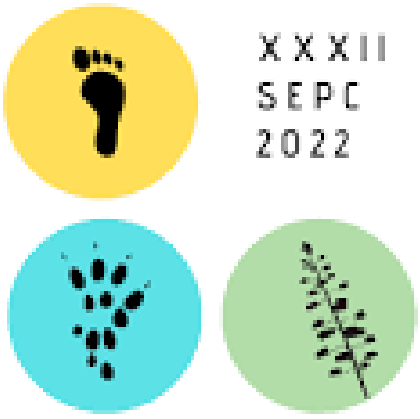

PROVISIONAL ABSTRACT BOOK

SYMPOSIUM I "Illusion and reality in the control by consequences"

Chair: Prof. Ricardo Pellón, Department of Basic Psychology, National University of Distance Education (UNED), Spain.

Appearances may deceive, or when suboptimal choices hide optimal choices under constraint

Marco Vasconcelos

University of Aveiro, Portugal

Keywords: Suboptimal choice; Reinforcement rate; Probability of reinforcement; Maximization.

When offered a choice between two alternatives, animals sometimes prefer the option yielding less food. For instance, pigeons prefer an option that on 20% of the trials presents a stimulus always followed by food, and on the remaining 80% of the trials presents a stimulus never followed by food (the Informative Option), over an option that provides food on 50% of the trials regardless of the stimulus presented (the Non-informative Option). This preference is surprising because pigeons fail to maximize the rate of food intake; they exhibit a suboptimal preference. We advance a new explanation, the Δ-∑ hypothesis, in which the difference in probability of reinforcement within terminal links (Δ), a sort of contrast, and the overall reinforcement probability rate of each alternative (∑) are the key variables responsible for such suboptimal preference. We tested the Δ-∑ hypothesis in two experiments. In Experiment 1, we manipulated the Δs while maintaining the ∑s constant. In experiment 2, we examined the effect of the overall reinforcement probabilities, the ∑s, while maintaining the Δs constant. The results of both experiments support the Δ-∑ hypothesis.

Excessive avoidance: When avoidance gets detached from its environmental consequences

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Biomedical Research Institute of Malaga (IBIMA), Spain

Keywords: Excessive avoidance; Intolerance of uncertainty; Anxiety; Relief; Perceived control.

Uncertain threat situations are thought to spark excessive avoidance, which, together with other unadjusted reactions, may eventually end up with some form of pathological anxiety in people showing high levels of intolerance of uncertainty (IU). However, the precise mechanisms underlying the development of excessive avoidance in uncertain-threat environments are still un-known. In the present study, we tested the hypothesis that excessive avoidance, especially in people high in IU, is aimed at distress reduction via the enhancement of subjective perceived control of uncertain threatening events. In our experiment, participants learned to avoid an un-certain aversive sound through a discriminated free operant procedure. In a later test phase in extinction, we manipulated the amount of avoidance responses available per trial by creating a limited and an unrestricted response condition. In both conditions, the aversive reinforcer could be avoided for sure by responding at a minimum rate of one (or slightly above one) response per second. We measured response frequency, avoidance confidence ratings and anxiety-predisposing traits such as intolerance of uncertainty, trait anxiety and distress tolerance. The degree of distress was inferred from post-trial relief ratings. In the avoidance acquisition phase, we found a positive association between prospective intolerance of uncertainty (P-IU) and dis-tress that tended to weaken throughout the training trial-blocks. At test, participants made much more unproductive avoidance responses in the unrestricted than in the limited response condition. We also found that the increase in avoidance responses at test led to distress reduction through the enhancement of avoidance confidence. Finally, we found a significant modulating role of P-IU in the effect of response limit on distress reduction that lends further support to our hypothesis. Specifically, P-IU was positively associated with the effect of response limit on distress. However, such modulating role was not significant when controlling for trait anxiety.

Superstition, causal illusion, and the theories of learning

Helena Matute

Department of Psychology, University of Deusto, Spain

Keywords: Superstition; Theories of learning; Illusion of causality; Illusion of control; contingency judgments.

Theories of learning have generally predicted that, in non-contingent settings, superstition and causal illusions should arise from adventitious pairings between an organism's behavior and a desired outcome, or between two external stimuli. These theories also predict that when desired outcomes occur frequently, increasing the probability of the potential cause (e.g., response) should increase the likelihood of superstition and causal illusion. Moreover, these theories generally predict that longer exposure to those conditions (i.e., high probability of the potential cause and of the outcome) should result in a reduction of the causal illusion and of superstitious behavior. By the same reasoning, they also predict that participants with a stronger tendency to jump to conclusions should also develop stronger illusions and superstitions. Our studies offer partial support for these predictions.

A further reexamination of "superstition"

Ricardo Pellón

Department of Basic Psychology, National University of Distance Education (UNED), Spain

Keywords: Superstition; Induction; Reinforcement; Chaining.

Operant superstition was first described by B.F. Skinner and then reexamined by Staddon-Simmelhag in terms of evolutionary processes, to further being reconsidered back in terms of operant control. I will further reexamine these analyses of superstition to place it in between Skinner and Staddon-Simmelhag approaches by reconcilling control in terms of induction and reinforcement. Through extended series of experiments, we have shown in the past that what was initially called adjunctive (or collateral, or even displacement) behavior (e.g., schedule-induced drinking) in fact responds to similar environmental manipulations as conventional operant behavior (e.g., schedule-controlled lever pressing), and that perhaps in both cases behavior is initially elicited by the delivery of the reinforcer and then is strengthened by it. The dynamic combination of induction by reinforcer delivery (the elicitation part) and reinforcement (the strengthening part) can be seen in recent data on the control of the acquisition of schedule-induced behavior by response-contingent consequences and on the control of behavior by past and future events. This issue will be further advance by proposing a chaining model that combines both types of influence on behavior, showing an excellent fitting to steady-state data generated by intermittent food reinforcement schedules in the form of licking a water spout, running on a wheel, entering into the food magazine and pressing a lever. Despite different appearance of behavior and different temporal location, the model does a good job in accounting for the structure and organization of behavior in time.

SYMPOSIUM II “INVERTEBRATE LEARNING: WHAT ''LOWER'' ORGANISMS CAN TEACH US ABOUT LEARNING AND COGNITION”.

Chair: Dr. Roberto Alvarez, Department of Psychology, University of Almeria, Spain.

Inside the minds of invertebrates. Some historical consideration

Roberto Álvarez

Department of Psychology, University of Almeria, Spain

Keywords: Invertebrate Psychology; History of Comparative Psychology.

Interest in invertebrate psychology has a long history. From Antoine Réaumur (1683-1757) to the present, scientists have tried to characterize the behavior of these organisms from mechanistic positions to vitalist perspectives. Darwin's interest (1809-1882) in the intelligence of worms marks a before and after in research on the psychology of invertebrates. This symposium will address phenomena such as habituation in annelids, research strategies in comparative psychology, and epistemological proposals about the evolutionary roots of associative learning.

Habituation in invertebrates, the complexity of simple organisms

Concepción Paredes-Olay

Department of Psychology, University of Jaen, Spain

Keywords: Habituation; Invertebrates; Adaptive function.

Several studies have showed that habituation, defined as the “simplest form of learning” is actually more complicated than it seems. Recently, McDiarmid, Yu & Rankin (2019) have revealed that the molecular mechanisms responsible of habituation depend on the temporal parameters or the response systems analyzed. This complexity in also showed in a theoretical level, where there is no consensus regarding the precise mechanism (¿associative?) that underlies habituation. Additionally, we must wonder about its adaptive function. Subjects play an active role in learning and, in order to fully understand the plasticity of habituation and their adaptive value, we must characterize the behavior of habituation in multiple species and with different stimulus and contexts. In this talk, we intend to show a general overview of this topic and to highlight the interest of studying habituation specifically in invertebrates.

A Comparative Approach to the Evolutionary Roots of Associative Learning: Towards a Phylogenetic Epistemology

José Prados

Keywords: Associative Learning; Evolution; Invertebrate learning models.

School of Psychology, College of Health, Psychology and Social Care, University of Derby, UK

Associative Learning (Pavlovian conditioning) has been observed in organisms that belong to different kingdoms (animals, plants, protists...) suggesting the existence of a learning mechanism inherited from a common ancestor. As such, learning could be argued to be a homologous characteristic that must have appeared very early in the evolution of life and is conserved as a characteristic of all living beings. In my presentation, I will address the following questions: Is learning in different groups of animals ruled by the same principles? Is learning exclusive of animals? Does associative learning depend upon the existence of a nervous system? What is the relationship between the evolution of the nervous system and the evolution of associative learning? I will also refer to the usefulness of the development of invertebrate learning models for the fields of behavioural and clinical neuroscience.

Development and Association as strategies of Cognoscitive-Comparative Experimental Psychology

Ignacio Loy

Department of Psychology, University of Oviedo, Spain

Keywords: Pavlovian conditioning; Comparative Psychology; Invertebrate Learning; Unicellular

Learning; Development.

The attention paid to the study of learning processes in lower organisms (invertebrates, fungy, plant & protist) by different disciplines, has increased in the last decades. The possibilities and limits of Pavlovian conditioning procedures are exposed and it is suggested that, in very simple organisms, can be detected microgenetic processes which are not possible to describe in associative terms but they are similar to behavioural change based on development and described by Jennings as a complex hierarchy of avoidance behaviors in stentor. This microgenetic processes is a change based on experience and it is a suitable theoretical framework to identify, explore and conceptualize behavioral adaptations in simple organisms. The implications for the study of the origin and evolution of minds are discussed considering different accounts (reductionism, emergentism and constructivism). Finally, it is claimed that this approach of comparative psychology, as a study of ways of acquiring knowledge by organisms through experience, can shed light over one of the critical problem in history of philosophy and psychology, such is the relation between mind and body or matter and spirit.

SYMPOSIUM III "TRANSLATIONAL NEUROSCIENCE ON ALTERED DECISION MAKING: FLEXIBILITY, EXTINCTION AND ERRORS"

Chair: Prof. Margarita Moreno, Department of Psychology, University of Almeria, Spain.

The role of prediction error and memory destabilization in extinction of cued-fear within the reconsolidation window

Emma Cahill

School of Physiology, Pharmacology and Neuroscience, University of Bristol, UK

Keywords: Fear; Anxiety; Memory; Extinction; Freezing.

Extinction training in rodents is a useful analogue of behavioural therapy used to treat anxiety-related disorders in Humans, in that extinction offers the potential to build resilience to responding to fear eliciting cues. Extinction overrides the conditioned defence responses that are consolidated after the initial aversive experience, however the extinction memory itself is often prone to fail and defence responses relapse even under conditions of safety. To prevent the relapse of responses after extinction many have studied how extinction of defence responses might be enhanced. In the short talk, I will present some of our recent efforts to elucidate how extinction of auditory cued-threat responses might be enhanced by pharmacological or behavioural interventions. I will present data on local administration of dopaminergic receptor agonists to the basolateral amygdala and on a behavioural protocol modification that attempts to tap into the mechanisms of memory updating (reconsolidation). These results, along with those from other studies, demonstrate the importance of defining the mechanisms underlying successful long lasting extinction in order to refine the potential for translation to the clinic in the treatment of psychiatric disorders characterized by over persistent aversive responding.

This work was funded by a BBSRC fellowship award to ENC, and a MRC program grant to BJE and ALM. ENC receives funding from Boehringer Ingelheim for projects related to this work.

Resistant to extinction and altered decision making: key neurobehavioral traits in a preclinical model of compulsivity

Margarita Moreno

Department of Psychology, University of Almeria, Spain

Keywords: Compulsivity; Perseverative behaviors; Brain; Extinction; Reversal learning.

Schedule-induced polydipsia (SIP), characterized by the development of excessive drinking under intermittent food-reinforcement schedules, has been proposed as a successful model for obsessive-compulsive disorder (OCD), schizophrenia, and alcohol abuse. We investigated the relation between impulsive-compulsive behaviours and neuronal biomarkers with a compulsive drinking behaviour phenotype in rats. In our lab, we select rats according low drinking (LD) vs high drinking (HD) behaviour following schedule-induced polydipsia (SIP). We have assessed these populations in different behavioural tasks, pointing towards to an increased vulnerability in individual differences associated with compulsivity such as inflexible behaviour, resistant to extinction and perseverative behaviours. Moreover, we found that rats selected as high compulsive by SIP showed reduced brain myelination and differences in brain volumetric measures in hippocampus and amygdala compared with low compulsives. Based on our recent psychopharmacological and neurochemical studies, we suggest that the mechanisms underlying the individual differences in neuroplasticity and compulsive behaviour might be associated with a glutamatergic dysfunction in High Drinker rats. These findings strengthen the validity of high compulsive rats selected by SIP as a possible phenotype of compulsive neuropsychiatric disorders, and point towards the relevant roles of neuroplasticity and glutamatergic signalling as biomarkers, and possible modulators, of compulsivity in neuropsychiatric disorders.

