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EDITORS' NOTE: *Participants were asked to submit abstracts between 400 and 600 characters, but only a few of them followed this instruction. Keywords were chosen by participants and their number has not been reduced.*

ABSTRACTS

(in order of the conference programme schedule)

KEYNOTE. Dolores Modic, *Kyushu University, Japan*:

Understanding Intellectual Property Data – the How and Why?

A single piece of intellectual property data is usually devoid of context, thus its usability is limited. E.g. for SMEs to be able to extract value from the information about the patent applicant, they need to know whether the applicant is still the owner. Is the patent in use? Is it embedded in their products, their processes? Similarly, university technology transfer office needs to understand how to match their seeds with industry needs. Presently, the field of intellectual property rights and patent informatics is a lively one. IPR data is big data, as its characteristics are high volume, high variety, and high velocity of changes. Consequently, connecting different types of IPR data presents a challenge. Yet, when large amounts of IPR data are connected, a new ecosystem for (open) innovation appears. The first part of this paper is concentrated on new advances in patent (IPR) informatics, focusing on the usability of new data-merging techniques (including disambiguation and allocation techniques), on new IPR data types (such as linked open data, LOD) and finally, promising new knowledge extraction techniques. The second part asks why bother? Discussing how advances can be harnessed for improvement of IPR management as well as better evidence-based policy-making.

KEYNOTE. Dalibor Fiala, *University of West Bohemia, Czech Republic*:

Online Sources of Patent and Bibliographic Data: Accessing and Processing Them

The established bibliographic databases have a number of functionalities and can, in principle, serve as search engines of academic papers, citation indices, or calculators of bibliometric indicators. Web of Science, Scopus, ACM Digital Library, DBLP, CiteSeerX, and Google Scholar belong to the best known ones. Similarly, Espacenet, PatentScope, and Google Patents are examples of search engines designed for patent databases. Larger amounts of data from these two types of databases can be successfully used for bibliometric measurements, citation and collaboration networks analysis, for the visualization of the production and quality of scientific research, or for the evaluation of innovation in various fields and countries. These data can be acquired only manually in some cases but also automatically in some others. In this talk, I will give an overview of bibliographic and patent databases and the possibilities of data acquisition from them and will focus in more detail on Web of Science, Scopus, Espacenet, and Google Patents.

KEYNOTE. Markus Abel, *University of Potsdam, Germany*:

Knowledge Engineering in Software Development at Two Examples in Machine Learning

We present two showcases of knowledge engineering with positive and negative outcome. Both examples reside in the domain of data analytics and/or machine learning. The first example concerns sound reconstruction from measurements and is relevant for music industry. The second example concerns the use of a specific machine learning strategy to control complex systems. We explain the difficulties related to IP rights on software, how they are tackled and what is relevant in a European and American context. The whole presentation will be given from the perspective of a developer and where his main difficulties were found.

Ana Hafner, *Faculty of information Studies in Novo mesto, Slovenia* and Jožica Čehovin Zajc, *University of Ljubljana, Faculty of Social Sciences, Slovenia*:

Differences between independent inventors and organizations in intellectual property rights management: The case of Slovenian automotive industry

Abstract: Preliminary research on 77 Slovenian independent inventors (2015/2016) showed that majority of them filed patents and 1/3 have trademarks. Although 80 % developed prototypes, majority had more costs than revenue from innovation activity. Recent research (2017/2018) on 242 Slovenian patents in automotive industry and their inventors showed some significant differences in patenting activity between independent inventors and organizations: independent inventors are more inclined to patent more general inventions, patents are maintained for shorter periods and are less likely to be successfully commercialized, however, their owners value their importance higher than organizations do.

Keywords: independent inventors, intellectual property rights management, patents, automotive industry

Victor Cepoi, *Faculty of information Studies in Novo mesto, Slovenia*:

Social networks as factors for innovations

Abstract: In the new local-global interconnection, nation states are losing their influence and legitimacy, while economic and cultural transformations are reconfiguring spatial formations. Going in line with the global trends, regions grasp more importance in shaping the political, economic and social environments. As a result, the regional level has an important role in creating a proper socio-economic framework for innovation development, which is considered one the engines of development. Relying on the theory of Social fields, the research considers three social forces (networks, institutions, and cognitive frames) as an alternative explanation for innovation processes, by

encompassing the aspects of different social fields on the regional level. Consequently, within this dissertation we approach regional innovation systems as an analytical unit for exploring innovation performance of a regional environment. As case studies, we selected seven regions with different levels of innovation performance. The analysis of the semi-structured interviews and the Qualitative Comparative Analysis emphasized the social forces are a special component for explaining innovation processes in the selected case studies. Nonetheless, the results offer insights for regional mechanisms within the innovation performance with the focus on an approach toward innovation that is beyond simple economics.

