photographs were selected based on their valence ranking from the IAPS database. The participants were instructed to decide as fast and as precise as possible and were allowed to answer also during the presentation of the chords. Participants lacking knowledge of musical terms were instructed to base their decisions on the affective value of the chord and the whole session was preceded by a short training phase. Data from seven participants from sample of eight graduate university students were used. Analysis was based on 435 successful trials.

Results
Analysis of variance showed no significant difference between the experimental conditions (F = 0.02, p = 0.88). Mean reaction times for both were almost identical (1.518 s, SD = 0.45 for first and 1.524 s, SD = 0.33 for second condition). The control condition significantly differed from the experimental conditions (RT = 1.27 s, SD = 0.35; F = 19.27, p < 0.001). Effect of affective priming was observed, but was not significant.

Conclusion
The results did not confirm the hypothesis. Possible explanation heads towards more holistic processing of broken chords. Therefore, it seems that humans, at least in the matter of assessing the affective value of broken chords rely on complete information. Results could be influenced by small sample size and therefore cannot be regarded as conclusive.

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Rather see once than read numerous times? Animated visual aids in probabilistic reasoning

Lenka Kostovičová

Comenius University,
Bratislava, Slovakia

Several decades of research have shown that not only laypeople but also professionals experience difficulties with solving Bayesian problems. Since probability judgment is a common part of our decision-making processes, finding ways to help people understand statistical information is of great theoretical and practical importance.

Recent evidence on the effects of static pictorial representations in solving probabilistic tasks is ambiguous [1]–[3]. In our research, we aimed to design animated visual aids, examine whether their presence improves Bayesian reasoning and identify the key components responsible for potential facilitation of performance. We will report a pilot phase of our investigation, a between-subject experiment with twenty-four participants in two conditions (either with or without the visual display). Research material consisted of the "Disease X" problem in a chance-risk format [2] accompanied by the animated pictorial aid based on an Euler circles diagram. The participants provided comments and suggestions for improvement of the current version of the visual display which will be considered and implemented into the final design.

Results showed a better understanding of the task instances and a higher proportion of correct Bayesian inferences in the experimental condition with the visual aid compared to the control group. Moreover, the occurrence of particular solving strategies differed according to the level of a problem comprehension score. Our findings support the hypothesis of performance enhancement through directly experienced animation of a nested-sets structure of information from the conditional probability task.

We will introduce the follow-up stages of our research plan and their particular objectives. Contribution of our study to the debate between ecological rationalists and proponents of the nested-sets account will be discussed. Furthermore, we will address practical implications of our research, with a primary focus on the area of health-related decisions and medical diagnostics.

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Vocabulary Differences Between Stutterers and Non-stutterers

Jana Kováčiková

Comenius University,
Bratislava, Slovakia

The stuttering is a speech disorder where verbal communication is involuntary disrupted by repetitions, prolongations or pauses. In order to speak more fluently, adult stutterers tend to replace words which are difficult to pronounce with more easily pronounceable words in their verbal expression, as a part of their coping strategy [1]. This exploratory study looks at potential differences in the active vocabulary of stuttering and fluent adult population. We hypothesize that due to such coping strategy, they might use less frequent words than the intact population in their speech.

Since stutterers prefer written rather than oral communication [2], both groups were tested with an online questionnaire, to make conditions more equal. The subjects are Slovak native adults. The questionnaire consists of an identification part, a verbal fluency task, a picture naming task and questions about the stuttering and learning disabilities, which could interfere with results. We hypothesize that vocabulary of adults who stutter will differ from the intact population vocabulary in both tasks. More precisely, the immediate vocabulary of both groups will be different in the verbal fluency task, because they will write the words they usually use as first. In the picture-naming task, they will use different synonyms for each depicted situation, because they do that in real life to avoid certain problematic words, which might belong to the active vocabulary of non-stutterers. The results of stutterers were compared with results of fluent participants matching their sex, age and education. The preliminary results showed mostly individual differences between the groups, which means more participants are needed to confirm the hypothesis. As it was not examined before, all methods are tested in the vocabulary of adult stutterers and non-stutterers for the first time and they might need further corrections.

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Qualitative Vision Recognition of Topological Features

Vadim Kulikov

Vienna University of Technology,
Vienna, Austria

Commonly pattern recognition has been revolving around statistical methods such as machine learning and Bayesian algorithms. Our approach differs in the sense that we are searching for qualitative rather than quantitative features from the scenes.

An interesting question was raised by a reviewer: how can qualitative information be dealt with algorithmically, i.e. isn't that a contradiction in terms? Perhaps a clarifying example is this: imagine a road map of a city. We call a map "connected" if every house can be reached from any other house via a road. Otherwise disconnected. An example of a disconnected map would be a map of a city which includes islands only reachable by a boat. Being connected is – in my view – a qualitative property. However, it is an algorithmically detectable feature.

In this research we investigate recent applications of algebraic topology to visual feature recognition. A robot whose task is to lift objects would benefit from recognising handles or objects with handles such as cups, teapots and plastic bags as opposed to handleless mobile phone, glass or box. The robot has a 3D-camera which gives the robot a point cloud in a 3D-space. The algorithm simplifies the data into a form of a simplicial complex, or just a graph (nodes with connections) and tries to find hole-structure in that graph or complex using persistent homology theory. Algebraic topology is a mathematical theory which characterizes geometrical shapes in terms of their qualitative structure (such as holes) and not so much taking into account exact metric properties (such as the shape or diameter of the hole).

This approach has been taken in [1] and [2].

This is also plausible as a model of (part of) human vision as at least on high cognitive levels we perceive a lot of qualitative and symbolic information in the visual field. There is also evidence [3] that mammalian brain maps territory in a topological rather than metric way.

Apart from researching the recent progress in this area we are writing an algorithm in Python for detecting holes in objects in the 3D images provided by a 3D camera. At the time of writing this article, the algorithm is a work in progress and hopefully a decent version of it will be available to present at the conference. The algorithm will be integrated into the long-term project of robotic vision carried out by the Robotics Group at the Vienna University of Technology. In this project only statistical methods have been used so far. The aim of this project is thus to bring this new, qualitative perspective into the robotics project at TU by surveying what has been done and writing a sample code to start with.

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Computational model of intrinsic and extrinsic motivation for decision making and action-selection

Igor Lacík

Comenius University,
Bratislava, Slovakia

Decision control is, obviously, an important ability people expect should be present in autonomous computer systems. Computer systems with reliable decision control can be expected to perform an unlimited amount of tasks. A computational model of decision making based on intrinsic and extrinsic motivation has been proposed by Takáč and Pileckyte[1]. The idea is that motivation can be represented as a set of physiological and psychological needs. These are represented as a point in a multidimensional space with needs at dimensions. We can have a dimension for energy, physical integrity as well as curiosity.

This project aims to develop the computer model discussed n the paper. This consists of the development of the simulating world where the agent will actually perform actions as well as the agent itself. The simulating world also acts as a laboratory in which the researchers want to perform experiments on this model. An important requirement here is high usability and ability to change any of the factors in the world that can affect the agent, its ability to manipulate the environment and its perception of the world. We have decided to go with a Rich Internet Application for our simulator. Our strong belief is that the main advantage of a RIA is that it allows transparency and access from anywhere in the world.

