

Affect & Emotion

Newsletter of the Swiss Center for Affective Sciences



EMOTIONS AND COMPULSIVE REWARD-SEEKING BEHAVIORS

RESEARCH FOCUS

Individual differences in emotional learning underpinning vulnerabilities to compulsive reward-seeking behaviors
Dr. Eva Pool

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EDITORIAL



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Feeling stressed, angry, and/or hopeful? The pandemic elicits emotions, challenges our daily activities as well as life plans, and tests our competence in emotion regulation.

Have you ever noticed that, when stressed, you may have the tendency to compulsively seek rewards such as chocolate or icecream? What would make some people more vulnerable than others to seeking rewards, even if they would prefer not to, as it happens in addiction? Dr. Eva Pool received in August 2020 an SNSF Ambizione grant for her research on how individual differences in emotional learning relate to vulnerabilities to compulsive reward-seeking behaviors. She presents her research in the Research Focus of this Newsletter.

Despite the weird times, CISA's research activities have remained rich and intense. One of the most recent contributions is the participation of our researchers in activities aimed to psychologically support people facing COVID-19. One such case is the website "covidout.ch", which allows people to learn how to adapt to the exceptional situation and be informed about its consequences thanks to practical videos and free personalized resources.

The 85 publications appeared in 2020 and listed in this newsletter also demonstrate how dynamic and diverse the research developed by researchers of the Center has been this year. Once more, we have published in international journals covering the large number of disciplines represented in the Center, with papers in *Cerebral Cortex*, *Cognition & Emotion*, *Emotion*, *Emotion Review*, *Developmental Science*, *IEEE Transactions of Affective Computing*, *Judgment and Decision Making*, *Learning & Instruction*, *the Monist*, *Nature Communications*, *Nature Energy*, *Nature Human Behavior*, *Science Advances*, or *Social Cognitive and Affective Neuroscience*.

We also obtained various national and European scholarships attesting to the good research dynamics at the Center! 7 researchers obtained grants from the SNSF or another institutions for a total amount of over 4'450'000 CHF. I am very happy to mention more specifically the ERC starting grant obtained by Dr. Mael Lebreton for his project «Characterizing information integration in reinforcement learning: A neuro-computational investigation».

I am also very proud to announce that, during this hectic period, 6 doctoral researchers successfully completed their PhDs.

CISA has offered and continues to offer a variety of educational activities. In 2020 many of our lectures and workshops took place online. However, some on-site events could still be organized, like a course on outreach scientific communication in September, or a workshop on mental health at work last October. Our awaited International Summer School in Affective Sciences (ISSAS), which was supposed to take place in July, had to be postponed and is currently scheduled for July 7-15, 2022. This edition will be dedicated to the timely topic of "Emotions & Well-Being"!

CISA is usually very involved in outreach activities. Unfortunately, this year most of them had to be cancelled. But we remain positive about 2021 and are already planning some exciting events. Stay tuned!

Finally, this period has prompted us to expand our online presence, and online research activities.

We invite you to follow us on Twitter, LinkedIn and Youtube, and to share in those and other channels the information we communicate about the Center.

Take care of yourselves and those around you, as well as of your and their emotions!

I wish you all a great end of the year, and already a very happy 2021!

David Sander ■



INDIVIDUAL DIFFERENCES IN EMOTIONAL LEARNING UNDERPINNING VULNERABILITIES TO COMPULSIVE REWARD-SEEKING BEHAVIORS

Dr. Eva Pool

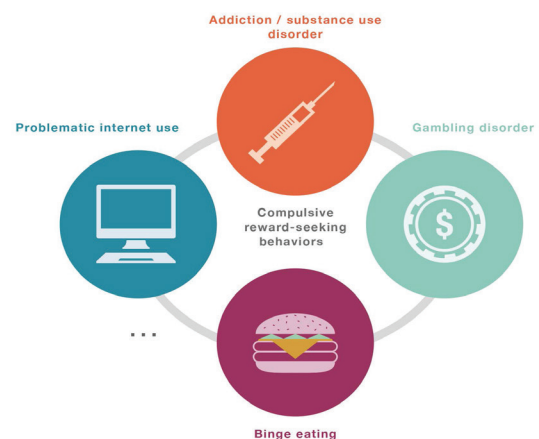
Many reward seeking behaviors that have a negative impact on well-being are characterized by their compulsive nature, where individuals are willing to spend everything to obtain a reward that no longer elicits any pleasure when consumed. This is typically seen in specific psychological disorders such as substance abuse, but also in more common behaviors such as overeating or excessive internet use. Strikingly, very large individual differences exist when it comes to the development of compulsive reward-seeking behaviors: Some individuals are more vulnerable than others to situations in which their behavior is hijacked in the service of rewards that are no longer valued.