Keywords: regional systems of innovations, networks, social fields, social forces, QCA

Cristian Gangaliuc, *Faculty of information Studies in Novo mesto, Slovenia*:

The measurement of innovation for management and research

Abstract: Innovation is a widely used terminology in manufacturing industries, usually associated with the competitive capacity of a company or a region. Moreover, it resembles a lead theoretical concept for European Regional Development policy, and receive increased interest from both entrepreneurial and academic fields. In that context, understanding and observing innovative performance is of practical use for both the public and private sectors. This paper aims to identify best practices for capturing innovation in regions and companies, for a pragmatic usage of managers and researchers. The objective is to define indicators that are closely related or associated with innovation and describe methodologies to measure those innovative indexes.

Keywords: innovation, index, measurement, methodology

Urška Fric, *Faculty of information Studies in Novo mesto, Slovenia*, Ana Hafner, *Faculty of information Studies in Novo mesto, Slovenia* and Dolores Modic, *Kjushu University, Japan*:

Why should we care about transfer of knowledge and technology?

Abstract: Knowledge and technology transfer is a challenge. While some technological innovations overcome it and create economic and/or social impact, others never see the light of day outside university research labs. In part, this can be attributed to the developmental characteristics of invention, for example, making an idea too complex or simple to be recognized by the industry for its marketing potential. But often it simply comes down to the problems of identifying and matching appropriate individuals; from researchers, inventors, developers, patent experts, salespeople, bold investors and risk tolerant spin-off founders to representatives of established firms. This paper wishes to address various concerns connected to transfer of knowledge and technology, focusing on the importance of transferring knowledge and technology from public research organizations to the industry. Our idea was illustrated in the Handbook for successful

transfer of knowledge and technology (Modic, Hafner & Fric, 2018), which serves as a practical guideline to researchers and technology transfer offices. The Handbook will be especially valuable to researchers and students, helping them understand the overall process of knowledge and technology transfer and how they can benefit from it, and, ideally, provide them with fresh ideas.

Keywords: knowledge and technology transfer, intellectual property, university inventions, commercialization, handbook

Katarina Krapež, *Faculty of Management Koper, University of Primorska and Faculty of Information Studies in Novo Mesto, Slovenia*:

Managing IP rights on space-related innovations: the insights from a Slovenian case study

Abstract: In the last decade, the outer space exploration has gained a new impetus, specifically through a challenge to send a human mission to Mars and to create a human-friendly environment on the Red Planet. Such undertaking involves significant advancement of a state-of-the-art technology. The stakeholders created triple helix structures, which linked governing bodies, research sector and industry to expedite the innovation. One of the challenges of building a successful innovation model for space was sustainable IP rights allocation and management within such structures. While outer space exploration and commercialization of space activities are themes that are commonly discussed from the top-down, this study takes a reverse approach, by exploring the impact of the involvement in space-related applied research (projects) on the small and medium-sized companies. This case study analyses the distribution and management of IP rights on space-related inventions among project partners, when a project results in the invention of the technology that needs to be commercialized. When a small company expresses the interest to join space research activities by offering to develop a product or service, this is typically discussed with a national space agency/ministry or regional/international organization, who act as investors. The company faces the challenge of managing the rights on its own inventions, while maintaining the good will of the investor. In case that the research activities are publicly founded, there is also a strong interest to make the inventions freely available. This study focuses on the SME located in EU and analyses risks and opportunities that the management of this particular company faced within space-related projects. The objective is to evaluate the overall impact of the involvement of this company in space-related research activities.

Keywords: intellectual property rights, innovation, management, space exploration, commercial use of space

Jernej Agrež, *Faculty of Information Studies in Novo Mesto, Slovenia* and Nadja Damij, *Northumbria University, United Kingdom*:

Intellectual property in E+ Sport project: management vs. dissemination

Abstract: Feel the freedom of the water is an Erasmus+ Sport project focusing on the integration of people with disabilities in water sports. Following the project aim, we redesigned user experience in sports like wakeboarding and stand up paddling by developing new technical solutions, that enabled soft introduction of the sport to participants with disabilities and made it possible for them to progress in the sport. All project results are part of project intellectual property. It is obligatory to conduct dissemination of the results, yet no intellectual property management action is demanded. Unclear regulation of intellectual property reveals in positive and negative reflections of the project.