The roles of reversal learning inflexibility and resistance to extinction in the symptomatology of gambling disorder

José Cesar Perales

Department of Psychology, University of Granada, Spain

Keywords: Gambling disorder; Emotion regulation; Decision-making; Reversal learning; Extinction.

Performance in reversal learning and extinction tasks has been used to investigate the associative processes involved in the etiology and symptomatology of addictions, including gambling disorder. From a series of experiments carried out with humans during the last 10 years, a recognizable pattern is starting to emerge. In line with Etkin et al.'s (2015) model of emotion regulation, resistance to extinction of emotionally conditioned cues seems to underlie malfunctioning of incidental emotion regulation processes. This malfunctioning expresses as emotion-driven impulsivity (urgency), and this, in turn, seems to be involved in problems with craving control. Inflexibility in reversal learning tasks, in turn, seems to be associated with trait compulsivity, and, more specifically, with insensitivity to contingency change in feedback-based decision-making, once an initial preference has been established. At difference with resistance to extinction, this kind of compulsivity is directly associated with a diagnosis and the severity of symptoms in gambling disorder.

Decision-Making, Reinforcement Learning and Resting-State Functional Connectivity As Transdiagnostic Targets

José Juan León

Department of Psychology, University of Almeria, Spain

Keywords: Decision-making; IGT; fNIRS; Resting-state functional connectivity; Computational

modelling.

Decision-making processes are essential for daily correct functioning. An impairment of these processes is linked to several psychopathological disorders, such as ADHD, OCD, pathological gambling or substance abuse disorder (SUD), so could be understood as a transdiagnostic feature. Growing neuroimaging studies have shown abnormal resting-state functional connectivity (rsFC) of such impulsive-compulsive spectrum disorders. However, the causal relationship between rsFC and decision-making processes remains unclear in both healthy and clinical populations. One of the most widely used paradigms for measuring decision-making is the Iowa Gambling Task (IGT), in which participants must learn to discriminate between long-term advantageous and disadvantageous choices. Thus, the present study aimed to investigate the idiosyncratic choice behaviour of healthy and impulsive-compulsive spectrum patients and its relationship with rsFC using computational modelling approaches and clustering methods. Using functional near-infrared spectroscopy (fNIRS), rsFC of 114 participants (34 controls; 25 OCD; 41 SUD; 14 ADHD) was recorded. Then, they completed the IGT. Behavioural results showed no differences in the IGT performance between diagnostic groups. However, each group faced the task using a different strategy, as revealed by differences in parameters estimated using computational modeling, such as learning rate, loss aversion, outcome sensitivity or response consistency. Hierarchical and non-hierarchical clustering analyses, based on individual deck choices during the early and late stages of the task, yielded three decision-makers subgroups. Cluster 1 (n = 63) was characterized by an exploration-based strategy. Cluster 2 (n = 24) presented a maladaptive decision-making strategy, as they were driven by the exploitation of choices that suppose a high immediate gain, regardless of the number of losses. Cluster 3 (n = 27) tended to choose high expected value decks and showed the highest loss aversion, which means that they estimate more negatively losing than winning the same amount. rsFC differences between diagnostic groups and clusters, as well as a predictor of decision-making strategy, will be discussed. This study highlights the importance of exploring in depth the variables that may drive defective decision-making in clinical and healthy populations, from a dimensional perspective.

Funding: Spanish Ministry of Science and Innovation [PID2019-108423RB-I00] and Regional Government of Andalusia [P20_00308].

SYMPOSIUM IV "43 YEARS OF RENEWAL"

Chair: Dr. James Byron Nelson, Basic Psychological Processes and Development, University of the Basque Country (UPV/EHU), Spain.

The Renewal effect and its explanations

James Byron Nelson

Basic Psychological Processes and Development, University of the Basque Country (UPV/EHU), Spain

Keywords: Conditioning; Extinction; Renewal.

The Renewal Effect is the recovery of a previously extinguished conditioned response that occurs with a change in the context between that where extinction occurred and testing. It has been a fundamental effect in associative learning with implications for both theories and application which has stimulated significant research into understanding extinction. This talk reviews theories and evidence regarding mechanisms that account for the "renewal effect" and presents new ideas currently under investigation. Evidence for and against explanations based on contextual summation, changes in the perception of the CS, and occasion setting are reviewed and, as complete accounts for the effect, rejected. New ideas currently under investigation that stem from the neglected idea of extinction inducing changes in the representation of the CS are presented and discussed.

Context inhibition during extinction: analysis of the protection from extinction hypothesis

Steve Glautier

School of Psychology, Southampton University, UK

Keywords: Inhibition; Alcohol dependency; Rescorla-wagner.

The Rescorla-Wagner Model of associative learning predicts that Pavlovian conditioning of a target cue T in context A:, followed by extinction of that cue in context B:, will result in B: acquiring inhibitory associative strength. The consequence of B: acquiring inhibition is that T will be protected from extinction -- learning will stop during the extinction phase when V_B: + V_T = 0, and this will occur when V_T > 0 if V_B: < 0. In the current talk an evaluation of the Rescorla-Wagner Model account of contextual inhibition and protection from extinction will be presented along with data on individual differences in context inhibition. In large samples (N>=80), including samples of heavy and dependent drinkers, it has been found that approximately 40% of participants fail to show evidence of inhibitory responding to an extinction context. Since heavy and dependent drinking has been linked to high levels of impulsivity and since one feature of impulsivity is weak inhibition an analysis of the relationship between drinking status, impulsivity, and context inhibition will be presented. Despite the fact that dependent drinkers did indeed have higher levels of impulsivity than non-dependent drinkers, confirming previous findings, no group differences on context inhibition were found.

Prediction Error and Context relevance as sources of differential contextual control: Revisiting renewal

Juan M. Rosas

Department of Psychology, University of Jaen, Spain

Keywords: Attentional exploitation; Attentional exploration; Context; Prediction error; Renewal effect.

Context dependence of information has been shown to be based, at least in part, on the attention contexts received at the time of training. Attentional Theory of Context Processing (ATCP) suggests that attention to the contexts is modulated by two general factors: Subjective context relevance and ambiguity of the information. When the context is perceived is relevant to solve the situation, retrieval of information learned within that context is assumed to become context-specific. Alternatively, ATCP suggests that contexts will be attended when the situation is ambiguous, so that retrieval of all the information learned in uncertain situations also becomes context dependent. Within this theoretical approach, renewal would be an example in which the ambiguity that appears when a cue or a response is extinguished leads the organism to pay attention to the extinction context, rendering context-dependent retrieval of the information about extinction. However, recent research suggests that the experience of uncertainty prompted by high prediction errors leads to the activation of a general exploratory attentional mechanism that would facilitate subsequent learning. These results open the possibility of explaining renewal as a byproduct of the activation of a exploratory attentional mechanism, rather than to the extinction experience specifically focusing the attention of the organism to the contexts. This talk includes a selective review of the evidence supporting current explanations of the renewal effect, and the potential of attentional approaches to the explanation of this and other context-switch effects in the associative learning literature.

Neurobiological Bases of Extinction and Renewal

Gonzalo Urcelay

School of Psychology, University of Nottingham, UK

Keywords: Neuroscience; Associative learning; Occasions setting; Extinction; Renewal.

This presentation will review the neurobiological underpinnings of extinction learning and other forms of interference. A particular focus of the talk is on the role of context processing in interference learning paradigms. The role of hippocampal, amygdalar, and cortical structures in the context-specificity of interference learning may provide insights into the theoretical processes and cognitive structures underlying the phenomena.

SYMPOSIUM V "THE EVOLUTION OF LEARNING AND MEMORY MECHANISMS, PART 1: EVOLUTION OF LEARNING MECHANISMS"

Chair: Prof. Mark Krause, Department of Psychology, Southern Oregon University, USA.

Introduction to the symposia: The evolution of learning and memory mechanisms.

Mark Krause

Department of Psychology, Southern Oregon University, USA.

Keywords: Associative learning; Social learning; Spatial and working memory; Episodic memory;

Metamemory.

The recently published volume, Evolution of Learning and Memory Mechanisms (Cambridge University Press) is a culmination of several years of hard work by the chapter authors and editorial team. The volume spans a broad range of approaches to studying learning and memory in human and nonhuman animals. We feature research on associative learning, social learning, spatial and working memory, and episodic and metamemory processes in a diversity of taxa, including invertebrates (insects, worms, sea hares), fish, amphibians, birds, rodents, bears and human and nonhuman primates. We also examine theoretical issues and advances in the study of evolution, learning, and memory. In this talk, I will provide background and context to why this was an important endeavor, I will highlight some historical themes that led to the book, and will honor the contributions made by the chapter authors, some of whom will be participating in this symposium.

Learning and Memory in the Nematode Caenorhabditis elegans.

Catharine Rankin

Department of Psychology, University of British Columbia, Canada

Keywords: C. elegans; Nonassociative learning; Associative learning; Signaling pathway;

Neuromodulation.

Caenorhabditis elegans is a microscopic, free-living nematode species that has been studied as a model organism for learning and memory. With a nervous system consisting of 302 neurons, its accessible anatomy accommodates an incredible capacity to support a wide range of behaviors to navigate in its surroundings. In this talk, we review both the classic and cutting-edge studies on learning and memory in C. elegans. These findings illustrate that learning allows C. elegans to adaptively adjust its behaviors to the environment as a result of experiences and plays a key role in promoting the organism's fitness. Learning and memory in simple organisms like C. elegans are mediated by complex neural and molecular mechanisms. Mechanisms of learning and memory elucidated from C. elegans studies show convergence onto the learning mechanisms discovered in other species, suggesting that a large portion of the neural principles of learning and memory are rooted in evolution.

Adaptive evolution of learning and memory in a model lineage

William G. Wright

Department of Biological Sciences, Chapman University, USA

Keywords: Learning in sea hares; Aplysia californica; Dolabrifera; Phyllaplysia.

Although reductionistic studies of mechanisms of learning in a broad range of model species have advanced our understanding of neural mechanisms, our integrated understanding of mechanisms, behavior, ecology, and evolution of learning remains patchy. A more holistic research approach in a model lineage of species related to the sea hare, Aplysia californica, has revealed a complete loss of mechanisms of sensitization in one sea-hare genus, Dolabrifera, with concomitant changes in its behavior and ecology. A partial loss of sensitization via different mechanisms in a sister genus, Phyllaplysia, provides further information for our evolving understanding of the evolution of learning and memory. Does a relatively specific “change in diet” hypothesis, or a more universal “generalist vs specialist” hypothesis better predict these phylogenetic patterns? Further analyses of sensitization in a half-dozen additional sea-hare genera will distinguish the predictive powers of these and other synthetic evolutionary theories.

Rescue Behavior in Ants: Recent Attempts to Explore Learning, Memory and Evolution in an Insect Specialization

Karen L. Hollis

Department of Psychology, Mount Holyoke College, USA

Keywords: Cataglyphis piliscapa; C. cursor; Ants; Specialization; Division of labor.

In Cataglyphis piliscapa, (formerly C. cursor) some individuals, mostly foragers, engage in highly orchestrated behavior to free a trapped nestmate. Their behavior, which we have labeled rescue, is a heritable trait in this species, and it appears fully formed within a few days of an ant's emergence as an adult. Not only is the rescue behavior by these ant specialists precisely targeted, but also it involves a complex, dynamic sequence of behavioral patterns that relies on the rescuer's short-term memory of its previous actions to increase efficiency and to decrease energy expenditure. Rescue appears in several other ant species as well, and, although the specific behavioral patterns and contexts vary across species, the outcome—namely, releasing a distressed nestmate—remains the same. Here, we describe research designed to address questions about the function, evolution, cause, and development of rescue behavior in C. piliscapa drawing on research in other species to highlight comparative similarities and differences and, importantly, to draw attention to still unanswered questions involving learning, memory and evolution.