The agent implements a neural network representation of an actor-critic model for reinforcement learning. It computes feedback depending on the reward it acquires after performing an action/a set of actions. The reward is computed from the change in distance of the current state of needs from the equilibrium (point where all needs are at zero) between two successive time points. It can be positive, or negative depending on whether the agent moved closer or further from the equilibrium.

Despite the fact that the model is yet to be finished and the results are yet to be reviewed, this project succeeded in building a team consisting of people with background in several fields, all playing a major part in Cognitive Sciences. The current state of progress can be seen at www.actorcritic.php5.sk.

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Effect of Art Expertise on Aesthetic Experience over Time

Yeon Joo Lee
University of Vienna,
Vienna, Austria

Based on the model of aesthetic experience by Leder, Belke, Oeberst, and Augustin(2004) [1], we assume that aesthetic experiences(AE) involve cognitive and affective processes that unfold over time. While psychological research on art perception mainly focused on early stages of information processing, this project examines prolonged AE, analysing viewing times of up to several minutes. We propose that three dimensions of expertise, complexity, and context influence the time course of the AE. However, the aspect of expertise is mainly discussed in this abstract because the project during April-June 2014 was performed from this perspective of view.

Art expertise is considered to be an important moderating factor. Given that AE is composed of several phases such as perceptual analyses, implicit memory integration, and evaluation, expertise in arts affects several phases such as explicit classification of artwork and cognitive mastering during the AE process interacting with other phases reciprocally [1]. We expect that AE show faster onsets and more enduring time courses for art experts than for non-experts.

We show two groups of expert and non-expert participants artwork stimuli for fixed minutes while measuring increase or decrease of AE over time. The main method is video-based remote and mobile eye-trackers. Points of gaze and visual scan paths are measured while participants view artworks for extended times on a computer screen. Additionally, facial muscle activity (fEMG) and skin conductance level (SCL) are measured to examine the affective components of AE and their dynamic changes over time. The combination of eye-movements and fEMG enables us to correlate specific fixation patterns and scan paths with changes in the affective state of AE. This project is still on the progress under the supervision of Laura Commare et al. and the results are anticipated to be come out on September 2014.

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The Phenomenological Interview: a New Approach to Schizophrenia

Bettina Ludwig
University of Vienna,
Vienna, Austria

Researchers of various fields contribute to the exploration of the several subtypes of schizophrenia since more than a century - still we are far from understanding the origin and the etiopathology of this complex and multilayered phenomenon.

Literature research shows that scientists are recently disenchanted with purely neurocentristic, cognitivist and computational approaches which lead to a strong focus on operationalizable concepts such as the DSM or the ICD10 manuals in the daily routine of psychiatry.

Instead of pursuing the ongoing over-focus on reliability, "thinkers such as Dreyfus, Varela, Gallagher, Zahavi, Thompson, postulate a renewed focus on subjectivity and on the embodiment and embeddedness of the human subject in its environment" [1] Following their concept this project focuses on a new empiric approach regarding the investigation of schizophrenia - the phenomenological interview.

Since this specific type of interview is a rather recent method, there are not many research examples and therefore there are still open questions about the actual procedure, its structure and rules.

Accordingly this project serves as a basic research for following empirical studies on schizophrenia. It contains a literature analysis and the analysis of two conducted interviews.

The aim is to find out if the phenomenological interview is applicable for research concerning the phenomenon of schizophrenia. And furthermore identifying the methodological problems/challenges of the appliance of a phenomenological interview within a study on schizophrenic patients and their personal experiences during psychosis.

In the course of the interview subjects are required "to direct attention exclusively to [their] own experience of the world, and its conscious appearance, and to exclude all beliefs, opinions, and theories about what that experience is (…)". Participants should not "adopt predetermined descriptive categories but (…) develop their own descriptions." [2]

The examination shows that the challenges such a method entails can be summarized in three different dimensions: guidance, participation and framework.

Guidance applies the internalisation of the concept of phenomenology on the part of the interviewer.

Participation concerns the possible difficulties that an untrained interviewee might have expressing his experience.

The most crucial dimension, framework, aims at ensuring a protective ambiance and foster the confidence of the patients.

To be an effective tool in the investigation of schizophrenia the method of phenomenological interviewing
requires, among other things, training both of the interviewer and the subjects on the phenomenological principles, social competence and a collaboration with medical staff.

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Can EDA Synchrony Differentiate Between Attentive and Non-attentive Listening?

Andras Makai
University of Vienna,
Vienna, Austria

The current study is designed to assess whether empathic synchrony and skin conductance (EDA) synchrony appears during attentive listening. Prior studies by Marci et al[1] showed that perceived empathy of counsellors and skin conductance of patients and counsellors showed positive correlation during sessions. Zaki et al[2] showed that verbal information is critical for empathic accuracy (EA). EA is the level in which people can judge the emotional state of another person. I hypothesize that there is a connection between EDA and EA. In the current study participants are required to view audio/visual footage, while being distracted in order to evaluate what effect distraction has on EA and EDA.

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Effects of Stress on Empathy and Situational Awareness

Maria Marchante Fernandez

University of Vienna,
Vienna, Austria

The construct of empathy has recently been referred to as a sense of similarity between the feelings one experiences and those expressed by others [1]. It involves not only affective experiences of the other person's actual or inferred emotional state but also a predictive validity of information processing. The prominence of emotional states reinforces the appraisal from neural and somatic activity that is conditioned by the ongoing embodied awareness and action [2]. Thus, when being exposed to demanding circumstances, our knowledge, experience and education provide us with the basis for subsequent decision making and performance in order to perceive relevant information, integrate data and predict future events.

In this study, several aircrews were recorded during all different phases of a short flight reproduced in a flight simulator. These videos were used to individually analyze eye gazing frequency, non verbal communication and body language (including features like facial expressions, body movements and posture, gestures, eye contact or touching), mimicry and differences in distance between the two pilots (the captain and the first officer). In addition, all the pilots couples of the crews were asked to fill out an anonymous questionnaire after the simulation's performance, with two relevant rating scale questions about their own and their partner's impressions of having the situation controlled and whether they felt stressed during the simulation among others.

Using psychophysiological measures for decoding performance manifestations tracked by the videos, and visualized using a language analyser software developed by the Max-Planck Institute for Psycholinguistics (ELAN), in contrast with data-based approaches, relied on self-impressions reports we can explore the influence that stress has on empathy and situational awareness, as well as their correlations within this specific context.

Mimicry seems to evoke the corresponding emotions in the observer which makes it an important factor for emotional empathy. There is a tendency for people to show the same expressions as those of the target they are interacting with or observing. Moreover, as this kind of expressions may also be influenced by the identity of the target [3], we are therefore looking for underlying constructions of these manifestations to see their relation to stress, by exploring the continuous perception between the self and aircraft in relation to the dynamic environment of the flight, taking into account possible threats within each of all different flight phases to evaluate the ability pilots use in such situations to forecast and execute tasks based on the perception of self-awareness and regarding the fact of being part of a team.

According to bibliography, both applied measurements should reflect a similarity effect on empathy. On one hand, the research to investigating this convergence may reveal that self-report measures can be a better tool to distinguish among the different components of empathy and so make them more specific than psychophysiological measures. However, pilots under stressful situations might also be prone to self-presentation bias and a lack of self-awareness according to their interpretations. On the other hand, psychophysiological responses, while being more objective, can be elicited by a range of different stimuli, especially when facing possible danger. This may lead to subjective interpretations that will have to be interpreted and related to specific components of empathy as well as self-awareness.