Keywords: E+ Sport, people with disabilities, water sports, dissemination, intellectual property management

Erika Džajic Uršič, *Faculty of Information Studies in Novo Mesto, Slovenia,* Biljana Mileva Boshkoska, *Faculty of Information Studies in Novo Mesto* and Borut Rončević, *Faculty of Information Studies in Novo Mesto:*

Modelling and development of industrial symbiosis networks in regional industrial areas with DEXi

Abstract: Resource sharing among co-located firms referenced in the industrial ecology literature as "industrial symbiosis" - IS is a term that is used and engages traditionally separate industries in a collective approach to business and environmental management involving the physical exchanges of materials, energy, water, and byproducts. In this study we try to model and evaluate the possibilities of creation of a such IS on a regional level and we present a qualitative hierarchical multi-attribute decision model for evaluation of appropriateness of industrial symbiosis networking (ISNs) based on DEX methodology. DEX is implemented in computer program DEXi, which enables modelling of an expert knowledge. Such a model has many advantages like comprehensibility, analysis and synthesis of interactions between actors and in this case structure. To answer that question, we have studied a benchmark of seven IS examples, two of which are used to build a qualitative multi-criteria decision model for evaluation of the development of ISN model. The model is then used to evaluate them. The results show that only mixtures of all three spheres that meet goals from the economic, environmental and social points of view, are rational and reliable in the context of ISNs needs for build a new ISN model.

Keywords: industrial symbiosis networks, qualitative multicriteria decision model, simulation

Alenka Pandiloska Jurak, *Faculty of Information Studies in Novo Mesto, Slovenia*:

Design of complex industrial symbiotic networks - transition to circular economy

Abstract: Studies show that, when company management realizes the transition to a circular economy should involve some changes that represent a departure from

established business, the interest in in-depth consulting drops. Based on the results of a case study from abroad, the purpose of the research project is to formulate the prerequisites for the design of complex industrial symbiotic networks. With the research project and the acquired new knowledge, we will empower stakeholders working in the business/entrepreneurial support organizations.

Keywords: circular economy, complex network, industrial symbiosis

Lucija Lapuh, *Faculty of Information Studies in Novo Mesto, Slovenia*:

Conceptually about the fourth industrial evolution and briefly about the preliminary results on the use of high performance computing

Abstract: Companies face nowadays several challenges as a technology is making an impact on every step of the manufacturing process. A conceptual overview is based on the author's postdoctoral research. The manufacturing is in the fourth industrial evolution, which is being labelled Industry 4.0 (in Germany) or Smart Manufacturing (in USA) or Factories of the future (in the European Union). The author will present that automation and digitization are fostering the development. Factories of the future (FoF), which are rapidly adaptable, highly flexible to external changes and sustainable, is the initiative to foster innovation and growth and to develop emerging industries. Beside information and communication technologies, environmental, social issues and individual customers' needs are taken into consideration. The manufacturing companies have to constantly innovate and deliver new products at a faster pace, increase production and reduce costs, without compromising product quality. The implementation of digitalization leads to higher production and resource efficiency (Jäger et. all, 2016). The author will also briefly present the preliminary results of the ongoing research about the usage (and the intention to use) of high performance computing (HPC) mostly at the high education institutions in Central and Southeast Europe and in small and medium size companies (SMEs) in the automotive and electronic industry in Slovenia.

Keywords: factory of the future, industry 4.0, smart manufacturing, fourth industrial revolution, digitalization, high performance computing, economic geography, Central Europe, Southeast Europe, Slovenia

Borut Lužar, *Faculty of Information Studies in Novo Mesto, Slovenia*, Timotej Hrga, *Faculty of Mechanical Engineering, Slovenia*, Janez Povh, *Faculty of Mechanical Engineering, Slovenia* and Angelika Wiegele, *Alpen-Adria-Universität, Klagenfurt, Austria*:

The BiqBin project - interface between scientists and high performance computer to solve combinatorial problems

Abstract: In the talk, we will introduce the project High-Performance Solver for Binary Quadratic Problems. Many problems in combinatorial optimization can be formulated as

constrained binary quadratic problems. The aim of the project is to present methods for finding exact solutions of linearly constrained binary quadratic programming problems. The methods will extensively use parallelization techniques and therefore using HPC is unavoidable. An important part of the project is the web application representing a communication bridge between scientists and HPC. We will focus in presenting this feature.