Brain and Spatial Cognition in Amphibians: Stem Adaptations in the Evolution of Tetrapod Cognition

Verner Bingman

Department of Psychology, College of Art and Sciences, Bowling Green State University, USA

Keywords: Spatial cognition; Amphibians; Medial pallium; Hippocampus; Evolution.

This talk offers a selective review of the spatial cognitive abilities of amphibians as manifested under natural conditions and in the laboratory, and the importance of the medial pallium, the hippocampus homologue in amphibians, for those abilities. In the field, amphibians display extraordinary navigational abilities associated with breeding behavior. In the lab, amphibians are capable of navigating to goal locations using either an egocentric turn strategy or a beacon-guidance strategy. More importantly, amphibians learn map-like representations of goal locations that resemble so called “cognitive maps,” an ability supported by their medial pallium. Assuming similarity in the design of the medial pallium of extant amphibians and the medial pallial-hippocampal homologue of stem tetrapods, i.e., the ancestors of modern amniotes, we hypothesize that the evolution of the amniote hippocampus began with a medial pallium characterized by a relatively undifferentiated cytoarchitecture together with a broad role in associative learning and memory processes, which included the map-like representation of space.

Dissociable learning processes: A comparative perspective

Barbara A. Church

Language Research Center, Georgia State University, USA

Keywords: Categorization; Metacognition; Relational processing; Comparative cognition; Explicit hypothesis testing and rule learning.

It is a traditional hope of comparative psychology that animal minds might be unitary, parsimonious, associative. In contrast, cognitive researchers acknowledge multiple learning systems, including humans' capacity for explicit hypothesis testing and rule learning. We describe new paradigms that may dissociate the explicit from the associative and demonstrate animals' explicit capabilities. These paradigms include matched tasks that foster explicit or associative category learning, and paradigms that disable crucial components of associative learning. Given this disabling, animals may adopt instead an alternative, more explicit learning system. We review this area, including research on multiple species, and consider the evolutionary factors that might favor the development of complementary associative and explicit learning systems.

Mechanisms underlying absolute and relative reward value in vertebrates

Mauricio R. Papini

Department of Psychology, College of Science & Engineering, Texas Christian University, USA

Keywords: Absolute reward value; Relative reward value; Strengthening/weakening principle; Successive negative contrast; Frustration.

In his Nichomachean ethics, Aristotle suggested that absolute judgments precede relative judgments. This talk places this notion in an evolutionary context by centering on comparative research on successive negative contrast (SNC). SNC occurs when a downshift from a more preferred to a less preferred reward deteriorates behavior. SNC is observed in experiments with mammals, but not in experiments with goldfish (bony fish), toads (amphibian), or turtles (reptile). Pigeons and starlings (birds) have produced a mixed set of results. Since E. L. Thorndike, an understanding of animal learning has been influenced by the notion that rewards strengthen behavior and nonrewards weaken behavior—the strengthening/weakening principle. Outcomes fitting this principle provide evidence of control by absolute reward value, whereas results that violate this principle, like SNC, suggest control by relative reward value. Comparative research suggests that absolute reward effects are more general than relative reward effects.

SYMPOSIUM VI "The Evolution of Learning and Memory Mechanisms, Part 2: Evolution of Memory Mechanisms"

Chair: Prof. Karen L. Hollis, Department of Psychology, Mount Holyoke College, USA

The Evolution of Memory as an Immediate Perceptual Identification Mechanism

Michael S. Fanselow

Department of Psychology, University of California-Los Angeles, USA

Keywords: Episodic memory; Defensive behavior; Pavlovian conditioning; Innate recognition;

Perceptual learning.

In this talk, I focus on the origins of memory, posing the question of what were the very initial forces that led to the evolution of learning. Although the common answer is that the function of memory is to allow future behavior to benefit from past experiences, I argue that future benefit is too small to overcome the large energetic costs associated with the neural mechanisms that support memory formation. Instead, I advance the hypothesis that memory evolved to solve an immediate problem, the identification of novel biologically significant objects. Although such identification is often attributed to innate recognition, reliance on genetic encoding would require enormous genomic space and would be unreliable when phylogenetically novel, but important, objects were encountered. Some often-unappreciated features of Pavlovian conditioning make it an ideal mechanism for immediate perceptual identification of biologically important objects. Although episodic memory is most clearly identified with this recognition process, immediate perceptual identification may be a general function of several memory systems.

Evolution of memory systems in animals

Johan Lind

Department of Zoology, Stockholm University, Sweden

Keywords: Memory; Evolution; Animals; Associative learning; Trace memory.

Memory provides information for decision-making and determines partly what animals can and cannot do. Here we categorize memory systems in animals in terms of their generality and their temporal characteristics, and we explore how evolution has tailored memory systems, considering both the benefits of having access to information and the costs of acquiring and remembering information. General associative memories are flexible and can last for years. In contrast, general short-term memories decay rapidly. We find no evidence of general memory systems used to store sequences of stimuli faithfully. Importantly, seeming limitations of general memory systems may be adaptive as they minimize storage and learning costs. In addition to general memory systems, animals have evolved specialized memories when they need more faithful or longer-lasting memories than afforded by general memory systems. We discuss the consequences of these findings for animal cognition research.

Distinguishing mechanisms of behavioral Inhibition and self-control

Audrey E. Parrish

The Citadel: The Military College of South Carolina, USA

Keywords: Self-control; Behavioral inhibition; Cognitive control; Delay of gratification; Choice behavior.

In this talk, we explore the concept of self-control through a comparative and evolutionary perspective, we discuss how it is measured, and we outline the mechanisms that underlie this capacity (i.e., motivational factors, cognitive control, perception and learning, grit or perseverance, inhibition, as well as choice and commitment). An important concept addressed herein is the distinction between behavioral inhibition and self-control as related yet separate terms. In this endeavor, we briefly review tests of behavioral inhibition (e.g., the detour task, reverse reward contingency task) and self-control (working for more, intertemporal choice, delay of gratification, exchange, tool use, and sequenced travel tasks), outlining how these tasks shed light on the different mechanisms underlying inhibition versus self-control. We also discuss the role of control mechanisms within executive function tasks, such as the Stroop test, and how performance in these tasks is reflective of varying degrees of self-regulation and inhibition.

Metacognitive monitoring and control in monkeys

Robert Hampton

Emory University and Yerkes National Primate Research Center, Emory University, USA

Keywords: Metacognition; Cognitive monitoring; Explicit memory; Implicit memory; Introspection.

Metacognition, or thinking about thinking, can adaptively modulate cognitive processing. For example, a student preparing for an exam may introspectively evaluate what she knows well already so that she can allocate more time to studying material she does not know as well. Such metacognition involves feedback between metacognitive monitoring, which assesses the current state of cognition, and metacognitive control that effects changes in cognitive processing. Some interesting and complex forms of cognition likely involve metacognition. Metacognition is also linked to explicit memory, executive control, theory of mind, consciousness, and other phenomena central to cognitive science. Like learning, memory, and cognition, metacognition is likely present in at least rudimentary forms in some animals other than humans. Information about the extent to which metacognition occurs in animals other than humans informs our understanding about the evolution of cognition. Metacognitive monitoring likely evolved because it supports effective metacognitive control.

SYMPOSIUM VII "Still new venues for delay discounting"

Chair: Prof. Ricardo Pellón, Department of Basic Psychology, National University of Distance Education (UNED), Spain.

Delay discounting: Acquisition, extinction, and restoration of polydipsia Induced by food

Carlos F. Aparicio

Department of Psychology, Salem State University, USA

Keywords: Discounting; Polydipsia; Extinction; SHR; LEW.

The acquisition, extinction, and restoration of Polydipsia induced by food were analyzed with Spontaneously Hypertensive (SHR) and Lewis (LEW) rats responding to concurrent chains. Choice was measured in the initial link. Entries to one terminal link provided 1-food pellet immediately (SSF) and entries to the other terminal-link 4-food pellets (LLF) with delays of 0.1, 5, 10, 20, 40 or 80 s. The acquisition and restoration phases permitted access to a bottle with water. The bottle was emptied during extinction but licking to its pipeline could be measured. The order of the phases varied within a strain and between strains. The acquisition of licking the pipeline of the emptied bottle was analyzed to test the idea that food induces licking. Mazur's hyperbolic-decay model fitted the data from both strains well, with the SHRs generating steeper discounting functions than the LEWs. All rats developed the behavior of drinking excessively. Discounting rate decreased in the acquisition and restoration of Polydipsia. Licking the pipeline continued during extinction. The acquisition of licking a pipeline of an emptied bottle suggests that water is not needed for food to induce that behavior. Food is a phylogenetically important event that induces behavior, or a discriminative stimulus that modulates behavior.

Food induces polydipsia on a delay discounting task

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Keywords: SHR; LEW; Impulsivity; Polydipsia; PIE.

The idea that schedule-induced polydipsia is a predictor of cognitive impulsivity was examined in spontaneously hypertensive (SHR) and Lewis (LEW) rats, two rodent models of Attention Deficit/Hyperactivity Disorder (ADHD). A concurrent-chains procedure requiring locomotion arranged 60-choice cycles. Each cycle started with one press on a rear lever to extend two front levers where choice was measured in the initial link. Entries to one terminal link provided 1-food pellet immediately (SSF) and entries to the other terminal link 4-pellets (LLF) with delays of 0.1, 5, 10, 20, 40 or 80 s randomly presented. Access to a bottle with water could (A) or could not be (B) available according to an ABA reversal design. Mazur's hyperbolic-decay model described delay discounting well, with the SHRs discounting the LLF more steeply than the LEWs. All rats drank water during a 1-min blackout separating each delay. But the SHRs drank more water than the LEWs, particularly during delays to the LLF. A negative correlation between polydipsia and discounting rate suggests that polydipsia is not a predictor of impulsive choice. It is concluded that polydipsia was induced by food delivery acting as a Phylogenetical Important Event (PIE).

Does environmental enrichment prevent or reduce impulsive behavior in rats? Comparison between sexes

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Keywords: Impulsive choice; Impulsive action; Environmental enrichment; Differential reinforcement of low rates; Delay discounting.

Environmental enrichment (EE) consists of exposing organisms to social (i.e. with peers) conditions and/or physical (i.e. with objects with which they may interact) enrichment. Some studies have shown that EE improves well-being and learning in rats and other studies suggest that EE may induce neurological and behavioral changes. There is a controversy between the results found, as some authors suggest that rats that have grown up with enrichment are more impulsive than those that do not have enrichment whereas others suggest that those that receive enrichment are less impulsive. Impulsivity is a multidimensional construct that might be divided into two subtypes: impulsive action and impulsive choice. Impulsive choice is defined as the preference for a smaller, more immediate reinforcer, over a larger, more delayed reinforcer; while impulsive action reflects the inability to stop responding when this might be inappropriate or premature. The objective of the study was to observe the effect of EE in young rats on impulsive action and choice in rats. For this, 32 male and 32 female rats of the Wistar strain were used as subjects. Since they were separated from their mothers at post-natal day (PND) 21 rats were divided into 4 groups according to the type of enrichment they had: 1) physical and social enrichment (PSE); 2) only social enrichment (SE); 3) only physical enrichment (PE); and 4) no enrichment (NE). The experimental procedure began at PND 50, the To evaluate impulsive choice, the delay discounting (DD) procedure was used, in which the subjects were exposed to 14 sessions and could choose between a small and immediate reward and a large one with a delay that increased by 3 s each session (0 to 36 s). To measure impulsive action, an operant procedure of differential reinforcement of low rates (DRL) 10 s was used for 30 sessions. All the rats went through both two tasks, counterbalancing the order of tasks. The results suggest that impulsive choice and impulsive action show a different pattern, when the subjects from one group are more self-controlled in impulsive action, the opposite happens in impulsive choice, that is, this group makes more impulsive choices, and vice versa.

Delay discounting in paediatric Attention-Deficit/Hyperactivity Disorder

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Keywords: Attention-deficit/hyperactivity disorder; Decisional impulsivity; Delay discounting task;

fNIRS.