The aim is to assess the influence of stress on these intersubjectively open mechanisms,

The Importance of Humor in the Classroom

Mária Marušáková

Comenius University,
Bratislava, Slovakia

Introduction
Many agree that humor is an important part of the learning process. There have been studies to prove the impact of humor on remembering and recalling information [1]. Two hypotheses for why this occurs have been proposed – either the emotional arousal helps heighten impact of the information on our brains or simply the fact, that we pay more attention to humorous material helps us remember it better.

Future experiment proposal
We hope to conduct a large-scale experiment in the future, where one group of students will be taught without humor and the other will be in an environment where humor is regularly used. Our hypothesis is to see greater improvement in the latter group of students at the end of the course. We believe that our proposed experiment could be run in various teaching environments, but for our pilot experiment we chose the classes of English as a Second Language.

Pilot experiment design
We designed a pilot experiment to help us find limitations in the testing approach and see preliminary results. As a part-time English tutor, the author tested her class. The class consists of 8 students, but only 6 attended both lessons in which the experiment was conducted.

The experiment had two phases; each phase lasted one lesson (e.g. 90 minutes). The lessons were similar in the type of taught material, apart from first 20 minutes of class, which intended to set the atmosphere in class. During each lesson new vocabulary was presented and explained without translation. In the last 15 minutes of class, the vocabulary was reviewed and students were given a test.

The lessons looked as follows:
1. non-humorus lesson: 20 minutes grammar exercises, reading, listening, testing
2. humorous lesson: 20 minutes speaking exercise, reading, listening, testing

Pilot experiment results
4 out of 6 students had better test results in the second lesson; the 2 remaining students had the same test score in both cases. The average difference between lessons was 0.91 words. The highest difference between the two lessons was 2.5 words.

However, this difference has not proven to be statistically significant. We assume this was caused by the small real difference between two classes, since the students were accustomed to relaxed environment in the classroom and finding situation humorous on their own. Another limitation was the relatively small number of participants.

Conclusion
Although due to limitations of our study we have not yet proven our hypothesis, we see the importance of such research to be conducted on larger scale. We have also found other aspects of learning and teaching that we would like to study in the future.

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The Influence of the Language Change on the Effect of Misinformation

Kamil Michalik

Jagiellonian University,
Kraków, Poland

The misinformation effect consists of introducing to a memory trace of a witness some false information (a misinformation) that contradict the original event seen/heard by the witness. Moreover, the origin of the misinformation is different than the original event[1].

The following experiment was based on the fuzzy-trace theory[2]. According to the theory there are two different memory traces being produced while remembering any information. One is a verbatim trace, that involves information about the formal freatures and the literal meaning of a memory material (e.g. colour, paper, font, language, etc.). The other is a gist trace that stores information about the deep meaning of a unit. Nonetheless, it is the verbatim trace that is responsible for the correct source-monitoring but at the same time it disappears more quickly than the gist trace. The authors of the fuzzy-trace theory state that it is the verbatim trace's work deficits that lead to source-monitoring failure and hence, make people produce the misinformation effect. If the verbatim trace was somehow enhanced, the functioning of the source-monitoring would be better and then people wouldn't confuse the two different sources of the information.

There have been a lot of studies considering the area of the misinformation effect, but only a few are focused on the problem of protecting the witness against the misinformation effect and none of them included change of the language between the experiment stages. Thus the aim of the following study was to enhance the verbatim trace of a presented information by the language change of the material and hence minimize the effect of misinformation. Language is strictly a formal feature of a text and

The main schema of the experiment was based on the typical experiment plan proposed by Loftus[3]. There was a short written Spanish story presented to 94 trilingual students. Than, after 15 minutes to one group there was presented the same text, but translated into English and including some changed details, and to the other group the same text without language change. In the third part, there were 10 questions regarding some details from the first, original Spanish text. The hypothesis of the study was that in the group with a language change, the amount of responses consistent with the misinformation from the second text would be smaller comparing to the group without the language change. The results though turned out to be quite the opposite, although still statistically significant.

There are a few explanations suggested by the author that could be helpful to understand the results. Most of them concern on the fact, that the results of many other studies prove, that the language change in memory tests deteriorates the remembering or retrieving the information. The other concerns an interesting aspect of foreign languages that says that the change of a language is not only a change of its form, but also a change of its content, as in every language the mental representations of every word or, at least every sentence might be different.

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Precognitive Detection of Erotic Stimuli

Dusanka Novaković, Florian Klauser, Maja Ratej

University of Ljubljana,
Ljubljana, Slovenia

In our study we are attempting to replicate one of the experiments originally performed by Daryl J. Bem and documented in his 2011 paper titled „Feeling the future". In it, Bem describes nine experiments that test for precognition, which he describes as „the anomalous retroactive influence of some future event on an individual's current responses" [1]. He tests for precognition by time-reversing established psychological tests, so that the individual responds before the stimulus affecting his or her response occurs.

The particular experiment we are attempting to replicate is the „precognitive detection of erotic stimuli". We chose this one because of its relative simplicity and comparatively attractive nature (we assumed we would get more participants with erotic stimuli than negative stimuli). Bem argues that, if precognition exists, it is the product of evolution and therefore provides some sort of advantage. The advantage he presumed for the precognitive tendency towards erotic stimuli is that it increases the likelihood of encountering situations that would enable the organism to procreate – namely situations of an erotic nature.

In order to minimize the experimenter's influence on the participant, the experiment is wholly conducted on a computer. The program used and supplied to us by Bem shows two curtains on the screen. Behind one is a picture. The participant chooses the curtain behind which he or she feels is a picture, and the curtain opens to reveal the picture or an empty wall. This is repeated 36 times. Half of the pictures are erotic and half are neutral. At the end of the session, the program reports the hit rate for erotic and non-erotic pictures.

Presuming our standard model of the world holds true and precognition does not exist, the average hit rate for either erotic or neutral stimuli should be about 50%. Bem's findings, however, differ from this. He reports a statistically significant difference from the expected average hit rate of erotic stimuli. His 100 participants scored an average hit rate of 53.1% on erotic trials versus 49.8% on nonerotic trials, which Bem supports with results from a t-test: $t(99) = 2.51$, $p = .01$ for erotic trials and $t(99) = -0.15$, $p = .56$ for nonerotic trials. He found that the participants' sex does not correlate with their performance.

Our own preliminary results fail to replicate these findings. Our current sample of 50 participants scored an average hit rate of 47.7%, $t(49) = -1,50$, $p = .924$ for erotic trials and a hit rate of 50.3%, $t(49) = .22$, $p = .432$ for nonerotic trials. During experimentation, we have found flaws in Bem's program that might have contributed to the failure to replicate his findings. Participants complained that the resolution of the images used is too low and that they are subsequently less stimulating. Therefore we plan on expanding on Bem's experiment, using higher resolution imagery, specifically calibrating the stimuli to account for every individual participant's sensitivity to them, as well as measuring skin conductance and blood pressure of participants.

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Emotions and Decision Making – A Case for a New Framework

Michael Anton Palkovics

University of Vienna,
Vienna, Austria

The ultimate goal of our research is to improve the consideration of the relation between cognition and emotion in (computational) models of decision-making. While the debate about this relationship dates back to the ancient Greek philosophers, much of modern decision-making research has been carried out within behavioral economy. Today, the psychology of judgment and decision-making is predominantly concerned with heuristics, biases, and their relation to dual-processing theories of reasoning [1].