Keywords: combinatorial optimization, HPC, web interface

Aida Kamišalić Latifić, *University of Maribor, Faculty of Electrical Engineering and Computer Science, Institute of Informatics, Slovenia*, Muhamed Turkanović, *University of Maribor, Faculty of Electrical Engineering and Computer Science, Institute of Informatics, Slovenia*, Blaž Podgorelec, *University of Maribor, Faculty of Electrical Engineering and Computer Science, Institute of Informatics, Slovenia* and Marjan Heričko, *University of Maribor, Faculty of Electrical Engineering and Computer Science, Institute of Informatics, Slovenia*:

Conceptualization and implementation of a digital blockchain-based platform for managing micro-credentials

Abstract: We will present EduCTX, a global decentralized platform based on Blockchain 2.0, designed on top of a consortium P2P network and implemented on the Ethereum platform. Blockchain technology enables the processing transactions and data, which are not controlled by a central authority. Transactions are secure, ubiquitous and trustworthy as they employ cryptographic principles. The developed platform offers a comprehensive and unified digital environment for managing micro-credentials for individuals by educational institutions as well as other potential stakeholders such as companies, institutions, and organizations, in order to avoid language and administrative barriers. By enabling public access to the ledger, the platform provides organizations the possibility to develop their own digital services in order to automate the evaluation of individuals' skills and knowledge.

Keywords: blockchain technology, education, micro-credentials, distributed environment

Saša Zupan Korže, *Vanadis Ltd, Slovenia*:

Blockchain, initial coin offering and virtual currencies: hype or hope for tourism

Abstract: The purpose of this paper is to present a critical insight to the field virtual currencies issued in the process of initial coin offerings (ICO) based on blockchain technology. Data were collected mostly from secondary sources obtained in the extensive internet research in 2018. The result of the study revealed that start-ups in different industries, including in tourism, perceive the virtual currencies and their underlying blockchain technology as a prosperous path for creating new business opportunities. In

2017 and 2018, there were some ICO initiatives also in Slovene tourism. However, recent changes in the virtual currency market, issues related to limitations of blockchain technology and regulatory concerns have calm down the virtual currency's and ICO's euphoria; thus, at the current stage the future development is difficult to predict.

Keywords: tourism, blockchain, initial coin offerings (ICO), virtual currencies

Marijo Volarevic, *Croatia Osiguranje dd, Croatia*, Ana Mihalic, *Croatia Osiguranje dd, Croatia* and Damir Bogadi, *Hrvatski Telekom dd, Croatia*:

Challenges of human expectations and information exchange in IoT driven society

Abstract: What it takes to ensure that IoT and "Smart City" concepts have a measurable and positive impact on quality of life or business competitiveness? This paper is discussing the challenge of human expectations, especially in soft areas like "quality of life" and "success" in the society driven by data overflow. Digital technology trends are clear, and artificial intelligence solutions are proving to be capable of handling data tsunami in real-time from millions of connected devices. Apart from moral decisions in famous "self-driving" car use cases, our Urban living is facing a new challenge- missing strategy, skills and processes to ensure that artificial intelligence decisions and outcomes correspond with expectations of human intelligence and really improve our living, not just make it "connected". Previous phases of internet penetration in society were dominantly "self-service" positioned, and many humans are still not capable to use the opportunity for almost unlimited free knowledge or fact-checking efficiently. We will present various models being used and discuss options to build capabilities in Urban strategic planning and innovative structure for information exchange and metrics that will make a human journey- i.e. living -in smart cities really better.

Keywords: quality of life, Internet of Things, digital, human journey, outcomes, urban planning, living, smart city, artificial intelligence, metrics

Valerij Grasic, *Iskratel, Slovenia* and Biljana Mileva Boshkoska, *Faculty of Information Studies in Novo Mesto, Slovenia*:

Comparison of forecasting incoming calls to emergency call number 112 based on the classification

Abstract: Within the public safety, 112 is the universal emergency telephone number that can be dialled free of charge from any stationary or mobile phone in case of need or natural disaster. Such a system is becoming part of Safe City solutions. A comparison of classification of forecasting of incoming calls to the emergency call number 112 for Slovenia and the city of Ljubljana is made. The comparison is made on monthly and quarterly granulation, using various classification methods. The results obtained help to improve the forecasting of incoming calls to Safe City solution.