In our Ambizione project, we therefore seek to address this question and aim at better understanding and identifying the mechanisms that underlie such vulnerabilities.

We are convinced that the study of Pavlovian learning – one of the most fundamental and universal forms of emotional learning – could be key to identify factors of vulnerability and resilience to compulsive reward-seeking behaviors. This type of learning represents one of the smallest units supporting our emotional life, and radically influences our behaviors and ways of thinking. Interestingly, animal studies have shown that a key factor associated with vulnerability to compulsive reward-seeking behaviors relies on the individual’s tendency to preferentially interact with cues that predict the reward (i.e., sign-tracking), rather than the reward delivery location (i.e., goal-tracking). Computational explanations have been advanced to account for the behavioral components of sign- vs. goal-tracking. They notably suggest that fronto-striatal network and dopaminergic signals underlie the individual differences associated with compulsive reward-seeking behaviors. In this project, we will investigate whether inter-individual differences in Pavlovian learning in a human population can be used as a framework to identify risk profiles.

To investigate these inter-individual differences, we will combine different methods. We will use a longitudinal approach leveraging a combination of fMRI techniques involving computational modeling analyses along with Pavlovian learning tasks employing primary rewards. This will be possible thanks to the great work of our colleagues at the CISA, who developed an innovative experimental setting at the BBL allowing to deliver a large variety of primary rewards, such as odors and tastes, to participants lying in an fMRI scanner. Using primary rewards is critical for Pavlovian learning tasks, therefore this special experimental setting represents a unique opportunity for us. We are planning on testing a large sample of participants at different times using behavioral, eye-tracking, and fMRI techniques to measure individual differences in Pavlovian learning. Additionally, we will assess a large variety of problematic reward-seeking behaviors (e.g., drug, binge eating, problematic use of the phone, gambling) through questionnaires and examine how these behaviors relate to individual differences in Pavlovian learning.

The question at the center of this project, namely “why are some individuals more vulnerable to pursue outcomes that are not longer valued?”, has come to the forefront in several disciplines including psychology, economics, neuroscience, and psychiatry. Accordingly, our project could help advance our understanding of the mechanisms underpinning these behaviors. Hopefully, this could contribute to fostering insights into human decision-making at a fundamental level as well as unravelling why we very often observe behaviors that appear to be “irrational”. We are particularly excited about this research program because it could have clinical implications: It is becoming increasingly recognized that individual differences should be exploited and modeled – rather than being ignored or considered as “noise” – for the identification of individual risk profiles for disorders characterized by compulsive reward-seeking behaviors (e.g., substance use disorder, binge eating). Future advancements in this line of research could even aid informing the development of personalized evidence-based treatments and prevention strategies targeting specific neuro-computational mechanisms rather than general diagnostic categories ■



Pool, E. R., & Sander, D. (2019). Vulnerability to relapse under stress: insights from affective neuroscience. *Swiss Medical Weekly*, 149(4748)



Completed PhDs

Giada Dirupo successfully defended her PhD thesis entitled “Cognitive and Neural Systems for Understanding others Pain” on April 23rd, under the direction of Prof. Corrado Corradi dell’Acqua.

Solange Denervaud successfully defended her PhD thesis entitled “When Pedagogy Matters: Insights from Montessori Education on the Development of Performance Monitoring” on May 15th, under the direction of Prof. Patric Hagmann.

Lia Antico successfully defended her PhD thesis on « Beyond Unpleasantness. The interplay between social cognition and somatic affective states of pain and disgust » on July 16th, under the direction of Prof. Corrado Corradi dell’Acqua.