These often competing views only encompass a rather narrow piece of a much larger phenomenon, as they are for instance predominantly concerned with decisions under risk and/or uncertainty. Moreover, decisions have traditionally been viewed as single events, isolated from the general intentions of a person. The practical and conceptual consequences of decisions form another virtually unexplored area in empirical psychological research. Our broader view on decision making does build on the seminal research by Gigerenzer and Kahneman (see e.g. [1]), but also considers emotions as a constituent element of reasoning, as they are hypothesized to play a key role in managing cognitive resources [2].

We propose a principled framework that relates and integrates previous research along two dimensions. The first dimension considers a decision's situatedness: While decision situations as described by Kahneman are disconnected from temporo-spatial, and usually factual, reality (i.e. are not situated), Gigerenzer's situated decisions pertain to the here and now. A second dimension addresses pro-active vs. reactive decisions, considering the temporal relation of decisions to their (anticipated) consequences, relating for example deliberation and means-ends reasoning.

We discuss how within this framework tasks such as those used in classical behavioral research can be (re)classified, what advantages this approach offers (e.g. the ability to model decisions depending on previous ones and/or general intentions, or enabling experimental designs to potentially have higher explanatory power), and explain how it aids the study of the relationship between cognition and emotion. Moreover, we explore how mechanisms underlying existing models (such as dual-processing theories [1]) can be adapted into this new framework, and where and how existing models and research paradigms fit in. Finally, we provide an outlook on pending work relating this framework to the developments in the formal BDI (Belief-Desire-Intention) modeling [3] of practical reasoning.

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Dual Tasking and Posture Control in Healthy Young Adults

Adrijana Posedel, Gašper Tumpej

University of Ljubljana,
Ljubljana, Slovenia

Introduction:

Motor functions of the human brain have traditionally not been considered to be dependent on cognitive functions. However, recent research in the field of dual tasking has succeeded in proving a connection between the cognitive and motor functions of our brain [1], [2]. Interference between these brain functions are in a setting of a disease such as multiple sclerosis or Parkinson's disease associated with increased risk of falling and other difficulties with walking. Considering inconclusive results from the previous studies we decided to investigate the effect of cognitive tasks that use different domains of working memory (visuo-spatial and verbal working memory)in order to determine which of its domains interferes with motor functions in greater extent.

Methods:

Twelve healthy volunteers were included in the study. We performed posturography alone and while performing two working memory cognitive tasks; 2-back and Brooks' spatial memory task. Subjects stood with legs together and eyes closed on a force plate. Signal from 4 pressure sensitive sensor under the force plates was sampled at 100Hz. From these data CoP (Center of Pressure) was calculated by algorithms developed in Matlab. We analysed body sway of the CoP in ML (medial - lateral) and AP (anterior - posterior) directions. To determine the effect of cognitive tasks on balance one-way ANOVA model was used with further post hoc analysis to determine comparisons between conditions.

Results:

ML sway amplitude was higher ($F_{(2,10)}$ = 12.94, p = .002)while performing concurrent cognitive tasks compared to posturography alone. Additionally AP sway amplitude was also higher ($F_{(2,10)}$ = 4.82, p = .034). Post hoc analyses showed significant effect of 2-back task on ML as well as AP sway amplitude.

Conclusion:

2-back memory task significantly affected balance control in our cohort of healthy young subjects. This indicates greater interference from phonological domain than spatial domain of working memory. A drawback of our study is a small number of participants and lack of evaluation of performance on cognitive tasks. Future research should include greater number of subjects to ensure more representative data. The results of cognitive performance should also be evaluated. We also suggest more demanding memory tasks to be used to ensure greater effect on motor performance.

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Can Girls with Rett Syndrome Speak with Their Eyes? A Case Study Using Eye-Tracking Technology

Tjaša Prelog, Saša Škof, Anka Slana
University of Ljubljana,
Ljubljana, Slovenia

Rett syndrome (RS) is a severe neurodevelopmental disorder, caused by mutations of the MECP2 gene located on the X chromosome, therefore almost exclusively effecting females. It is characterized by normal early growth and development followed by a slowing of development where loss of purposeful use of the hands, distinctive hand movements, slowed brain and head growth, problems with walking, seizures, and intellectual disability can be seen. Profound impairments in the ability to speak and use of hands severely limit the abilities of girls with RS to communicate with the environment. However, a few studies using eye-tracking technology [1, 2, 3] have shown that these girls demonstrate strong and intentional eye gaze and eye contact, which is considered as the most important way in which girls with RS relate to the world.

In our case study, performed with a 12 year old girl with genetically confirmed RS, we used eye-tracker to determine if she can use her eye-gaze intentionally and to assess whether she could potentially use this to express her preferences. Specific aims of the study were to determine whether 1) she rather looks at herself and some of the closest family members than at other unknown people, 2) she rather looks at preferred stimuli than at neutral ones, 3) she prefers looking at socially weighted stimuli.

Eye tracker EyeLink1000 was used to measure the duration of eye fixations of stimuli displayed on the screen. The equipment was calibrated using 3 point calibration. To minimize her body movements, she was seated in her teacher's lap, 50 cm away from the monitor and was presented with pairs of images, each with duration of 4 s. No verbal instructions were given. In the first task, 44 pairs of images including faces of her family members and visually similar unknown faces and 14 pairs of images of her face and similar unknown faces were presented on a left and right side of the computer screen in random order. The second task comprised of 32 pairs of images that included her likes (food, drink) and similar neutral stimuli. To determine her preferences we interviewed her mother and a special education teacher beforehand. In the third task she was presented with 24 pairs of images that were either socially weighted (which included a person using a certain object) or not (the image contained that object only).

The results show, that she spent more time looking at her face than other similar faces, indicating she recognized herself. However, this was not observed for other family members. She exhibited a preference for preferred stimuli and socially weighted stimuli. These results suggest that she can intentionally use her eye gaze and that eye tracking technology appears to have a potential of bypassing the severe impairments in expressing preferences. We wish to expand our study and use the eye-tracker as a feasible method of communication for people with RS.

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Rasa Resonator: Towards Affective Music Interaction

Peter Rantaša

University of Vienna,
Vienna, Austria

The complex relation between music, its constitutive elements and affect has concerned scholars in the East and West for more than 2000 years. Two positions have been taken: „Emotivists" hold that music is able to induce genuine emotional responses. „Cognitivists" claim that listeners only perceive emotions expressed in music without experiencing them.

Empirical research points in the "emotivist" direction but the issue is far from being settled. It remains unclear how properties of a work of music or its sounding elements elicit emotions and which. Listening to „sad" music often makes a listener happy. It still can be said that "music´s apparent ability to induce strong emotions is a mystery" [1]. There is no agreement in the research community about why and how musical emotions appear. [2]

The last 20 years have seen an increase of empirical research on the topic. The affective sciences have developed a variety of theories and models. Psychological experiments about the interpretation of the emotional expression of music and sounds have been conducted. Databases of auditory stimuli that evoke emotions have been validated – though connected only to a limited set of emotional theories (namely the „dimensional theory" and the „discrete emotions theory").

Inspired by the classical „Rasa Theory" [3] of Indian aesthetics I am taking the „emotivist" position. Rasa is a notion that describes the dominant affective state in perceiver of a dramatic performance. I develop a research proposal that aims to create a biosignal driven music instrument that elicits defined affective experiences according to the „rasa doctrine". The concept rests on the fact that affective responses are indicated by physiological changes in heart rate, skin conduction, temperature, respiratory rate, etc.