In recent years, there is a great interest in disentangling the phenotypic heterogeneity of Attention-Deficit/Hyperactivity Disorder (ADHD). ADHD diagnosis is based on attentional and inhibitory control disruptions but up to date, it is not clear what components of inhibitory control are impaired and constitute the core of the disorder. Specifically, ADHD children are thought to be characterised by a steeper temporal discounting rate on delay discounting tasks, where they have to choose between a small-sooner reward and a large but delayed one, but evidence shows inconclusive findings. Thus, in this study we aimed to characterize the behavioural and neurofunctional mechanisms of decisional impulsivity in ADHD. We recruited adolescents (12-16 years) with a clinical diagnosis of ADHD and typically developing (TD) from health and education services. Participants completed an experiential delay discounting task (delays at 5s, 10s, 20s, 30s, 60s) while the hemodynamic activity of the prefrontal cortex was recorded using functional Near-Infrared Spectroscopy (fNIRS). We applied clustering analyses to task main outcomes to identify novel ADHD phenotypic profiles. We obtained three clusters differing in severity: excessive temporal discounting (cluster 1), moderate temporal discounting (cluster 2) and low temporal discounting (cluster 3). ADHD participants were distributed among the three clusters. We found significant differences in the functional connectivity strength between dorsolateral and orbitofrontal cortices at the cluster level. Our findings show that there are individual differences in temporal discounting among adolescents with ADHD, so only a subset of the ADHD population may be characterised by high impulsivity in this type of decision-making process.

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ORAL COMMUNICATION SESSION 1

OC-01- Assessing the reciprocal nature of associations in Pavlovian conditioning

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Keywords: Pavlovian conditioning; Reciprocal associations; Performance; Sign-tracking; Goal-tracking

Formal models of Pavlovian conditioning assume that conditioning trials in which the presentation of a conditioned stimulus (CS) is followed by unconditioned stimulus (US) result in the formation of a directional association from the CS to the US. However, both Asratian (1965) and Pavlov (1932) assumed that such forward conditioning trials would result in the formation of reciprocal (excitatory) associations (i.e., CS⇄US associations). This assumption is embodied in a recent formal model of Pavlovian conditioning (HeiDI; Honey, Dwyer & Iliescu, 2020). HeiDI provides an analysis of the fact that the nature of conditioned responding reflects the nature of both the CS and US, and a broad range of other theoretically important findings. Here, we assess the claim that reciprocal (excitatory) associations form during an autoshaping procedure in rats. In this procedure, the brief insertion of a lever into a chamber serves as the CS and food (or sucrose) serves as the US; and the CR takes the form of interactions with the lever (sign-tracking) and food-well entries (goal-tracking). We demonstrate that trials on which the US precedes the CS, like trials on which the CS precedes the US, result in substantial excitatory conditioning. However, such "backward" trials shift the distribution of conditioned responding both temporally (to the start of the CS) and topographically (from CS-oriented sign-tracking to US-oriented goal-tracking). These results are considered in light of recent developments of the HeiDI model (e.g., Honey & Dwyer, 2022; Navarro, 2022).

OC-02- Beyond the information (not) given: Associative mechanisms vs representations of uncertainty in extinction.

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Keywords: Animal cognition; Extinction; Uncertainty; Renewal; Secondary reinforcement

Associative learning models typically reflect statistical relationships between experienced events. Causal models can go beyond this information to specify the ways in which events are related. This meta-representational aspect of causal models allows them to reflect effects of uncertainty about the relationships between events: e.g., a situation where cue A leads to outcome B on some occasions but not others might produce two alternative causal models (A causes B, and A does not cause B) along with uncertainty about which model applies. Studies of Pavlovian conditioning in rats manipulated sucrose-magazine access during extinction to produce uncertainty about the presence or absence of rewards (Waldmann et al., 2012). The fact that rats were sensitive to blocking access to the site of reward delivery was interpreted as evidence for a causal-model account reflecting uncertainty. However, associative mechanisms – based on the direct impact of magazine covering on access to the dipper mechanism delivering rewards through secondary reinforcement or contextual renewal of responding – also predict the same pattern of results. Thus there are two classes of account for the effects of magazine covering on extinction: one focussing on the direct sample of experience (e.g. the associative accounts), and one focusing on representational structures which go beyond this experience (e.g. the causal model account – see Dwyer & Waldmann, 2016 for an extended discussion of these classes of account). In two experiments, manipulation of the dipper mechanism through extinction and test phases resulted in behaviour consistent with these associative accounts. These results are consistent with accounts based on the direct sample of experience and suggest that uncertainty-based cognitive mechanisms are not required to account for the effects of magazine covering on extinction in rats.

OC-03- The role of a bias induction phase in an intervention to reduce the causality bias

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Keywords: Causal illusion; Debiasing; Illusion of causality; Cognitive bias; Educational intervention

Causality bias refers to the tendency of people to believe that there is a causal relationship between events, when in fact these events are not related. This bias is associated with threats to human welfare such as the development of social stereotypes, ideological extremism and pseudoscience. Previous interventions that have been shown to efficiently reduce causality bias have included a bias induction phase prior to the actual training. However, to our knowledge, the role of the bias induction phase has not yet been studied. The present research aims to examine the effect of the bias induction phase on the reduction of the causality bias. For this purpose, we conducted an experiment with three groups (induction+training, only-training and control) involving 234 university students. We use a standard contingency judgment task to assess their causality bias. The results showed that both training groups (induction+training and only-training) decreased their causality bias as compared to the control group in a null contingency scenario, which suggests that the intervention was effective regardless of whether the induction phase was included or not. In addition, when contingency was positive we observed a significantly lower causal judgment in the induction+training group as compared to the control group, which can be interpreted as a higher overall skepticism after the intervention when it included a bias inducement phase.

OC-04- Why only judge if you can act? An alternative measure in contingency learning tasks.

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Keywords: Causal illusion; Outcome-density effect; Cause-density effect; Action test; Causal judgements

Causal illusions can be induced experimentally in the context of contingency learning tasks, where participants are asked to learn about the relationship between two events (a potential cause and an outcome) which are actually non-contingent. The intensity of causal illusion developed in these tasks is typically measured by asking the participants to provide the perceived causal relationship (e.g., perceived effectiveness of a treatment) in a 0 to 100 scale (conventional causal judgements). The more distant the ratings are from zero, the stronger the causal illusion is assumed to be. Employing this procedure, several studies have found outcome-density and cause-density effects, that is, a strengthening of causal illusions when the outcome event or the cause event, respectively, happens with a high probability. In the present study, we explore a less ambiguous measure of causal illusions. After completing the training phase, participants were asked to perform an action test, in which their goal was to produce the outcome as many times as possible and, for doing so, they were able to introduce (or not) the potential cause at several points during the test. Our results show an outcome-density effect (Experiment 1) and a cause-density effect (Experiment 2) with this alternative test, suggesting that such effects are not limited to conventional causal judgements but also emerge in measures that might be more closely connected with actual decision making.

OC-05- Vulnerability to causal illusions is predicted by prior pseudoscientific beliefs and the scientific status of the potential cause.

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Keywords: Causal illusion; Pseudoscience; Alternative medicine; Cognitive bias; Causal learning

Understanding why some people rely on pseudoscience is relevant since it can pose a threat to public health. Previous research indicate that people can interpret causal information to fit their prior beliefs. In the present experiment, we hypothesized that prior pseudoscientific beliefs (i.e., attitudes towards alternative and scientific medicine) and the scientific status of a specific treatment used in the experimental task (i.e., alternative or scientific) will interact to predict the perceived effectiveness of the treatments. A sample of 98 participants completed an adaptation of the standard causal illusion task in which they had to judge whether two fictitious treatments, one described as scientific medicine and the other as alternative medicine, could heal the crises caused by two different fictitious syndromes. Contingency was set to zero; therefore, both treatments were completely ineffective. Thus, those believing that any of the two treatments worked were exhibiting a causal illusion. The Pseudoscience Endorsement Scale (PES) assessed volunteers' adherence to popular pseudoscientific beliefs and participants also answered some questions about trust in alternative therapies that were taken from the Survey on the Social Perception of Science and Technology published by FECYT. The results replicated the causal illusion effect. In addition, they show that individuals reporting stronger pseudoscientific beliefs were more vulnerable to the illusion in both scenarios. By contrast, nonbelievers seemed to be more resistant to the illusion in the alternative scenario. These results provide evidence of how trust and prior beliefs in pseudoscience are related to the perceived effectiveness of pseudoscientific (or scientific) treatments and point to causal illusion as an underlying bias in the process.

ORAL COMMUNICATION SESSION 2

OC-06- Schizotypy does not influence the McCollough effect.

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Keywords: Schizotypy; McCollough effect; Opponent processes; Visual illusions; Associative learning

The McCollough-effect is a contingent visual after-effect. Participants first view alternating pairs of gratings composed of red and black horizontal lines and green and black vertical lines (RH & GV). After this adaptation, participants see black and white gratings (i.e., WH & WV) that appear as GH and RV, an effect being interpreted as an example of an opponent-process conditioned response. The effect has been reported as being diminished in people with schizophrenia who were less inclined to agree, when asked, that they could see any of the colouring on GH and RV gratings. This led us to predict that it should also correlate with participants' schizotypy scores. We induced and assessed the McCollough-effect with an automated, method-of-adjustment procedure and used the O-LIFE scale to measure their schizotypy, which capture characteristics of schizophrenia in healthy people in 4 sub-scales. In 3 experiments, we found a robust McCollough effect and a broad range of schizotypy scores, but none of the O-LIFE sub-scales correlated with the McCollough effect. What is the cause of the discrepancy in our (null) results with schizotypy and the positive results from schizophrenic patients? One possibility is that there is no real effect, here, and that the published positive results are an artefact associated with using self-report, rather than automation.

OC-07- Assessing the relevance of Skin Conductance Responses and schizotypal personality traits on the Iowa Gambling Task

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Keywords: Decision-making; Schizotypy; Iowa gambling task; Skin conductance; Somatic marker

An adequate decision-making could be at the basis for a correct daily life functioning, and some clinical populations have suggested impairments in this ability. One of the most widely employed tasks for assessing decision-making is the Iowa Gambling Task (IGT). Performance on the IGT has been suggested to be modified by several factors. One of them could be Skin Conductance Responses (SCRs) generated when making a choice, discussed in the literature due to controversial results. As far as we know, this effect has been studied indirectly rather than directly, associating the presence of differences between groups in SCRs with differences in performance, but not analysing the relationship between these SCRs and performance themselves. In the present study, 136 students were assessed with a modified version of the IGT with 100 trials followed by three additional reversal blocks in which the contingencies provided by each deck were changed, 20 trials each. Their SCRs were registered during the whole session, and they completed the Schizotypal Personality Questionnaire (SPQ) when they finished. We employed a Bayesian Generalized Linear Model to jointly estimate the probability of making an advantageous choice, as well as the SCRs generated by advantageous and disadvantageous choices in each block. We also estimated the effect that SCRs during the current block and schizotypy may have on the probability of making an advantageous choice, as well as whether schizotypy may influence the magnitude of these SCRs. Results revealed that SCRs generated by advantageous and disadvantageous decks were not credibly different in any block and that only SCRs after losses when making a disadvantageous choice in the fifth block of the task were credibly above average. Furthermore, the Cognitive-Perceptual factor of the SPQ was negatively related to the SCR generated after losing when making a long-term advantageous choice in the first block of the IGT. Finally, in the first block, anticipatory SCRs when making a disadvantageous choice were positively associated with the probability of making a long-term advantageous choice, and, in the last reversal block, SCRs generated after losing when making an advantageous choice were negatively associated with the probability of making a long-term advantageous choice. Nevertheless, all these effects were so small to be considered decisive when evaluating performance in the IGT, as some models suggest.

OC-08- Extinction learning of a non-aversive task in psychosis: A H1a and Arc mapping study.

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Keywords: Extinction; Renewal; Immediate Early genes; Limbic system; Prefrontal cortex

The extinction of appetitive associations is key to understanding clinical disorders such as abnormal persistent appetite, contextual drug associations and some psychotic symptoms in which failure of extinction may play a major role. Psychosis disorders such as schizophrenia or bipolar disorders affect 3% of the population. These patients present symptoms such as delusions and hallucinations that are related to extinction learning (EL) failures. We now know that psychosis is accompanied by changes in neuronal excitability and synaptic plasticity, however, the neural network modifications associated with these cognitive impairments remain largely controversial. In our study, we seek to elucidate the neural changes after extinction and renewal of a pavlovian conditioned response in the psychosis knockdown rat model CACNA1C. The gene cacna1c plays a crucial role in regulating gene expression of L-Type Voltage-Gated Calcium channels involved in synaptic plasticity and learning, being strongly associated by GWAS with schizophrenia and bipolar disorders. Here, we used fluorescence in situ hybridization of somatic immediate early gene (IEG) expression to scrutinize how the hippocampus and associated structures process EL in the case of psychosis as compared to healthy animals. Although the genetically modified animals successfully engaged in extinction and renewal, context-related neural activation changes were found in the prefrontal cortex, the hippocampus, retrosplenial cortex and amygdaloid nuclei in the psychosis model as compared to healthy subjects.