Allan Berrocal successfully defended his PhD thesis “Peer-ceived Momentary Assessment: Empirical examination of a peer supported sensing method to augment personal sensing in human computer interaction” on August 28, 2020 under the direction of Prof. Katarzyna Wac.

Coralie Debracque successfully defended her PhD thesis “The Voice of Primates : Neuro-Evolutionary Aspects OF Emotions” on September 8th, 2020, under the direction of Prof Didier Grandjean and Prof. Thibaud Gruber.

Moshen Falahi successfully defended his PhD thesis “Golf theory – A Unifying Framework for Studying Humain Choice Behaviour” on October 26, 2020 under the direction of Prof. Kerstin Preuschhoff ■

NEW BOOKS /SPECIAL ISSUES



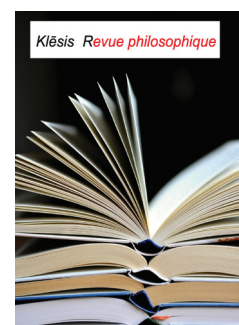
Pour ou Contre La Mort. Editions Slatkine. Livre collectif grand public à thématique art-science (co-éditeur et contributeur - avec la participation de David Rudrauf)

(<https://www.slatkine.com/fr/editions-slatkine/74906-book-05211027-9782832110270.html>) ■

La philosophie de Pascal Engel, Klesis.

Vollet, J.-H (dir.). La philosophie de Pascal Engel, Klesis - Revue Philosophique, 45, 2020

Available at: <https://www.revue-klesis.org/index.html#d45> ■



Awards and grants

Sevgi Demiroglu was awarded a ThinkSwiss Asia-Pacific Research Scholarship as an alumna of the Indian Institute of Technology Gandhinagar, India. Her short-term research within the philosophy group Thumos will focus on the relationship between pain and emotion by questioning the definition of pain as an emotional experience and exploring the role of valence in facilitating and/or maintaining this experience in consciousness.

Dr. Donald Glowinski obtained a SNSF Spark grant for his project entitled “Sensors-based behavioral analytics for simulation-based interprofessional team training”. The aim of the project is to develop team behavioral analytics using a sensor-based approach to enhance and improve team safety management in simulation-based interprofessional team training (SITT).

Roberto Keller obtained a SNSF Doc.CH grant for his project entitled “On the Normativity of Correctness”. The aim of the project is to inquire upon the notion of correctness by determining what it means for something to be correct or incorrect, how judgments of correctness provide us with normative guidance, and how correctness relates to other normative concepts such as values, norms, and reasons.

Dr. Mael Lebreton has been awarded a European Research Council starting grant (2021-2026) for his project “Characterizing information integration in reinforcement learning: a neuro-computational investigation”. Reinforcement learning (RL) characterizes how we adaptively learn, by trial and errors, to select actions that maximize the occurrence of rewards, and minimize the occurrence of punishments. While the behavioural, computational and neurobiological features of learning from singular experienced outcomes have been extensively studied, the mechanisms by which RL could leverage multiple, concurrent information samples – including abstract information about prospective outcomes – have been largely overlooked. As a consequence, little is known about how we prioritize, filter or value outcome information in RL, while these processes likely critically contribute to shaping learning behaviour.

This project proposes to address this gap, and hypothesizes that humans can learn from multiple concurrent information samples, but that computational limitations and affective biases curb information integration. By investigating an overlooked aspect of reinforcement learning – the integration of available information – this project could not only help refine computational and neurobiological models of the learning process, but also shed new light on maladaptive traits of human behaviour in social and clinical contexts.

Edgar Phillips was granted a Leverhulme Trust Study Abroad Studentship for a 15-month research stay (from September 2020) at the Institut Jean Nicod, Paris, to work on a project on the teleological character of intentional action. The aim of the project is to investigate how ideas from the ‘neo-Aristotelian’ tradition in the philosophy of action might fruitfully be brought into contact with empirical and interdisciplinary work on social cognition and joint agency.

Dr. Eva Pool received a SNSF Ambizione grant for her project entitled “Individual differences in emotional learning underpinning vulnerabilities to compulsive reward-seeking behaviors”. The aim of the project is to investigate whether we can model the individual differences during Pavlovian learning - one of the most fundamental forms of emotional learning - as a framework to identify risk profiles to compulsive reward-seeking behaviors (e.g., addiction, gambling, problematic internet use, or binge eating).