To realize the proposed cybernetic feedback loop of an "Emotional Resonator" we need:
- a valid set of physiological parameters that represent specific emotions
- a theory of emotions that connects these parameters to specific emotional states and processes
- a model that integrates these physiological parameters according to the theory
- a relation of sounds, music and their (dynamic) properties to the affects they evoke
- the influence of personal taste and cultural disposition of the subject for purposes of calibration
- a model for the timing of changes of emotional states

In creating this actual instrument open questions in measuring emotions (eg. continuous reporting), the influence of low and high level processes in music cognition and the relation of acoustic signal properties and affective response will be addressed.

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Nonverbal Cues During Staredowns Predict Outcome of Mixed-Martial-Arts Fights

**Dominic Reichl,
Tatiana Blazseková**
University of Vienna,
Vienna, Austria

Nonverbal behavior provides a crucial means of human communication that expresses, even more emphatically than the verbal channel, attitudes, emotional states, personality traits, and social power relations. Staredown events in the UFC (Ultimate Fighting Championship) are rife with nonverbal cues, which may reflect opponents' self-confidence or their abilities to win the fight on the next day. Winning fighters, for example, display less smile intensity during staredowns than their losing opponents [1].

In our study, we looked at the gazing behavior and head movements of UFC fighters in video clips of staredown events. We wanted to investigate whether victories could be predicted by our two variables: breaking eye contact and turning away first.

We defined the breaking of eye contact, ordered by priority, as (a) moving one's eyes away from the target's eyes, (b) closing one's eyes for longer than 5 video frames (i.e. not mere blinking), or (c) turning one's head away from the target. Simple video software was used to identify and assess in our video material the frames in which the breaking of the gaze took place. These observational judgments were performed by four independent raters.

To identify who turned away first, we used a computer program to code the same video clips by placing three dots on each fighter (tip of the nose, middle of the ear, and shoulder) and using optical flow for frame-by-frame encoding. As soon as at least two of the dots on one fighter could not be encoded anymore due to occultation of the respective body parts, this determined the fighter who turned away first.

Pearson's chi-squared test indicated that there is a significant systematic relationship between the fighter who turned away first and the winner of the subsequent fight (N = 87, χ^2 = 5.070, p = .024, φ = .241), particularly if the winning method was knockout (χ^2 = 4.804, p = .028, φ = .370), but not with other winning methods such as submission or decision (p > .05). Victory and breaking eye contact were significantly related as well (N = 87, χ^2 = 4.316, p = .038, φ = .223), particularly if the winning method was submission (χ^2 = 5.625, p = .018, φ = .791), but not with other winning methods (p > .05). Pearson's r between breaking gaze and turning away first was .346.

Being the first to break eye contact is usually seen as a sign of submission. However, the ritualistic setup of staredowns might explain why this behavior predicts the winner: by breaking eye contact first, the fighter unofficially ends the staredown sequence and thereby dominates the situation in which staring is the common baseline anyway. The unexpected relationships between the two investigated nonverbal behaviors and the winning methods have yet to be explained.

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Impact of Contextual Information on Visual Working Memory

Aleksandra Sadowska, Patrycja Kałamała, Wawrzyniec Ordziniak

Jagiellonian University,
Kraków, Poland

Our scientific project was designed to enrich the knowledge on visual working memory (VWM). Traditional research focuses either on capacity of visual working memory or on its fidelity. By this project we tried to learn more about how context information is stored and retrieved, so we would get a piece of picture of how do levels of representation in our minds work.

According to some recent studies, elements of a visual scene are not stored in VWM independently of each other [1]. Every display has multiple levels of structure – from separate units to whole ensembles. There is always a particular number of elements that is encoded, each having its own fidelity, but in order to encode the complete picture, the contextual (featural and spatial) information must also be stored.

In order to verify how context information influences capability of the retrieval of elements of a visual scene, we designed a novel version of the change detection task [2], in which information was stored on two levels. The first level consisted of a group of simple small geometrical shapes (such as circle, trapesium, star, heart, etc.), and the second was a large pattern (e.g. circle, trapesium) composed of elements from the first level. In some trials, the shape of one element matched the pattern, in the rest of them no shape could match it. The participant's task was to detect the change between two trials.

The interaction between these two levels based on featural context information can be understood as a congruence of shape between the large pattern and one of the elements that this pattern was built of.

Moreover, we assumed that if the element would have the same shape as the large pattern, then the change within this element will be perceived more often than in the incongruent case. To verify this hypothesis, we conducted Exp. 1 (with 9 elements) and Exp. 3 (with 5 and 6 elements).

The spatial context information was operationalized as a regularity of the large pattern, in which distance between elements was either always equal (as in Exps. 1 & 3) or disturbed by manipulation of this distance. We suspected that regular patterns would yield higher scores on the task. Moreover, according to Gestalt rule of symmetry, we predicted that figures like circle or "X" would score even higher than trapesium or irregular quadrangle. In this procedure, we also decided to conduct the experiment in two versions, each of which contained a different number of elements (respectively Exp. 2 and Exp. 4).

We will present results and interpretation of described experiments as fresh insight into visual working memory exploration. Generally, the data supported our hypotheses (with some exceptions), with local-global congruence, regular patterns, and symmetric patterns yielding higher accuracy of responses than incongruent, irregular, or asymmetric patterns.

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Acknowledgements

People with near death experiences under mortality salient condition

Michael Schlattl

University of Vienna,
Vienna, Austria

Terror Management Theory assumes that humans have developed defends mechanisms in order to protect them from existential anxiety they experience when they have to face their mortality. Existential anxiety arises due to surviving instinct and the awareness of the inevitability of death. As research has shown when individuals feel threatened by death they foster a state called symbolic immortality, attempting to connect themselves to a broader social entity--either some collective, pursuit, or meaning. Moreover individuals should become more inclined to adopt the norms, attitudes, and beliefs of this social entity in order to gain security. That proposal could be derived by "evolutionary forces" that make the indivual seek protection within a group if threatened by death. In order to receive this protection from a bigger group however, one needs to achieve a sense of self-esteem within that cultural worldview. Self-esteem lies at the heart of TMT, and is a fundamental part of its main experimental paradigms. Consequently, it has been shown that under mortality salience (MS) individuals perceive members of their collective as more favourable than members of other collectives after they reflect on their mortality. Moreover it has been shown in myriads of studies that people become less tolerant to other collectives. E.g.: One study demonstrated that Christian subjects evaluated other Christians more positively in comparison to Jews only when they were in the mortality salient (MS) condition but not in the control condition. Another study demonstrated that judges in the MS condition set significantly harsher bonds (over $400) for prostitutes in comparison to judges in the control condition.

The present study aims to investigate people with near death experiences under mortality salient condition. It is not clear what the results will look like yet, since there are too few participants up to now. It is expected that people with near death experiences have more intrinsic values and decreased cultural world view defence.

The study is being carried out online via the platform survey monkey. The design consisted of two conditions; (a) pain (c) death and two different groups of participants (people that had near death experience and participants without near death experience). That means one group with people without near death experience mixed with participants that had a near death experience are being asked to write down one sentence related to pain (control group) wheras the other group has to think about a sentence regarding death. Afterwards there is a dummy test plus a questionair that they have to fill out in order to receive a personality discription. Participants receive a bogus personality description, which is very positive in nature and were asked to rate how much they agree with it or not.