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OC-09- A behavioural and functional connectivity approach to executive functions in frontostriatal stroke patients

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Keywords: Executive functions; Frontostriatal stroke; Decision making; Cognitive flexibility; Functional connectivity

Stroke is the second main cause of cognitive impairment and the third leading cause of death and disability worldwide. Stroke cognitive impairments are frequently related to a dysexecutive functioning in frontal stroke patients, involving frontostriatal and frontoparietal circuits, and broadly affecting daily life functioning. However, literature of cognitive affections in stroke is still scarce in comparison to speech and motor impairments. Hence, the present study shows an integral neurobehavioural evaluation of executive functioning and functional connectivity in frontostriatal patients. To this end, we compared the performance of frontostriatal patients (n=18) and healthy controls (n=15) in four executive function tasks that measured decision making, cognitive flexibility, motor inhibition and working memory (delay discounting task, probabilistic reversal learning task, stop-signal task, and ICE CREAM Nesplora test, respectively). The Functional Connectivity was measured in resting-state (RS-FC) with Functional Near-Infrared Spectroscopy (fNIRS) (16x16) between left and right orbitofrontal, dorsolateral, and parietal posterior cortex. We found that frontostriatal stroke patients performed significant worse in decision making and cognitive flexibility than the control group. RS-FC was lower in patients between orbitofrontal and parietal posterior cortex as well as between both parietal posterior hemispheres. In the group control, a better decision making was related with a lower RS-FC between orbitofrontal and posterior parietal right. This study highlights the difficulties frontostriatal stroke patients find in decision making and cognitive flexibility, that should be further addressed in their post-stroke evaluation and interventions, hence, it is necessary to develop additional studies exploring cognitive impairments in frontostriatal stroke patients in order to achieve more accurate diagnosis and treatments.

OC-10- Sex differences in effort-based decision-making in rats: influence of type of reinforcer, operant schedule and dopamine depletion

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Keywords: Operant-behavior; Dopamine; Accumbens; Effort; Sex differences

Dopamine (DA) plays an important role in regulating activational and effort-related aspects of motivation. DA receptor antagonists and DA-depletion produces a low-effort bias in rats and mice, shifting choice behavior from high-effort to low-effort alternatives. These tasks also have been used for animal models of motivational symptoms in psychiatric disorders. However, a limitation of these studies is that the vast majority were done in male rodents. Thus, in the present work we characterize the potential sex differences in operant tasks requiring effort-based decision-making. We employed the concurrent fixed ratio 5 (FR5)/ choice task in male and female adult Sprague Dawley rats. Animals have to lever press for the more preferred reinforcer but they concurrently have a less preferred but free one. In different experiments we used different reinforcers; high carbohydrate pellets vs standard chow food or high sucrose concentration 5% vs low concentration 0.3%. Additional studies investigated the effects of IP injection of the vesicular monoamine transport (VMAT-2) inhibitor tetrabenazine (TBZ), which blocks vesicular DA storage in both male and female rats. TBZ was selected because this drug produces depressive symptoms and motivational dysfunctions in humans, and animal studies use TBZ to model these dysfunctions. Under baseline conditions, males typically lever pressed more than females for food, but for sucrose both sexes had the same level of performance. However, females showed a higher preference index for the high sucrose concentration under free-concurrent-access conditions. Females were more active on a running wheel, suggesting that they are not more sedentary in general. TBZ produced a dose-related suppression of lever pressing and an increase in free intake in male rats, but was ineffective in females. However, in females, higher doses had an effect in both males and females. Investigating sex differences in the pharmacology and neurochemistry of effort-based choice may lead to a greater understanding of the role of sex in motivational dysfunctions in humans.

ORAL COMMUNICATION SESSION 3

OC-11- Persistent binge-like intakes in rats generalise from maltodextrin to sucrose

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Keywords: Bingeing; Sucrose; Maltodextrin; DRL; Rats

Rats given day-long access to a sucrose solution once every four days (1D4) develop greater daily intakes than rats given unrestricted access to sucrose. Such binge-like intakes persist in a second stage where all rats are given access on alternate days (1D2), a 'persistent elevated consumption' (PEC) effect. Aim 1 of the current project is to confirm our preliminary evidence that 1D4 access to maltodextrin for 4 weeks can produce a PEC effect on sucrose intakes. In a 2 x 2 design one factor is whether rats are given either maltodextrin or sucrose solutions in a 4-week Stage 1. The second factor is whether rats are given 1D4 or daily access. In Stage 2 all rats are given 1D2 access to sucrose. Generalisation of a PEC effect from maltodextrin to sucrose is shown if Malto-1D4 rats drink more sucrose than Malto-Daily rats. Such a result would suggest that the PEC effect induced by intermittency involves a general delayed satiety response. Alternatively, the PEC effect may be sensory-specific and have generalised from maltodextrin to sucrose on the basis of similar tastes. A separate experiment using a taste aversion procedure indicated limited similarity between sucrose and the type of maltodextrin used in the new experiment. Aim 2 is to test whether 1D4 access to either maltodextrin or sucrose solutions reduces response inhibition, as measured by performance on a schedule (DRL) that reinforces low rates of responding. Rats are trained on a DRL 20-s schedule prior to Stage 1 and then their performance is tested both at the end of Stage 1 and at the end of Stage 2. More responses per reinforcer in the two 1D4 groups than in the Daily groups would suggest that the 1D4 schedule reduces response inhibition.

OC-12- PRE- AND POST-PRANDIAL RUNNING IN THE ANIMAL MODELS OF ACTIVITY-BASED ANOREXIA AND STARVATION-INDUCED HYPERACTIVITY

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Keywords: Activity-based anorexy (ABA); Starvation-induced hyperactivity (SIH); Activity wheel; Food intake; Weight loss

The animal models of activity-based anorexia (ABA) and starvation-induced hyperactivity (SIH) allow us to identify and understand the variables that modulate weight loss, food consumption, and level of wheel running. In ABA is given unlimited food for a limited period of time (1-1.5 h), while in SIH is given a limited amount (percentage of baseline intake) for an unlimited time. Food restriction causes rats to increase the number of turns on the activity wheel, thus resulting in greater weight loss. The periods in which the activity wheel shows the greatest number of turns are around meals, both before (called "anticipatory food activity"-FAA) and after (called "postprandial activity"-PPA). It has been found rapid weight loss associated with running in both periods. Thirty female Wistar rats were assigned to three groups (ABA, SIH, and control) that were exposed to the corresponding procedure until animals lost 25% of their initial free-feeding weights. ABA rats received 1-hour of food availability per day, and SIH and control rats received the same percentage (according to their baseline intake) that ABA rats had eaten the previous day but without limitation for their time of consumption. ABA and SIH groups had access to the wheel 22 hours each day, while control did not have access to exercise. The results showed a significant weight loss mainly in the ABA group, followed by the SIH group, and finally, the control group. Due to the rapid reach of the withdrawal criterion, a survival analysis was performed, verifying that the ABA and SIH rats were close in the number of days in which they reached the withdrawal criterion and that most of the control rats did not reach the withdrawal criterion. Taking the 2.5 hours before and after a meal, both wheel groups showed greater running during the FAA period on days 1-2, but in the last session, the SIH rats ran more in PPA. During recovery, the rats gradually regained their weights, which was quicker in control than ABA or SIH rats. The SIH procedure had an arbitrary percentage of the diet, coupled to the percentage of the amount consumed by an ABA rat but with no time limit to ingest it. ABA and SIH did not differ much in the main results, however, the SIH protocol is more ecological and closer to the type of food restriction that takes place in anorexia.

OC-13- CACNA1C and juvenile stress impact on alcohol consumption and palatability

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Keywords: Palatability; Alcohol; Rat; CACNA1C; Juvenile stress

Genetic variation in CACNA1C is associated with psychiatric disorders and plays an important role in regulating gene expression relating to L-Type Voltage Gated Calcium Channels involved in synaptic plasticity and learning. Recent studies from our laboratory revealed hedonic deficits in a hemizygotic deletion rat model (Cacna1c +/-), in particular lower mean cluster size (LCS) consistent with anhedonia, a condition that frequently occurs in mood disorders. Surprisingly, juvenile stress produced an increase in the palatability of sucrose compared to controls without the stress experience. The present study aims to investigate the impact of CACNA1C and juvenile stress on alcohol consumption and its hedonic evaluation. 74 male and female Cacna1c +/- and WT littermate rats were used. Half of the animals underwent a juvenile stress procedure consisted of 3 days of mild stressors (forced swimming, elevated platform, and shocks) from postnatal day 25. Approximately 6 weeks later, all animals were exposed to 6% alcohol solution with consumption and LCS were measured. In contrast to palatable sucrose solutions, neither CACNA1C nor the juvenile stress procedure affected the LCS for alcohol. Furthermore, in contrast to previous results, no differences in consumption were found between conditions. These results suggest that low dose Cacna1c expression produced by hemizygotic deletion has selective impact on LCS and does not produce an effect on acute alcohol consumption. Further investigations will aim to evaluate effects of variation of CACNA1C and juvenile stress on alcohol dependence and other palatable substances.

OC-14- Differences in sensitivity to hedonic value between the taste reactivity test and the microstructural analysis of licking in attenuation of neophobia

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Keywords: Attenuation of neophobia; Palatability; Taste reactivity test; Licking; Hedonic value

When exposed to a novel taste, animals will be reluctant to consume it (neophobia), which has been suggested to be a survival mechanism that prevents the over-intake of a potential toxic food. In addition, if its ingestion is not followed by aversive consequences, consumption will increase in subsequent exposures (attenuation of neophobia – AN). While the increase in consumption with exposure seen in AN is well established, the potential for changes in the palatability of the taste is less well investigated. Here, we explored how the palatability of a mildly-aversive flavour (3% cider vinegar solution) changes during AN using two different tasks: microanalysis of the licking pattern and taste reactivity test followed by a voluntary intake test. For the first, water restricted rats had access for 15 minutes to the novel flavour solution over six consecutive days, and both consumption and lick cluster size increased across exposures. Interestingly, the increase in hedonic reactions across exposures was slower and less complete than the increases in consumption. For the taste reactivity test, animals were infused orally with 1ml/min with the novel flavour solution for 5 minutes across six days, and then they completed a task of voluntary consumption for three days. Animals did not show a clear shift in hedonic value in taste reactivity test across the taste reactivity test sessions and, interestingly, exposure to vinegar by oral infusion were not enough to reduce neophobia as assessed by voluntary intake. While neophobia and attenuation of neophobia were clear in consumption measures from both experiments, a neophobia effect (and its attenuation), in terms of palatability, was only seen with the lick microstructure analysis, and not with the taste reactivity test. Because the taste reactivity test relies on involuntary exposure to the solution, while the lick analysis method rests on the analysis of the voluntary consumption, this suggests that the sensitivity of hedonic assessment methods in the context of neophobia may differ between voluntary and involuntary consumption. In turn, this difference may suggest that the nature of exposure – voluntary vs. involuntary exposure – may affect the process of AN.

OC-15- Cognitive and neurodevelopmental correlates after long-term administration of psychostimulants: a model of hyperactivity based on individual differences.

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Keywords: Phenotype; Methylphenidate; Sustained attention; Prepulse Inhibition; Impulsivity

Attention deficit hyperactivity disorder (ADHD) is highly prevalent in school-age children (Dopheide y Pliszka, 2009; Slezak et al., 2014). Methylphenidate (MDF) is the most widely used psychostimulant for the treatment of this disorder. Recent studies have associated adolescence with brain regions maturation involved in the control of motivation, emotion, and cognition. Specifically, it has been proposed that the development of the prefrontal cortex (Pfc) during adolescence underlies the maturation of cognitive functions and the regulation of affective response. Therefore, the consumption of psychoactive substances during this period can produce an abnormal development of the prefrontal region (Caballero, Granberg and Tseng, 2016). In this study we analysed the effect of chronic consumption of methylphenidate during adolescence on the maturational process of the prefrontal cortex in an animal model of impulsivity. To this end, adolescent animals (35d) were treated with methylphenidate for a period of 20 days and tested during adulthood (98d). Rats were classified using an autoshaping procedure prior to pharmacological treatment and prior to behavioral test. We evaluated the attentional capacities of animals using a sustained attention task (SAT) and a prepulse inhibition test (PPI). Also, we quantified parvalbumin immunoreactive neurons in the Pfc in order to analyse whether the chronic MFD administration affected Pfc maturation. The results showed that pharmacological treatment affected animals differently depending on phenotype (goal-tracker vs sign tracker), and animals treated with MDF during adolescence period showed a deficit in both task, sustained attention and filtering tasks.