Keywords: classification, emergency call 112, public safety, smart city, safe city

Blaž Rodič, *Faculty of Information Studies in Novo Mesto, Slovenia*:

Modelling the influence of individuals' and network characteristics on dissemination of fake news in a social network

Abstract: The fake news phenomenon has gained researchers attention after the widely covered role of fake news factories in the 2016 US presidential election. New theories on the dynamics of dissemination of fake news have been introduced, largely based on the analysis of past media publications, tweets, and social network and blog posts. While the data-driven, statistical methods help us identify the factors and identify the covariations of variables present in the fake news phenomena, the models produced are a high-level abstraction of the psychological and social processes involved, and do not provide enough insight into the rules on the level of individuals that result in a viral spread of demonstrably false news. Objective of our ongoing research is to develop and test new theories on rules that influence the dissemination of fake news in a social network at the level of individuals, using a new, original ABM model. We are developing a set of experiments to research the relationship between relative success (domination in news cycle) of fake news and a set of factors, i.e. individual and network characteristics, e.g. cognitive biases, political bias, connectedness, fact-checking time, presence of hubs or 'influencer' nodes and echo chambers. The current version of the agent based model includes a large number of agents, representing individuals within a social network and several sources of legitimate and fake news, that allows us to examine the relationship between fake news and legitimate news dynamics and a set of agent and network parameters.

Keywords: fake news, social networks, agent based modelling

Karlo Babić, *University of Rijeka, Department of Informatics, Croatia* and Ana Meštrović, *University of Rijeka, Department of Informatics, Croatia*:

Neural networks visualizations

Abstract: In order to better understand neural networks and the process of learning which they are going through, we implemented a tool that can generate a large number of visualizations. This tool with all the transformation techniques was implemented in Python. Library used in the implementation is TensorFlow. For the purpose of our experiment, we used three neural networks: a neural network for digit recognition, a neural network for word2vec representation of words, and a neural network which learned the simple logical gate XOR. Using transformation techniques in different combinations results in a large number of visualizations. We present and interpret the selected set of the most interesting visualizations.

Keywords: neural networks, visualizations, deep learning, word2vec

Miroslav Mađarić, *University College Algebra, Zagreb, Croatia* and Domagoj Ružak, *University College Algebra, Zagreb, Croatia*:

From Confucius to Flipped Classroom

Abstract: In 5th century BC through Chinese philosopher Confucius says: "Tell me - I'll forget, show me – I'll remember, involve me – I'll know!". Today unfortunately "ex cathedra" lectures prevail! Authors discuss nowadays mainstream method in education – Flipped Classroom (FC) aimed to INVOLVEMENT: 1. Students' involvement BEFORE the lecture (quizzes, essays, presentations). 2. DURING the lecture, explanations, discussions, problem solving, project teamwork takes place. Actual situation on the global and national level is presented. Finally, authors describe their practical work in application of Flipped Classroom method in the courses at University College Algebra, Zagreb, Croatia.

Keywords: Flipped Classroom, education, e-learning, CBT - Computer Based Training, WBT - Web Based Training

Katarina Rojko, *Faculty of Information Studies in Novo Mesto, Slovenia* and Dejan Jelovac, *Faculty of Information Studies in Novo Mesto, Slovenia*:

Moral dilemmas of industry robotization

Abstract: The transformation to Industry 4.0 brought negative social impacts, as the ethical aspect is mostly neglected. The number of employees in manufacturing sector is decreasing, while the number of industrial robot's shipments is increasing rapidly- we are entering the so-called robots stealing jobs period. Installed industry robots replace human workers, which leads to the devaluation of human work and its meaning. We further argue that factory owners do not consider enough ethical consequences and moral dilemmas of this trend, which could lead to great negative impact on a society as a whole. For this reason we stress out the importance of new strategic approach and regulated direction for further industry development in the context of paradigm 5.0, which would constitute a moral compass for human friendly development in this field. The further development of industry should be directed toward sustainable and human friendly transformation, where human workers should again be placed in the foreground. Despite the introduction of an increasing number of automatic lines and robots, the number of employees is not decreasing in industry on general. As now as in the future, there will be the constantly growing need for new knowledge and competences, and thus the need for professionals, developers, maintainers and operators of more and more demanding production systems. Linking knowledge and creativity in combination with the achievements of Industry 4.0 thus allows and requires a new step in the development of industry. Manufacturing sector also has to create new high-tech jobs, which change the type of employment in line with the orientations of the factories of the future. Advocates of human role in industry believe