The primary aim of the study was to investigate whether near-death-experienced participants would produce less self-esteem striving than people without near-death-experience as reflected by participants' evaluation of their bogus personality descriptions.

Effects of Stress on Brain Activation

Nadine Schlichting

University of Vienna,
Vienna, Austria

The purpose of this research project was to investigate the effects of psychosocial stress on brain activation using functional magnetic resonance imaging. This project is part of a study examining the effects of stress on empathy and prosocial behaviour and its neural correlates.

Data acquisition is still on going, up to this point 53 healthy male subjects (mean age= 25 ± 4 years) were assigned to the experimental (n= 27) or control group (n= 26) and tested.

Psychosocial stress was induced using the Montreal Imaging Stress Task (MIST) which includes mental arithmetic tasks combined with elements of uncontrollability and social evaluative threat. In the original protocol [1], difficulty and time limit of each arithmetic task in the experimental condition adapts to the user performance to yield a 45-50% correct performance. Subjects receive negative feedback throughout the task (via a colour bar showing individual and average performance, where individual is always worse than average performance) and after each scanning run (via the experimenters, informing the subjects verbally about their insufficient performance and the need to improve).

In the control condition no time restrictions are set and no negative feedback is given to the subjects.

In this study, we tried to intensify psychosocial stress by adding a social evaluative threat component: during the briefing, subjects were told that their behaviour will be observed by a scientist. While performing the task in the scanner, subjects saw a real-time webcam transmission showing one experimenter taking notes.

Each subject performed the modified MIST three times, each run lasting between five and seven minutes. After testing, subjects in the experimental group were debriefed and told that this task did not assess their mental arithmetic ability and is designed to be impossible to accomplish.

Subjects also completed a rating scale measuring their stress level (from 1= "not at all" to 7= "extremely") at eight different time points throughout the experiment.

Preliminary results indicate higher subjective stress ratings in the experimental group compared to the control group for all time points. To investigate the effects of psychosocial stress on brain activation, we compared brain activation maps during stressful versus non stressful mental arithmetic. First results show stress-induced activation in the insula, premotor area, midcingulate gyrus, areas of the primary somatosensory cortex, superior parietal lobule, anterior lobe of the cerebellum and parts of the occipital cortex. Stress-induced deactivation is only found in the left middle temporal gyrus.

Before final conclusions will be drawn, data from 27 additional subjects will be analysed.

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The Influence of Emotional Distraction on Spatial Working Memory

Nina Škrlj, Martina Starc, Grega Repovš
University of Ljubljana,
Ljubljana, Slovenia

Introduction

Working memory (WM) supports cognitive processing by storing and maintaining limited amounts of information while performing everyday tasks. It consists of separate stores for verbal, visual and spatial information. Spatial WM maintains information about the position of objects by directing spatial attention to their locations. Therefore, if subjects are prevented from keeping attentional focus at locations held in WM, memory accuracy should decline [1]. Since emotion-laden stimuli receive prioritized attention, task-irrelevant emotional stimuli presented during maintenance of information in WM should reduce accuracy of recall. This has already been demonstrated for visual WM using task-irrelevant negative pictures in a study by Dolcos et al. [2]. Comparing the effects of task-related versus task-unrelated emotional distracters they have also shown different patterns of brain activity, related to the nature of the distracter. We investigated whether a similar pattern of results can be found for spatial WM as well.

Methods

28 healthy (9 male), adult (19-42, average 24.5 years of age), right-handed volunteers performed a delayed-response WM task. Participants were instructed to remember the position of a round scrambled image on a computer screen. After a delay they indicated the remembered position on a blank screen by moving a grey circle with a joystick. There were 2 blocks of trials (16 trials each) not containing a distracter and 4 blocks of trials with three potential distraction types presented during the delay interval: (1) neutral image (32 trials); (2) negative image (32 trials); and (3) task-related scrambled image (32 trials). Scrambled images were emotionally neutral as content was impossible to discern. Positive images were not included due to their weaker effect on attention and time limitations. During task performance scalp electroencephalogram (EEG) and functional magnetic resonance imaging (fMRI) data were acquired. Data have been collected but not yet analysed.

Expected results

Spatial WM uses spatial attention to actively maintain positions; therefore we expect even greater influence of emotional distraction on memory performance compared to visual WM. Both task-related scrambled images and emotion-laden negative distracters should attract attention and cause accuracy to decline. However, the importance of task-related images emerges from current goals while negative images gain salience from their evolutionary relevance for survival so mechanisms and patterns of brain activity should differ. By using a joystick to record participants' responses instead of a match-to-sample task we gathered precise measurements of memory accuracy for each specific trial, which will enable more detailed analysis of contributing brain regions. The study will thus further our understanding of the interactions between emotion, task relatedness and spatial WM and their underlying neural mechanisms.

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A Socratic-like Problem to Reveal Misconceptions in Fractions

Stanislava Sojáková

Comenius University,
Bratislava, Slovakia

Introduction

Fractions are the stumbling block in understanding qualitative reasoning for many. In our pilot study, we tried to determine the suitability of our research design for the further experiment in fractions diagnosis. When choosing a problem, we were inspired by Liping Ma's interview question of 1¾:½ and by the Socratic problem of doubling the square [1] [2]. Our problem was to find the sides of rectangles which can be obtained by cutting unit squares into pieces and rearranging the pieces, so that they would be all used without overlapping. Hands-on approach was chosen to elicit variability of subjects' representations of fractions, in accord with Lesh Translation Model [3]. Our hypothesis was that the key misconceptions subjects hold would surface.

Method

Five subjects of different level of mathematical background were observed. Author's intervention (number of guiding questions) varied. Subjects were invited to use scissors, paper, and ruler to solve the problem given.

Results

Each subject displayed some misunderstanding of the inverse relationship between the sides of the resulting rectangle (e.g. failure to see it/hardship calculating it). They all erred somewhat during the measurement/calculation (e.g. there was confusion between the number of pieces and the side length and incorrect basic fractions operations). The interplay between the picture/paper aid usage and verbal/symbolic calculation was interesting: the subjects, who had miscalculated the sides of rectangles, usually corrected themselves upon constructing the concrete embodiment of the calculation.

Discussion and Conclusion

Even though many misconceptions surfaced, they could have been problem specific or influenced by the guiding questions. Another con was that the problem lacked Real Life Context interpretation, which negatively influenced the motivation of the subjects. The pros of the problem choice were that it was approachable with different levels of mathematical literacy and that it provided an insight into what modes are the subjects comfortable in. These highlights and drawbacks are to be taken into account in the following experiment, in which we want to find correlations of misconceptions, and subsequently develop a prototype of a diagnostic tool for misconceptions in fractions.

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Basic Neuropharmachological Research on Ibogaine as a Potential Therapy for Drug Addiction

Blaž Svetic, Roman Paškulin, Maja Bresjanac
University of Ljubljana,
Ljubljana, Slovenia

Ibogaine (IUPAC name 12-Methoxyibogamine) is a naturally occurring plant alkaloid which has been traditionally used as a medicinal and ceremonial agent in West Central Africa and is allegedly effective in the treatment of drug abuse [1].]. It has been reported that ibogaine decreases various adverse phenotypes associated with exposure to drugs and alcohol in human and rodent models [2]. The research of ibogaine and its effect on the body and the brain is interesteting from many aspects concerning cognitive science, ranging from first-person perspective/phenomenological point of view (impairment of cognitive control over impulses - addiction) to neuroscientific approach. Our group focuses on neuropharmacological aspects of ibogaine and its mechanisms of action.