ORAL COMMUNICATION SESSION 4

OC-16- Evaluating the effects of Counterconditioning, Novelty-Facilitated, and Standard Extinction on the spontaneous recovery of threat expectancy and CS valence

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Keywords: Fear extinction; Counterconditioning; Novelty-facilitated extinction; Threat expectancy; CS valence

Several studies have suggested that emotional aspects related to the CS valence are a key factor involved in the return of fear. After a fear conditioning phase, individuals learn not only the contingency relation between the CS and the US (threat expectancy learning), but the CS also gains negative features after being paired with an aversive stimulus (evaluative learning). A later standard extinction treatment in which the CS is presented alone may reduce threat expectancies, but the negative valence newly acquired by the CS can stay intact, which could explain the return of fear. Our study focuses on the role of changes in the CS valence as a potential mechanism to reduce the spontaneous recovery of threat expectancies. To do that, we evaluated counterconditioning, a technique aimed to reduce the CS negative valence by paring it with a positive stimulus and compared its efficacy to that of a novelty-facilitated and a standard extinction intervention. Using a two-day protocol, participants first learned the relationship between a figure and an aversive sound, using a differential conditioning paradigm, and were then randomly assigned to one of the three different groups: standard extinction, novelty-facilitated extinction (CS paired with a neutral stimulus), and counterconditioning (CS paired with a US of positive valence). Finally, on the second day, spontaneous recovery was tested. Our findings did not provide evidence to suggest that counterconditioning could be more effective to reduce the return of threat expectancies or influence valence ratings when compared to novelty-facilitated and standard extinction.

OC-17- Decrease in the rewarding value of spatial novelty due to the contamination of the stimulus field with light - evidence from a free exploration test involving rats

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Keywords: Light stimulation; Exploratory behavior; Neophilia; Rat; Curiosity

It has been shown that rearranging the spatial properties of a familiar environment consistently elicits a positive response in rats directed toward the source of novelty. Previous studies have been conducted under red light or darkness. The purpose of this study was to test the effect of rearranging the spatial properties of a familiar environment in conjunction with a change in lighting conditions. The results have shown specific effects of the light presence and its intensity on different behavioral measures. We propose that this study provides a basis for hypothesizing a two-way mechanism of the behavioral response to light regulation in rats. The first is based on ON/OFF states. This level may be related to fundamental, evolutionarily early, emergent components of behavioral antipredator adaptations. Another level of behavioral regulation involves mechanisms sensitive to light intensity. These appear to be involved in the regulation of more advanced behavioral acts, such as exploratory responses. This may suggest that light intensity analysis may require the involvement of more advanced, cognitive components in the behavioral regulation system.

OC-18- Acquired dimensional relevance attenuates overshadowing

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Keywords: Prior experience; Overshadowing; Configural processing; Attention; Intradimensional

Previous research suggests that past experience with elemental or configural discrimination changes how participants process new information. Elemental pretraining tends to promote competition, while configural pretraining tends to attenuate competition. In two experiments, we sought to assess whether increasing configural processing during pretraining attenuated subsequent overshadowing when using two separable dimensions (i.e., colors and symbols) in a predictive learning task. In the first stage of learning, one group (Biconditional) was subjected to biconditional discrimination training (promoting configural processing), followed by a classic overshadowing design. Two control groups were included – neither of these experienced pretraining enhancing configural processing. In Experiment 1, we observed similar overshadowing in group biconditional compared to control groups. In Experiment 2, in addition to the biconditional group, we included two groups, one group in which the color dimension was relevant during pretraining (Color-Relevant group) and another group in which the symbol dimension was relevant during pretraining (Symbol-Relevant group). We observed asymmetric overshadowing in groups Color and Symbol Relevant during the overshadowing test. In the relevant dimension for each group, overshadowing was attenuated, but it was reliable in the alternative dimension. We did not observe any modulation in the magnitude of overshadowing for group Biconditional. Using a paradigm with two-dimensions configural pretraining was insufficient to attenuate subsequent overshadowing. However, pretraining a particular dimension attenuated overshadowing, but only in the relevant dimension. The results are discussed in terms of attentional and configural theories of learning.

OC-19- US devaluation and extinction of outcome-specific Pavlovian-to-instrumental transfer (PIT) in humans: Individual differences

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Keywords: Extinction; Impulsiveness; Negative urgency; Outcome devaluation; PIT

Previous research conducted in our laboratory (Hinojosa-Aguayo & González, 2020) found that outcome-specific PIT (os-PIT), but not general PIT, was positively correlated with the outcome devaluation effect on an instrumental task (Exp. 1), and was itself sensitive to outcome devaluation (Exp. 2). These results were interpreted as showing that os-PIT, at least using our procedure, was an instance of a goal-directed process rather than being based on an automatic response-selection process. In the present study, two online experiments using the same computerized task were aimed at 1) replicating some of our previous findings (Exp. 1), increasing the heterogeneity and size of the previous sample, and thus generalizability, and (Exp. 2) determining whether our os-PIT task was affected by the extinction of the Pavlovian cues. The results of Exp. 1 showed effects of both outcome-devaluation and os-PIT, and that both were positively correlated, whereas those of Exp. 2, using presentations of compounds of extinguished and non-extinguished cues in the test, showed that os-PIT was affected by extinction. In addition, the score in negative urgency (affect-driven impulsivity) was negatively correlated with the indexes of outcome devaluation (Exp. 1) and os-PIT extinction (Exp. 2). Taken together, the results suggest that os-PIT may be based on flexible representations that allows updating of the value of the outcome, as well as the strength of the S-O contingency, but that this might be modulated by individual differences related to emotion regulation such as emotional impulsiveness.

OC-20- The impacts of extensive extinction on the ABC “super” renewal of instrumental responses in rats

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Keywords: Context; Extinction; Operant learning; Rats; Renewal

Two free operant conditioning experiments with rats examined the impact of conducting a large amount of extinction sessions on situations that enhance the ABC renewal effect such as conducting acquisition in multiple contexts and using a large amount of acquisition sessions. In Experiment 1 all rats were trained to press a lever for food, ABC group was trained in one context, while the other two groups were trained in three contexts (ABC3_4 & ABC3_36). Then, all rats received extinction in context B. For groups ABC and ABC3_4 this phase lasted 4 sessions, whereas lasted 36 sessions for group ABC3_36. Rats were tested in context B and C. In Experiment 2, rats were trained to perform an operant response to obtained food in context A. Group ABC received a moderate amount of training, while the other groups (ABC12_4 & ABC12_36) received a larger amount of acquisition sessions. Responses underwent extinction in context B. Groups ABC and ABC12_4 received 4 sessions while 36 extinction sessions were used for group ABC12_36. Testing was conducted in both context B and C. Both experiments showed the ABC “super” renewal effect. Nevertheless, we found that conducting a large amount of extinction sessions reduced only the ABC “super” renewal in Experiment 1. Clinical and theoretical implications of our data are discussed.

ORAL COMMUNICATION SESSION 5

OC-21- Attentional Modulation of Spatial Learning in Humans using a 3D Immersive Virtual Task

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Keywords: Spatial Learning; Attention; 3D Immersive Virtual Navigation Task; Pre-exposure; Landmark Learning

In this experiment we made use of an immersive virtual 3D navigation set that incorporates an eye tracker that allows monitoring visual attention and focus. The participants wore a 3D headset and could navigate the environment by using the handsets of the equipment. The task was to find a treasure buried under the ground whose location could be sorted out by reference to four landmarks. Before this, participants were given active pre-exposure to the relevant landmarks following the procedure developed for rats by Redhead, Prados and Pearce (2001). Over 12 trials, participants in the Control group were required to find the treasure whose location was signalled by the presence of a flagstick; for the experimental groups (Stable and Random) as well as the flagship the four landmarks were present. For the group Stable the flagship (and the treasure) remained in the same place relative to the four landmarks for four consecutive trials but was moved to a second and third location in the subsequent two blocks of four trials. For the group Random the treasure location changed at random from trial to trial among the three possible locations. During the test, the treasure was in a fourth new location in the presence of the four landmarks (without the flagship). The group Stable performed slightly worse than the groups Control and Random during the active pre-exposure phase, indicating attention to the landmarks (relatively relevant for the location for the goal). During the test phase all the participants readily learned to efficiently locate the goal in a new location. Analysis of the search time and gazing suggest some differences in the way the participants process the information, at least during the first test trials. However, overall, the test used was insensitive to the attentional modulation of learning (as found in rats by Redhead et al., 2001). We will discuss alternative approaches to reveal the attentional modulation of spatial learning in humans.

References:

Redhead, E. S., Prados, J. & Pearce, J. M. (2001). The effects of pre-exposure on escape from a Morris pool. The Quarterly Journal of Experimental Psychology, 54B (4), 353-367.

OC-22- STEM careers and the gender gap

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Keywords: STEM careers; Sex gap; Interventions; Proposals; Reversing a trend

In an interesting article published in the Barcelona newspaper La Vanguardia (dated 17/03/2020), Mireia Furriol, president of the Technology and Future Commission of the Industrial Engineers of Catalonia, commented that it is a painful observation that the presence of women in the world of science and technology is a minority. According to Furriol, ""today more than ever it is necessary for the application of technology to be built on diversity, because if algorithms reproduce the biases of those who program them and the majority are men, we run the risk that present and future applications or programmes will have sexist behaviour"". Unfortunately, however, the percentage of women working in the technology market is around 20% and, according to Furriol, in recent years there has been a worrying decline in the number of girls enrolled in technical careers, the so-called STEM (Science, Technology, Engineering and Mathematics). How can this trend be reversed? This paper presents concrete proposals, starting in kindergarten.

OC-23- Immersive virtual reality as a tool for ecological study of spatial cognition in humans

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Keywords: Spatial Learning; Virtual reality; Gaze tracking; Morris Water Maze; Human

The Morris swimming pool is one of the relevant tests for the evaluation of memory and spatial learning in a simple and controlled way. Theoretical developments in spatial cognition based on the results using the Morris pool in animal subjects, has motivated the interest in establishing similar tasks that allow to test these theories in humans. Ecological approaches to the issue use virtual reality technology for the implementation of learning tasks. Development of gaze tracking systems has also provided a valuable tool for the study of conditioning and spatial learning. However, most of the studies developed with the goal of studying spatial cognition in humans by using virtual reality are conducted with ad hoc designed procedures and tasks that make it difficult to test the replication of the studies across laboratories. The general goal of this work was the validation of a standardized tool that integrates gaze tracking in virtual reality systems that can be easily used by the scientific community. We present an immersive virtual reality task that incorporates gaze tracking within a video game in which participants play the role of archaeologists searching for a hidden treasure within a defined searching area that is surrounded by a forest environment. Task reliability was successfully tested replicating animal data in an acquisition paradigm. The task allows a flexible design of experiments allowing for configuring: (i) rotations of the digging area (N, S, E, W) in each trial, (ii) cues that appear in each trial, (iii) position of these cues (in the periphery of the arena or inside it), (iv) meaning of the cues (they can be relevant and indicate the position of the treasure or not), (v) position of the treasure to be found, (vi) test trials, etc. This task also includes gaze tracking, which allows extracting information about the user's attention to different elements of the environment. Some data that can be extracted after an experiment are: (i) number of movements performed, (ii) time in which each movement has been performed, (iii) diggings performed, (iv) time in which each digging has been performed, (v) fixations performed on each object, (vi) total time each object has received attention, etc. In addition, a zenithal map is extracted showing the movement path followed by the user during the experiment.