Laura Luz Silva was granted a two-year Postdoctoral Research award by the Leverhulme Trust to carry out a project entitled ‘The Expressive Domain of Emotions’. This project addresses foundational issues in the philosophy of emotion (such as their representational content, relation to reasons and epistemic role), with the aim of developing an adequate account of the expressive domain of emotions: what emotions express and how. An account of the expressive dimensions of emotions may then be able to ground work on the normative nature of particular emotional expressions (perhaps some emotions express demands of other agents), as well as on the potential obligations incurred by those at whom emotions are directed.

Marius Vollberg, Phd student from Harvard, received a Swiss Excellence Scholarship to spend one year at CISA in Prof David Sander’s Lab to run an fMRI study on empathy and memory ■

Upcoming events

De l'Amour, Quai des Savoirs, Toulouse

(December 11, 2020 – September 15, 2021). The Swiss Center for Affective Sciences is the scientific partner of this exhibition on love. The exhibition questions this mysterious feeling, convening contemporary scientific works in biology, neuroscience, psychology, and artistic expression. <https://www.quaidessavoirs.fr/la-grande-expo>

Annual Research Forum 2021 (ARF), Geneva

The next edition of the Annual Research Forum will take place on 25-26 May, 2021 at the Campus Biotech in Geneva. The ARF offers the opportunity to meet peers (old and new) and get updated on the fascinating research carried out at the Center, and the last logistic developments.

Montreux Jazz Festival, Montreux

(July, 2021). Prof Didier Grandjean will participate in a workshop on music, emotion and memories at Montreux Jazz Festival in collaboration with EPFL and Ecole de Design et Haute École d'Art du Valais ■

Douze Mille Vingt, Geneva

(March and May 2021). The sound artist Julie Semoroz will present, as part of the SNSF Agora project entitled “Body Resonance” in collaboration with Prof. Didier Grandjean, an installation and performances on bodily and emotional vocalizations at “Halle Nord” in March 2021 and at “Comédie de Genève” in May 2021.

On our website <https://www.unige.ch/cisa/>

Research materials are available at <https://www.unige.ch/cisa/research/materials-and-online-research/research-material/>. Free of charge for non commercial research projects.

Online Platform on Emotional Competence at <https://www.unige.ch/cisa/research/materials-and-online-research/online-research/>, including the major contributions and debates in the literature on emotional intelligence, potential applications, as well as results of the most recent research

FACSGen is available to the scientific community. A demo is available for download, along with an introductory video tutorial on www.unige.ch/cisa/facsgen ■

Other CISA websites of interest

XPhi Replicability: <https://sites.google.com/site/thexphireplicabilityproject/> The XPhi Replicability project, coordinate by Prof. Florian Cova, seeks to reach a reliable estimate of the replicability of empirical results in experimental philosophy ■

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Website “covidout.ch”, which allows people to learn how to adapt to the exceptional situation and be informed about its consequences thanks to practical videos and free personalized resources

Prof. Luc Mallet, University of Geneva

Prof. Swann Pichon, Geneva School of Health Science & University of Geneva

Marie Bourdeau, communication manager Fondation FondaMental Suisse

Agora project, entitled « Body Resonance »
The artistic outreach is called DOUZE MILLE VINGT and will be an installation and performances on bodily and emotional vocalizations at Halle Nord March 4-27, 2021 and at “Comédie de Genève” May 9-15, 2021.

Julie Semoroz, sound artist

Prof. Didier Grandjean (University of Geneva)



Le syndrome du paresseux



Le syndrome du paresseux.

Ce livre propose un nouvel éclairage sur ce paradoxe de l'activité physique et pointe du doigt un coupable improbable : l'évolution.

Dr. Boris Cheval (University of Geneva)

Prof. Matthieu Boisgontier (University of Ottawa)

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The Swiss Center for Affective Sciences is hosted by the
Université de Genève
Centre Interfacultaire en Sciences Affectives
9, ch. des Mines - 1202 Genève - Switzerland
Tel: (+41) 22 379 09 31

Editor: cisa@unige.ch

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