There has been reports that ibogaine and its desirable actions to reduce self-administration of, and relapse to, alcohol consumption are mediated via the upregulated expression of glial cell line-derived neurotrophic factor (GDNF) in the midbrain ventral tegmental area (VTA), and the consequent activation of the GDNF signaling pathways [2]. In order to test the hypothesis that ibogaine induces increased transcription of gdnf gene and synthesis of this trophic factor, we will employ primary cell-cultures of neurons and astrocytes, either grown together or cultured separately, as well as a neuroblastoma cell line (SHS 5Y5). GDNF expression will be assessed both at the transcription (PCR) and translation level (immunodetection in cells (immunocytochemistry) and medium (ELISA)) following different times of cell culture incubation with various concentrations of ibogaine.

In addition, due to (1) a key role played by liver in the metabolism of ibogaine when it is acting systemically, and (2) putative hepatoprotective effects of ibogaine on alcohol-induced injury, we aim to study effects of ibogaine on primary cell cultures of rat liver cells (hepatocytes), and its potential hepatoprotective properties. We will treat primary hepatocyte cultures, with alcohol in various combinations with ibogaine and look at possible changes in activity of biochemical markers of alcohol-induced injury.

While experiments are under way and we have no results, yet, we formulated our hypotheses based on published scientific reports, wich explored mechanisms of ibogaine activity. Addiction is a process, which causes impairment of functional connections within brain reward system and changes its sensitivity to certain neurotransmitters like dopamine. Ibogaine has been shown to reduce / halt self-administration of drugs and alcohol without signs of withdrawal syndrome – this effect outlasts ibogain's measurable presence in blood or tissues. This could be explained in two ways, which complement each other: 1. by effective long-lived metabolite of ibogaine (e.g., noribogaine), and 2. by long-term neuroplastic changes in brain reward (or related modulatory) networks. Some previous studies have provided evidence for both explanations in vitro (i.e., in cell cultures) and in rodent models of addiction, respectively [2]. Our studies may shed additional light on ibogaine effects and mechanisms of action.

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Case Study of a 5-Year Old Girl with Mild Developmental Delay – a Multidisciplinary Approach and the Perspective of Body Schema

Lovro Tacol, Tina Bregant
University of Ljubljana,
Ljubljana, Slovenia

Introduction
In this paper I present a 5-year old girl E. T. through different perspectives, which mainly derive from different fields of practice of specialists who examined her. In the second part I present the case through perspective of body schema. This is a postural model that keeps track of limb position and plays an important role in control of action. It involves aspects of both central (brain processes) and peripheral (sensory, proprioceptive) systems and it can be considered the collection of processes that registers the posture of one's body parts in space [1]. I hypothesize that sensory integration therapy improves girl's body schema and thus facilitates her development the most.

Methods
I searched the child's medical records – exams, diagnostic tests, and different specialists' opinions and performed unstructured interviews with her parents. To understand her functioning better, the girl was filmed during medical examinations, spontaneous activity, and during sensory integration therapy. Written consent was obtained from child's parents prior to the study.

Results Obtained from the Multidisciplinary Approach
The child seemed to have developed normally in first few months, but around seventh month growth and especially motor development slowed down. She was examined by pediatrician and diagnosed with developmental delay and stunted growth; year later she was treated by ophthalmologist and diagnosed with divergent strabismus. At four years pediatrician diagnosed her with social functioning disorder. Brain imaging was done at 15 months and showed wider lateral ventricles. Psychologist described E. T. as calm, quiet, and unmotivated for moving. She received neuro-physiotherapeutic treatment and occupational therapy and she still receives sensory integration therapy, logopedic treatment and special pedagogic support in kindergarten. Child's mother reported she is herself stiff and ponderous regarding movement and her sister also received neuro-physiotherapeutic treatment.

New Perspective – Body Schema
Even though different perspectives from different experts give a lot of information about the child's situation, I wanted to integrate them and reflect them through more holistic view. I conclude that E. T. doesn't have adequate body schema. Since she doesn't have a good sense of her body (parts), she isn't as able to successfully perform motor actions as her peers; she also needs more time to choose the right movement strategy. I conclude that the sensory integration therapy facilitates E. T.'s development the most, because it challenges her to explore her body, the ever-changing environment and the interaction between the two – it gradually improves her body schema. Child's mother indeed confirmed the biggest improvement in all the areas of development after this therapy.

Acknowledgments
We'd like to thank E. T. and her parents, who were willing to participate.

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Motor imagery based brain-computer interface

Ján Tóth

Comenius University,
Bratislava, Slovakia

Motivation

Brain computer interfaces (BCI) play an integral role in cognitive neuroscience. Currently, there are various uses for BCI technology, some of the more famous being neurofeedback (NFB), where reward from the environment conditions participants to be able to concentrate (retain a desired state of mind) for prolonged periods of time. Another such use is robot assisted neuro-rehabilitation, where stroke patients can use BCI controlled robotic arm attached to their paresthetic upper extremities for muscle exercise [1].

Method

In our BCI experiments we use the concept of mirror neurons - units that fire invariantly whether an action is performed, observed, or imagined. We concentrated on motor imagery, which relates to the sensorimotor cortex - the brain areas that coordinate voluntary movement. It seems that imagining a motor action has almost the same manifestation in the firing patterns of mirror neurons as performing the action physically. When the area in the motor cortex for a specific part of the body is at rest, synchronized neural oscillations form a macroscopically observable pattern: the mu rhythm (8~12 Hz) [2]. The mu rhythm should be absent when the area is active. This phenomenon is called event related synchronization and/or desynchronization, and can be used as a control signal for the BCI application.

Experiment

The participants undertook series of EEG experiments, starting with measuring mu rhythm over the sensorimotor cortex. This experiment consisted of multiple phases, in which subjects performed various mental tasks (conditions) - motor imageries or relaxation. Motor imageries correlated with desynchronization, their absence (motor relaxation) helped facilitate mu rhythm. These pre-trials enabled us to select viable candidates for later BCI experiments. Prior to the BCI experiment itself, subjects were measured performing various conditions to determine the strongest contrasts in frequency-channel bins. These contrasts were used to assemble a personalized classifier for each participant. Using such classifiers, BCI sessions were performed, consisting of 1-D (up-down) moving a cursor on screen. The BCI sessions with promising candidates are still in progress.

Future efforts

We would like to refine the BCI process and make it easier to replicate for further research. Also, exploring additional classification mechanisms and their adaptation capabilities may improve the quality and sensitivity of BCI control. One more area demanding improvement is the BCI "literacy" - the ability of a subject to give steady performance, when working with the brain-computer interface.

Acknowledgements

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Is There Any Difference Between Feeling and Acting an Emotion?

İpek Ural

University of Vienna,
Vienna, Austria

Taking into consideration my experience in acting and my philosophical background I would like to find out what kind of experiment settings are designed in order to observe corresponding movements to the several emotional states; such as fear, sadness, happiness and anger. Since most of these experiments are done with the use of actors, I would also like to analyze whether it makes any difference to use actors in emotion expression studies, and why? Within this framework, it is necessary to go deeper in the theories of emotion processes and analyze further the question of how emotion relates to expression.