OC-24- The effect of learning and instructions in outcome expectations: a small contribution from experimental psychology to the social problem of sexual harassment

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Keywords: Contingency; Instructions; Predictive learning; Outcome expectations; Sexual harassment

An experiment aimed to test the effect of outcome expectations on the probability of reporting sexual harassment is presented. To do this, outcome expectations were manipulated through the instructions provided to the participants during the experiment (favorable, adverse, or neutral) or by a predictive learning task with feedback in which mostly favorable or adverse cases were presented in a 20/25 ratio. A significant effect of learning was found, being the lawsuit more likely when in the predictive learning task the legal process ended successfully in most cases. Further, a significant effect of the instructions was found in the predictive learning task. Specifically, adverse instructions reduced the likelihood of reporting, but only in predictive trials inconsistent with that expectation. These results are discussed in relation to the role that social expectations regarding court proceedings in cases of sexual harassment may have on the probability of reporting, making more difficult to overcome this social problem.

ORAL COMMUNICATION SESSION 6

OC-25- Chaining topographical tagging of behavior

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Keywords: Schedule-induced drinking; Concurrent schedule; Chained schedule; Adjunctive behavior; Rats

Schedule-induced drinking (SID) was first described more than 50 years ago, and it was classified as adjunctive behavior, induced by an incentive but not necessarily reinforced by it. Notwithstanding, the rules governing adjunctive drinking resemble a type of operant behavior. Therefore, in case SID should be controlled by its consequences, it would be fitting the major definition of an operant. The present study tested this hypothesis. We used two different sets of Wistar rats (n=8). In a first experiment, a single pellet of food was delivered at regular intervals after completion of a fixed interval (FI) schedule of 15, 30, 60 or 120 seconds for lever pressing. Concurrently, the opposite lever leaded to free water delivery during that time (a fixed ratio 1 schedule). In a second experiment, the rats had 15 seconds to complete a chained schedule where at least one lick was needed to have access to a FI schedule of 5, 10, 20 or 40 seconds providing one food pellet for lever pressing. Regardless the experimental contingencies, the animals showed higher levels of SID throughout the experimental conditions in which the inter-reinforcement interval was below 50 seconds, and a gradual decrease on this type of behavior as the time interval increased. Finally, we pooled data of both experiments to test a model, and its subsequent statistical fit, asking if both licks and lever responses to obtain food belong to the same type of behavior. We observed that regardless of the different contingencies governing the two experiments, our data showed a high degree of similar fitting for both experiments, suggesting that same processes might govern performance independently of the schedule used, thus supporting the view that adjunctive behavior is operant and advancing on the chaining mechanism that might be involved on its maintenance.

OC-26- Some properties of habituation of siphon withdrawal in the slimy clam Ruditapes decussatus

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Keywords: Bivalves; Habituation; Comparative Psychology; Learning; Clams

Over the last decades the comparative study of invertebrate animals' intelligence has shown the psychological complexity of these species. Although significant research has been carried out on the phylum of mollusks in the classes gastropods and cephalopods, there has been little research concerning bivalves. Some studies have demonstrated in clams the habituation phenomenon with a dishabituation test. However, no further studies in this line of research have been developed in order to study cognitive processes of clams and similar species. The aim of the present research was to develop a habituation procedure in the slimy clam Ruditapes decussatus by measuring the percentage of siphon withdrawal when exposed to light. In Experiment 1 a habituation-dishabituation procedure was used to study the stimulus intensity effect. A group was exposed to 350 lm and another to 806 lm. Clams exposed to 350 lm showed a higher habituation than those exposed to 806 lm. Experiment 2 studied the effect of stimulus and inter-trial interval (ITI) duration using a 2x2 design. Trials lasted 20 or 180 seconds, and ITI lasted 5 or 10 minutes. A combined effect of these two parameters was seen. Habituation is higher in clams exposed to 180-seconds trials with a 5-minute ITI. All together this constitutes a first systematic demonstration of habituation in bivalves.

OC-27- Differences between Simultaneously and Delay Conditioning in the snail Cornu aspersum

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Keywords: Appetitive Pavlovian Conditioning; Invertebrates; Simultaneously and delay conditioning; Attentional processes; Tentacle lowering

Several authors suggest that attentional processes are basic rates of consciousness and Classical Conditioning may be useful to study these attentional phenomena, specifically, the differences between simultaneously and delay conditioning. The aim of the present study was to observe these differences in the garden snail, using an appetitive Pavlovian Conditioning procedure of tentacle lowering. Subjects were divided in two groups according to the conditioning treatment: "simultaneously group" received an odorous conditioned stimulus (CS) paired with the access to food as unconditioned stimulus (US) at the same time, whereas "delay group" received the CS followed by the US immediately at the end of the CS exposure. It was observed that subjects which had received delay conditioning showed an equivalent conditioned response (CR) as subjects which had received simultaneously conditioning. However, delay conditioning group needed more training sessions to rise an asymptotical learning level than simultaneously conditioning group. The implication to understand the distractor´s interference in learning processes are debated.

OC-28- The influence of light exposure on the adaptive behavior of earthworms measured trough habituation learning

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Keywords: Earthworms; Adaptive behavior; Habituation; Lumbricus terrestris; Dendrobaena veneta

Earthworms are highly sensitive to light conditions. In fact, light might be a harmful stimulus for these subjects, which are animals of nocturnal habits. The phenotypic flexibility in earthworms light response has been registered in natural environments, but they have not been tested in experimental laboratory conditions. In these experiments, we studied the adaptation of earthworms to different light conditions through an habituation learning test. In the first experiment, we compared the habituation of the retraction response to the light in three groups of earthworms, L. terrestris, exposed for several days to a focal light, room illumination or darkness, respectively. In the second one, an intra-subject design was employed. Two groups of earthworms, D. veneta, were exposed to different light/darkness periods. One of the groups was kept in a brightly lit room for 15 days, whereas the other group was kept in total darkness before the habituation test. Afterwards, the illumination conditions were interchanged (light darkness; darkness light) before a new habituation test 15 days after. The results of these experiments suggest a modification on the habituation pattern of earthworms based on their previous experience with the light.

ORAL COMMUNICATION SESSION 7

OC-29- Executive functions in obsessive-compulsive disorder from a behavioural and functional connectivity perspective

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Keywords: Obsessive-compulsive disorder; Executive functions; Behavioural; Functional connectivity; Resting-state

Obsessive-compulsive disorder (OCD) is one of the most prevalent mental health disorders worldwide. It is considered the sixth most disabling in terms of functioning in daily life. OCD is characterized by deficits in executive functions, showing preference for immediate gratifications, low tolerance for uncertainty, difficulties in stopping a response, use of rigid strategies and working memory problems. All these functions are mainly driven by the prefrontal cortex. However, studies so far have addressed these behavioural dimensions and neuroanatomical basis in isolated ways leading to controversial results. The present study shows for the first time an integral view of the behavioural and neurofunctional state of executive functions over an OCD sample. For that aim, we recruited patients diagnosed with OCD (n = 25) and healthy controls (n = 32). Executive functions were measured with neurobehavioural tasks: Stop-Signal Reaction Time (SSRT), Probabilistic Reversal Learning (PRLT), ICE CREAM Nesplora and Delay Discounting Task (DDT). The resting-state functional connectivity of prefrontal and motor cortex was measured with Functional Near-Infrared Spectroscopy (fNIRS) (16x16). We performed a correlation analysis to determine whether there is any relationship between behavioural variables and the resting-state functional connectivity. We found that OCD patients perform significantly worse than the control group in motor inhibition, cognitive flexibility, working memory and decision-making. We found significant correlations between functional connectivity and behavioural variables. Further studies are necessary to understand how these deficits contribute to the clinical features of these disorders. Funding: The present study is part of the R&D and Innovation project PID2019-108423RB-I00, funded by the Spanish Ministry of Science and Innovation “Proyectos I+D+i: Generación de Conocimiento” and R&D and Innovation project P20_00308, funded by Junta de Andalucía “Proyectos I+D+i: Retos de la Sociedad Andaluza”.

OC-30- Chronic stress and renewal: two online studies evaluating the relationship between the Perceived Stress Scale-10 and the renewal effect

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Keywords: Human learning; Perceived Stress; Renewal effect; Predictive Learning; Cyberchicken

Research (e.g., Drexler et al., 2019) has suggested that stress is related to the recovery of extinguished learning with a context change (the Renewal Effect), claiming that stress induced prior to extinction can reduce Renewal. However, the impact of chronic stress on Renewal is presently unknown. Two online experiments evaluated the relationship between chronic stress measured by the Perceived Stress Scale-10 and Renewal. The first experiment used a task where participants played a space traveler shooting a "Cyberchicken" in different galaxies (contexts) to earn points. Two different lights predicted an attack that led to a loss of points in Context A. Participants learned to suppress shooting before the attack to avoid the point loss. One light was extinguished (no more attacks) in Context B, and then tested in Context A where renewal of suppression was expected. The second experiment used the predictive-learning paradigm used by Drexler et al. (2017). Participants played the role of a physician learning about different foods and stomach ache in two different restaurants. Two foods first predicted stomach ache in Context A and then occurred without consequence in Context B before being tested in back in Context A where renewal of stomach-ache expectation was expected. The first experiment showed a correlation between renewal and stress [$r(66) = .252$; $p = .038$]. The second experiment showed a correlation when renewal was maximum [$r(121) = .197$; $p = .029$]. The effects of stress and stress type (chronic vs. punctual) on renewal are discussed.

OC-31- Latent Inhibition and Personality Traits: Myth or Reality?

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Keywords: Latent Inhibition; Personality traits; Psychoticism proneness; Within-subject procedure; Experimental procedures

Latent Inhibition (LI), usually defined as the reduction of the associability of a stimulus that has been repeatedly preexposed without consequences, has received ample attention both in animal and human domains. A specific field of research that has revealed some conflicting and even contradictory results is related to the analyses of the relationship between LI intensity and different personality traits. The first results in this field of study revealed a negative correlation between psychoticism proneness and LI intensity. Soon after, other studies analyzing the effect on the intensity of the pre-exposure effect of other personality factors such as creativity, extraversion, openness to experience or even faith in intuition were published. In an attempt to replicate the relationship between LI and psychoticism proneness using a highly reliable within-subject procedure to induce the effect of LI with human participants, we found an enhanced effect of preexposure for those participants classified as high-psychotic prone, a result that is opposite to most of the reports from the previous literature. Considering both our results and those from the literature, we analyze the potential differential factors between experiments that can justify the apparently contradictory results, and discuss to what extent certain factors of personality can modulate the processes underlying LI.

OC-32- Latent inhibition with humans is actually latent inhibition, not learned irrelevance or relative novelty effects.

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Keywords: Latent inhibition; Human learning; Learned irrelevance; Relative novelty; Animal models

In recent years, it has been questioned whether results interpreted as demonstrations of latent inhibition (LI) with humans can be considered equivalent to demonstrations from animal models. For example, some results interpreted as IL with humans could actually be cases of learned irrelevance and/or relative novelty effects. We present a series of experiments using a video game task in which we attempted to rule out the contribution of these alternative effects through manipulations in both the stimuli involved in the exposure programs and the instructions received by the participants. The results obtained revealed a retardation in responding to the pre-exposed stimulus attributable to a context-specific IL effect, but not attributable to either learned irrelevance or relative novelty effects. The implications of these results for current theories of IL are discussed.

OC-33- Testing the inhibitory properties of a latent inhibitor in a superconditioning design

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Keywords: Latent inhibition; Inhibitory Learning; Rats; Conditioned flavor aversion; Appetitive conditioning

According to the Hall-Rodriguez account of latent inhibition (LI), under certain conditions, a stimulus pre-exposed in the absence of consequences may eventually acquire a net inhibitory value. For example, the pre-exposure of a stimulus (A) in compound with several novel stimuli (An1, An2, An3...) would endow A with this inhibitory value. Stimulus A would start from an initial excitatory value that would allow it to activate the expectation that some event might happen. This expectation would be extinguished by presenting A in the absence of consequences. But, critically, the presence of the novel stimuli would ensure (by increasing the strength of the expectancy that something will occur) that A's acquisition of inhibitory strength during that extinction would exceedits initial excitatory value, thus reaching a net inhibitory value. In previous studies we tested this predictionby performing summation tests after preexposure. In the experiments presented here we resort to superconditioning designs in several conditioning procedures: if the target stimulus A acquires active inhibitory properties when it is preexposed under the conditions described above, it should potentiate the acquisition of the CR by other stimuli when both are presented in compound during conditioning (i.e., AX+).