that the transformation to Industry 5.0 will give the job back to human, but the human workers will have to cooperate, communicate, and interact with advanced technological systems, including robots. This leads us to the questioning about the ability of robots to apply ethical, cultural and moral norms. We namely see the future in inevitable cooperation between man and artificial intelligence. While the transition to Industry 4.0 is more a process change rather than a technological change, the transition to Industry 5.0 will primarily be a mental change. For this reason, it is necessary to develop new norms, values and codes of conduct, that were put on hold in current transformation. This necessary change would require strong commitment and joint effort of all interested parties - workers, owners and governments at national and transnational levels.

Keywords: industry robotization, moral responsibility, ethics in manufacturing, Industry 4.0, Industry 5.0

Albert Zorko, *Faculty of Information Studies in Novo Mesto, Slovenia* and Zoran Levnajić, *Faculty of Information Studies in Novo Mesto, Slovenia*:

Precise measurement of heart rate dynamics distinguishing sleep from awake for man and woman

Abstract: Being able to tell whether a person is asleep or awake quickly and from limited information is important not just for medical, but also for practical applications, including traffic safety. The survey is based on observation of heart rate with holter which is non invasive method and easy to handle for subjects included. By analysing the heart dynamics of 55 individuals (40 men from 16 to 57 years with mean 34,7 ± standard deviation 11,0 and 15 women from 23 to 56 years with mean 46,1 ± standard deviation 9.7) over 24h cycle measured with microsecond precision, we identify distinctive patterns from which the sleep/awake state of an individual can be established almost immediately and with great precision, regardless of person's age and sex. In the presentation we will observe Time series shapelet method and its version Distance matrix. Both methods are accompanied with different statistical formulas and graphical presentation in order to get best possible classification. Analysis of results is equipped with regression to get inside in trend of results.

Keywords: heart rate, sleep stages, shapelet, classification

***Mateja Lesar, Faculty of Information Studies in Novo Mesto, Slovenia* and Zoran Levnajić, *Faculty of Information Studies in Novo Mesto, Slovenia*:**

Connectivity of brain functional networks during ostracism

Abstract: Functional connectivity in human brain can be represented as a complex network, consisting of functional interactions between closely as well as more remotely related brain areas, which can be investigated using electroencephalography (EEG)

signals. The neuroscience of social interaction – an essential domain of human life - lacks understanding of neuronal mechanisms underlying these processes. A standard paradigm in investigating them is an online game called Cyberball game. The game has been proven to cause feelings of rejection in adults and adolescents. Aim of my doctoral research is to investigate brain network dynamics during various versions of game playing for a variety of subjects. We will gather the data of many participants playing Cyberball game, while their EEG signals will be measured. The network analysis of these signals may provide an efficient method to monitor the cortical dynamics behind conditions of social inclusion and exclusion.

Keywords: network neuroscience, network dynamics, complex network analysis, functional connectivity, social interaction, social inclusion, social exclusion – ostracism, Cyberball game

Dušanka Novaković, *Faculty of Information Studies in Novo Mesto, Slovenia*, Urška Puh, *University of Ljubljana, Faculty of Health Sciences, Slovenia*, Gaj Vidmar, *URI RS Soča, University of Ljubljana, Faculty of Medicine, University of Primorska, Faculty of Mathematics, Natural Sciences and Information Technologies, Slovenia*, Metka Moharić, *URI RS Soča, Slovenia* and Mara Bresjanac, *University of Ljubljana, Faculty of Medicine, Institute of Pathological Physiology, Slovenia*:

The effects of body pose on hot pain threshold

Abstract: The field which includes the study of body poses as they pertain to pain threshold perception is poorly researched. One of the few studies addressing this problem is the study performed by V. Bohns and S. Wiltermuth (2012) on how dominant or submissive poses affect pain threshold. Because acute pain management is an important area of clinical and research practice, as well as our everyday lives, we decided to replicate and upgrade their experiment. First, we performed a preliminary online study which aided in picking the most dominant and the most submissive pose, as judged by a sample of Slovenian populace. These two poses were then used in the main study, where we tested the hypothesis that adopting a randomly designated dominant pose increases acute pain. The main study was completed by 129 participants who were between 18 and 61 years of age. We improved the Bohns and Wiltermuth study protocol by recording pain thresholds using a computer-controlled thermal sensor, thus obtaining more objective results. By adopting the poses for three repetitions we ensured an increase in the magnitude of any possible effects on the participants. Using a Medoc Pathways Pain & Sensory Evaluation System probe, all the participants had their hot pain thresholds measured before and after adopting a randomly designated dominant or submissive pose. Our findings show that adopting a dominant pose statistically significantly increases the pain threshold for hot temperatures, while adopting a submissive pose does not affect it. This supports our hypothesis and is in line with the results of Bohns and Wiltermuth. The average self-reported feelings of power and powerlessness for both poses were comparable to the ratings gathered via the online survey.

Keywords: nonverbal communication, power poses, pain threshold, thermal pain, Medoc Pathways Pain and Sensory Evaluation System

Eva Koderman, *University of Ljubljana, Programme Cognitive Science, Slovenia* and Gorazd Drevenšek, *University of Ljubljana, Slovenia*:

Expect the unexpected – sensory processing of neutral and aversive stimuli in the anticipation of predictable and unpredictable threat

Abstract: Anxiety is characterized by a sustained state of heightened vigilance due to uncertain danger, producing increased attention to a perceived threat in one's environment. Predictability of threat impacts attentional engagement and sensory processing. Supporting research has primarily focused on shocks, unpleasant pictures and sounds, but there haven't been many studies on a combination of these three different types of threat, which is why it remains unclear how different sensory modalities interact between each other in a hypervigilant state. This study exploited the temporal resolution afforded by event-related potentials to investigate the impact of predictability of threat on sensory processing and vigilance, indexed by early perceptual activity. We recruited 28 participants and utilized a within-subject design to examine hypervigilance (N1 component) in anticipation of shock, unpleasant picture and unpleasant sound during a no (N), predictable (P), and unpredictable (U) threat task. We investigated if any habituation to stimuli was present by asking the participants to rate unpleasantness and intensity of the stimuli before and after the experiment. They completed the Beck Depression Inventory and the State-Trait Anxiety Inventory so we could see if there was any correlation between attentional engagement and possible symptoms of depression and anxiety. We observed hypervigilance only in the unpredictable threat of shock condition. N1 was enhanced for the neutral somatosensory stimuli in the unpredictable threat of shock condition. Habituation was observed only for the visual stimuli. The present study suggests that unpredictability enhances attentional engagement with neutral somatosensory stimuli when the threat is of the same modality. This would mean that we observed sensory-specific, intramodal processes, suggesting a sensory-dependent activity.

Keywords: unpredictable threat, sensory processing, aversive stimulus, npu threat task, predictable threat, sensory modality, neutral stimulus, sensory processing stimulus, neutral somatosensory stimulus, repeated measure anova, somatosensory modality, visual stimulus, event related potential, auditory modality, aversive visual stimulus, somatosensory threat, trait anxiety inventory, state trait anxiety, somatosensory stimulus, threat condition, descriptive statistic, sensory competition, auditory stimulus, aversive somatosensory stimulus, beck depression inventory, pain thresholding procedure, sensory specific, sensory response, visual modality, prefrontal cortex

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Brain connectivity, personality and attitudes towards migrants

Abstract: The presentation consists of two parts, firstly I would like to present my graduate thesis, a review paper on the topic of brain connectivity correlates of personality in modern brain connectivity studies. Secondly, I would like to present the main idea of an ongoing study in collaboration with dr. Gorazd Drevenšek, dr. Zoran Levnajić, mag. Teja Lesar, Eva Koderman and myself, on the topic of the descriptive role of brain connectivity and personality in observed interpersonal differences in attitudes towards migrants. The study consists of an EEG experiment, where participants will view pictures of people that are, to them, typical migrants and pictures of people that they consider their in-group population. In addition, personality questionnaire data, namely the Big Five Inventory, Social Dominance Orientation Scale, Right Wing Authoritarianism Scale and self report of attitudes towards migrants will be obtained for each subject. These data will then be correlated to brain connectivity patterns during picture viewing. Thus we hope to establish a connection between specific patterns of brain connectivity and personal attitudes towards migrants, of people varying in personalities.

Keywords: brain connectivity, personality, migrants