The first question to be addressed is what emotions are and how the process is. In order to answer this, one needs to review different approaches and relate those with the discussions using actors in experiments. With this purpose, cognitive, somatic feedback and embodied approaches to emotion definition will be examined in detail. Besides, the Schachter and Singer Theory [1] which states that the emotions are not only physiological reactions but also are cognitive activities of labeling, is going to be discussed in order to approximate the cognitive and somatic feedback theories. The reason why the different theories of emotion process needs to be examined, is to be able to discuss whether there could be difference between imagining and experiencing an emotion.

My main aim is to show that, getting into an emotional state while acting, does not involve the same process as natural emotion expression; which could be a barrier in emotion expression studies. My assumption is that there is a methodological problem in using actors: the results won't give adequate data about expressions in a natural way, since acting requires imagining and arousing the body in order to form an emotional state. So there is an artificial stimuli created by themselves, where the distinction between artificial and natural expression occurs. I will base my assumption on the idea that emotion has no imaginative counterpart which is argued by Currie and Ravenscoft [2].

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Reading Between the Lines: a Vector Space Model of Language Using Semantic Role Structures

Charley MS Wu,
Marcin Skowron,
Paolo Petta
University of Vienna,
Vienna, Austria

A Vector Space Model (VSM) is a mathematical method of representing text that has been widely used for tasks such as topic detection, information extraction, text generation, and the modeling of language acquisition [1]. Traditionally these models have either used a bag-of-words approach that ignores word order such as Latent Semantic Analysis (LSA) or incorporated some measure of word order (ie. HAL or BEAGLE) [2]. By representing the association of words with where they occur, VSMs are able to leverage latent contextual relationships to learn semantic information. Our hypothesis is that it is possible to improve on these models by using Semantic Role Labeling (SRL) to encapsulate a richer representation of natural language.

We are presenting a new type of Compositional VSM that is capable of representing semantic role structures, rather than just single words or phrases as a vector. A semantic role is the relationship each verb has to the syntactic constituents of a phrase, such as the agent performing the action of the verb and the patient, which receives the action. We use a deep convolutional neural network trained on the Wall Street Journal corpus to extract these semantic relationships from natural language [3]. The result is a structured representation of how each verb relates to the arguments associated with it. Unique to our method, we perform a mathematical transformation to create a semantic vector for every semantic role structure in a target corpus. As inputs, the function uses word vectors for each token (provided by a generic LSA model trained on the entire English Wikipedia) as well as the structured semantic relationship between each word. This transformation takes into account the specific semantic role of each word vector to preserve the semantic relationships in the vectorized output.

To test this model, we are training a generative classifier to differentiate between classes of ideologically divergent text. For example, the classifier can learn the decision boundary between transcribed speeches from two different politicians. It will be possible to measure the performance of the model based on the generation of new text based on each of the learned classes, or by classifying new natural language input. We will compare the performance of our model against a traditional LSA model as a benchmark to validate our hypothesis. The applications of this model extend to all the traditional applications of VSMs such as supervised classification and unsupervised topic detection, with the additional advantage of being able to generate new data in the form of a semantic role structure.

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Unconscious Processing of Human Faces. A Subcortical Pathway for Disgust?

Adriana Zbanț
University of Vienna,
Vienna, Austria

Visual processing of human faces is believed to take place through two major pathways: a slower, more detailed cortical pathway and a faster, less detailed subcortical one. The cortical pathway receives its input via the parvocellular fibers and is thus more sensitive to high spatial frequency (HSF) information. As opposed to this, the subcortical pathway receives input via the magnocellular fibers which are more sensitive to low spatial frequency (LSF) information [1]. The subcortical pathway involves the superior colliculus, the pulvinar and the amygdala in the brain. Because of the involvement of the amygdala, fearful facial expressions seem more likely to activate this pathway. Nonetheless, there are studies that indicate that the subcortical pathway might respond to a wide range of emotional stimuli, especially negative facial emotions that might suggest a potential danger, such as anger, disgust or contempt [2] as well as stimuli presented in the periphery [3]. In order to investigate the hypothesis that the subcortical pathway might be involved in the processing of various negative emotions, not only fear, we tried to see in the present study whether the subcortical route is also involved in the subliminal processing of disgusted faces.

In order to test this hypothesis we used a psychophysical approach with a masked prime paradigm in which the participants of the experiment had to discriminate between neutral and disgusted target faces. Prior to these target faces, prime faces that were either congruent (having the same emotional expression as the target) or incongruent (having the opposite emotional expression from the target) were presented in the periphery. The primes were either unfiltered (carrying both high spatial frequencies and low spatial frequencies), or filtered in order to contain only LSF or only HSF information. Because the LSF face primes should be processed regardless of whether they are attended or not, we also manipulated spatial attention by either cueing the target or the prime. We tested an equal amount of participants, in two blocks, one for HSF primes and one for LSF primes and measured the prime-target congruence effect which refers to the difference in discrimination speed between congruent and incongruent pairs. In order for the hypothesis to be validated, if the disgust emotional expression is processed via the the subcortical route, we expect an extension of the gender face priming of Khalid et al. (2013) to the disgust emotional expression. In this case the masked LSF filtered face primes should produce a congruence effect on the subsequent target face regardless of where spatial attention is focused, whereas the masked HSF filtered primes should not produce a congruence effect over the subsequent target face categorization.

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Dropping items from visual working memory: Initial behavioral investigation

Cirila Zorenč, Işıl Uluc, Grega Repovš
University of Ljubljana,
Ljubljana, Slovenia

Introduction

Research has shown that at any given moment, we can only maintain three to four objects in our visual working memory (VWM) [1,2]. Studies using lateralized Change Detection Task (lCDT) and employing concurrent EEG measurement, have further shown that subjects' VWM capacity can depend on the ability to filter irrelevant items, presented either concurrently with target items or subsequently during maintenance period [1]. The aim of this study was to investigate the ability of subjects to not only filter and selectively add objects to VWM but also drop them from VWM if they are irrelevant for the performance of the task. To investigate that possibility we developed a variant of lCDT in which the cue indicating the task relevant hemifield was presented only after the target items to be maintained, requiring the subjects to first encode items from both visual hemifields and then drop the items from the irrelevant hemifield. Here we present the initial behavioral part of the study, exploring the number of items subject can maintain when they are initially required to pay attention and encode items from both hemifields.

Methods

Ten healthy young adults participated in the study. In all of the conditions, the participants were first shown a cue, indicating which side of the screen they have to attend to. There were three possible conditions: attend to left, right or both sides. Afterwards one, two or three black rectangles of varied rotations were shown on each side of the screen. After a short delay a second cue appeared, indicating either left or right side of the screen, telling the subjects which side they have to keep maintaining in memory. After another short delay, the probe items were shown on both side of the screen and the participant had to indicate, whether there was any change in the orientation of the rectangles on the relevant side of the screen from the initial presentation, ignoring a possible change on the other side of the screen. To perform the task efficiently in the initial 'remember both sides' condition, the subjects had to drop the information from one side of the hemifield. Reaction times and accuracy of the responses were recorded.

Results

Statistical analysis of the data obtained in the behavioral study returned the average K value (= average capacity for a subject) of 2.2875 for 3-load (keep-3) condition and 2.925 for 6-load (drop-3) condition. The results show that the subjects were able to encode and maintain six objects in their VWM simultaneously, when they were presented three to each hemifield. These findings indicate an intriguing possibility of separable left and right hemisphere VWM stores, and open possibilities for further study of the VWM dynamics using EEG.

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List of Participants

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