ORAL COMMUNICATION SESSION 8

OC-34- Dissociable control of sign-tracking and goal-tracking

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Keywords: Pavlovian conditioning; Sign-tracking; Goal-tracking; Extinction; HeiDI

"The nature of conditioned responding can reflect the properties of both the conditioned stimulus (CS) and unconditioned stimulus (US). For example, after rats have received pairings of a lever with food, they come to interact with the lever (sign-tracking) and the food well (goal-tracking). While both responses emerge as a result of conditioning trials, there is evidence that they are dissociable: sign-tracking is less sensitive to changes in reinforcement contingencies than is goal-tracking (e.g., Iliescu, Hall, Wilkinson, Dwyer & Honey, 2018), and sign-tracking declines over the duration of a CS while goal-tracking increases (Iliescu, Dwyer & Honey, 2020). Here, we demonstrate that extinction trials produce a less rapid reduction in sign-tracking than goal-tracking, and that such trials disrupt the usual distribution of sign- and goal-tracking during lever presentations. These results are inconsistent with those models of Pavlovian conditioning that provide no explanation for the emergence of sign- and goal-tracking during conditioning or for the dissociable control of these behaviours by (i) conditioning and extinction trials, and (ii) different components of the CS. Instead, the results provide support for a recent model of Pavlovian learning and performance (HeiDI; Honey, Dwyer & Iliescu, 2020; Honey & Dwyer, 2022; see Navarro, 2022).

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OC-35- Giraffes show the ability to make statistical inferences

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Keywords: Giraffe; Cognition; Statistics; Ungulate; Behaviour

The ability to make inferences based on statistical information is thought to require large brains and therefore to be limited to few species like great apes and parrots. Here we tested if giraffes (Giraffa camelopardalis) rely on relative quantities to predict sampling outcomes. To our knowledge, this ability has never been tested before in mammals other than primates. Giraffes were presented with two transparent containers filled with different quantities of highly-liked food (i.e. carrot pieces) and less-preferred food (i.e. zucchini pieces). The experimenter randomly drew one piece of food from each of the two containers and the giraffe could choose between the two without seeing whether a carrot or zucchini piece was drawn from the container. In the first condition, we varied the quantity and proportion of carrot and zucchini pieces. In the second condition, a physical barrier was placed in the middle of both containers, so giraffes only had to take into account the upper part of the container when selecting the container. In both tasks giraffes successfully selected the container more likely to provide the highly-liked food, making decisions based on statistical information and also integrating physical information to correctly predict sampling information. These results suggest that the ability to use statistical information to make decisions might be evolutionarily more widespread than previously considered.

OC-36- Influence of algorithms in trials based on testimonies

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Keywords: Decision Making; Algorithms; Justice; Cognitive bias; Jury

Over the last century research on the psychology of judicial process has tested the influence that some variables, such as the order or the format in which the information is presented, may have on the decisions of the juries. The irruption of algorithms in the justice system in recent years has led to some additional problems. Can the information provided by algorithms affect decision-making, so much so that people come to issue erroneous verdicts? If this were the case, could this problem be reversed or controlled by changing the order in which the information is presented? Could this problem also be solved by training or warning the participants that the algorithms are also prone to errors? The aim of our experiment was to answer these questions. Our results show that decision processes can be strongly influenced by algorithms and that some manipulations can reduce this influence.

OC-37- Early epistemic uncertainty and its influence on stimulus exploration

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Keywords: Uncertainty; Novelty; Attention; Learning; Stimulus exploration

When an animal is offered to explore two stimuli, one familiar and the other novel, it usually shows a preference for novelty. This preference is often interpreted in terms of the influence of the error term on attention to learn: perception of the novel stimulus results in the processing of a larger error term (i.e., a larger discrepancy between the sensory input and the mental representation of the stimulus) and an attentional mechanism aimed at reducing that type of uncertainty prioritizes the approach to that stimulus. This idea predicts a monotonic relationship between the number of exposures to the familiar stimulus and the magnitude of the preference for the novel stimulus: the more familiar the exposed stimulus the lower the tendency to approach it and the more readily the preference to explore the novel stimulus will be exhibited. We present evidence that challenges this monotonic relationship: both rats and humans show a preference to explore a "familiar" stimulus (as opposed to a novel one) when its exposure has been very brief. In light of these results, we speculate on the existence of a particular type of early epistemic uncertainty that would generate more entropy than the uncertainty elicited by a novel stimulus and that would prioritize access to limited attentional resources directed to learning.

OC-38- Salience modulation of the unique elements after the pre-exposure of four compound landmarks (AX, BX, CY and DY) in spacial learning

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Keywords: Salience modulation; Morris navigation task; Pre-exposure; Differential representation hypothesis; Spatial learning

Using the Morris pool several groups of rats received Intermixed or Blocked pre-exposure to two couples of compound landmarks (AX, BX, and CY, DY) that shared common elements. After pre-exposure, all animals were trained in a circular pool to find a hidden platform whose location was defined by a pair of landmarks outside the pool. A pair of landmarks formed by two unique elements from two compounds that did not share common elements (for instance by A and C; or B and D). Finally, after the acquisition trials, the rats received a last test trial without platform. On the one hand, the results of these experiments seem to suggest larger effectiveness of the unique elements (i.e. A and C) after a short intermixed pre-exposure; on the other hand, suggest reduced effectiveness of the unique elements after a long intermixed pre-exposure. Results according to our proposals in Ballesta et al. (2021) and that we discuss from this approach.

ORAL COMMUNICATION SESSION 9

OC-39- Reevaluating the function of the hippocampus in frustrative nonreward

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Keywords: Frustrative nonreward; Anticipatory behavior; Consummatory behavior; Hippocampus; DREADDs

The hippocampus is crucial for mnemonic representations of reward-predicting environments and goal-directed behavior. Yet, most studies have examined the spatial rather than the appetitive component of these memories. The present studies investigated the involvement of the hippocampus in the processing of negative discrepancies between obtained and expected rewards (frustrative nonreward). Previous research showed that hippocampal lesions cause a retention of anticipatory behaviors reinforced with a large reward after the reward was downshifted. However, there is no evidence of a similar effect on consummatory behavior. Experiment 1 studied the effects of excitotoxic lesions of dorsal and ventral hippocampus in a choice task in the 8-maze. In forced-choice trials, turning in one direction (right, R) led to 12 pellets, whereas turning in the opposite direction (left, L) led to 2 pellets (counterbalanced). Hippocampal lesions did not affect preference for the large-reward arm in free-choice preshift trials (R12>L2), but hippocampal rats continued to prefer that arm after a 12-to-2 pellet downshift (R2>L2). Such preference was eliminated in sham controls (R2~L2). Full hippocampal lesions could have disrupted various neural circuits, led to compensation by other brain areas, or interfered with learning before the reward manipulation. For a more specific assessment, we inactivated only the dorsal region during reward downshift sessions. In Experiment 2, rats were treated with inhibitory designer receptors exclusively activated by designer drugs (DREADDs) in the dorsal hippocampus and tested in two frustrative nonreward situations. In consummatory reward downshift, there was no evidence of an effect of inactivation on consummatory suppression after a 32-to-2% sucrose downshift. In a Pavlovian (autoshaping) choice task with two levers paired with 12 vs. 2 pellets (R12, L2, counterbalanced), chemogenetic inhibition did not disturb preference for the 12-pellet lever (R12>L2). However, after a 12-to-2 pellet downshift in one lever, preference for the large-reward lever was eliminated in control rats (R2~L2), whereas hippocampal rats continued to prefer the large-reward lever despite the downshift (R2>L2). These results are consistent with previous research and suggest that disruption of hippocampal function impairs tasks based on anticipatory (but not consummatory) responses requiring flexible adjustment to frustrative nonreward.

OC-40- Haloperidol induces conditioned catalepsy and a conditioned increase of locomotor activity

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Keywords: Haloperidol; Catalepsy; Locomotor Activity; Conditioning; Context

"Different experiments conducted in our laboratory have revealed a high degree of complexity of the conditioned response that appears after associating a context (CS) with the effects of the dopaminergic antagonist haloperidol (US). Specifically, when a drug-free test is conducted in the presence of the context, conditioned catalepsy is observed. However, if the test is extended over time, the opposite effect occurs, namely a conditioned increase in locomotor activity. In this work we present the results of an experiment with two groups of rats that received haloperidol before (Group Paired) or after (Group Unpaired) context exposure. After such context-drug association we conducted a drug-free test registering catalepsy and spontaneous locomotor activity. The results revealed, on the one hand, the expected conditioned response of catalepsy for the Paired as compared to the Unpaired Group. However, an analysis of locomotor activity for an extended period of ten minutes revealed less resting time, more rapid movements, and more rearing responses for the paired group. No significant differences appeared neither for stereotyped movements nor for slow movements. These results are interpreted considering the possible temporal dynamics of CR that could be inducing changes in dopaminergic transmission responsible for the changes in locomotor activity.

OC-41- Evaluating the Scalar Property of Scheduled-Induced Drinking

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Keywords: Schedule-induced behaviour; Timing; Scalar property; Drinking; Rats

The role of scheduled-induced behaviours (also known as adjunctive) in temporal estimation tasks is yet to be fully understood. Current theories suggest there may be two processes responsible for the development of behavioral patterns displayed by organisms and quantitative timing measures within an inter-reinforcement interval: induction and response-reinforcer contingency. Previous studies on the issue have failed to demonstrate the scalar property in scheduled-induced behaviours, arguing that its absence was due to the lack of an explicit response-reinforcer contingency. To test this hypothesis, a conjunctive schedule of food reinforcement was arranged so that the development of schedule-induced drinking occurred under stricter control than mere contiguity while maintaining reinforcer delay. Rats were divided into three groups, depending on the value of the fixed-time (FT) schedule used; and all were exposed to a conjunctive FT (15-, 30- or 60-s) fixed-ratio 10 schedule. Preliminary results show that the scalar property is not properly manifested; however, a more comprehensive data analysis on timing measures such as post-reinforcement pause and time of transition do point to a certain scalarity of induced behaviours, which stimulates further investigation on the topic.

OC-42- Effect of cerebellar perineuronal nets removal on drug seeking

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Keywords: Addiction; Cerebellum; Perineuronal Nets; Chondroitinase; Drug-seeking

Addiction could be considered the result of pathological learning and memory in which drugs induces aberrant activation of drug-induced plasticity and metaplasticity mechanisms that restrict subsequent synaptic modifications and stabilize drug-related memory. Perineuronal nets (PNNs) are specializations of the extracellular matrix that enwraps the soma and proximal dendrites of some subsets of neurons and have been related to synaptic stabilization and long-term memory. In the cerebellar cortex, the only neurons that express PNNs are Golgi interneurons and Lugaro cells. In previous studies, we have found a dynamic regulation of PNN expression after extended cocaine self-administration. While cocaine self-administration reduced PNN expression around Golgi inhibitory interneurons in the cerebellum after one day it increased expression after protracted abstinence. The aim of the present study was to investigate the effects of PNN removal on the incubation of drug seeking during protracted abstinence in a model of escalating cocaine use. The effect of PNN digestion using the bacterial enzyme Chondroitinase ABC (ChABC) was evaluated after rats were allowed to self-administer intravenous cocaine during an extended (6h) or restricted (1h) access for 12 days and left undisturbed in their home cages for 24h or one month (28d). The results showed a decrease in lever pressing during the drug seeking test after PNN digestion in lobule VII. However, we did not find effects of PNN digestion on extinction. Therefore, extended access to cocaine self-administration increased the expression of Golgi-bearing PNNs during protracted abstinence. PNN removal during protracted abstinence affect the intrasession maintenance of drug seeking but did not affect extinction. Our findings suggest that PNNs play a key role in the stabilization of neuroplasticity underlying the incubation of drug-seeking that occurs during abstinence.

POSTER SESSION I

P-01- Is probiotic supplementation capable of inducing changes in the psychological and physiological effects of prenatal exposure to chlorpyrifos?

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Keywords: Autism; Gut-brain axis; Organophosphates; Development; Probiotic

Autism Spectrum Disorder (ASD) is a heterogeneous neurodevelopmental disorder with a complex etiology characterized by early-appearing social communication deficits, social impairment and repetitive sensory-motor behaviours, activities or interests. Although the important role of genetics in autism is undeniable, it is also modulated by external environmental variables. The prenatal exposure to Chlorpyrifos has proved to have medium and long-term behavioral and molecular effects that are reminiscent of those observed in autism patients. Furthermore, immune dysregulation, gastrointestinal issues and dysbiosis are common comorbidities in this disorder. In recent years, links between the gut microbiota and ASD have been established. In fact, CPF exposure has been proved to induce dysbiosis in animal models. Based on this, we consider that ASD-like behaviours following gestational CPF exposure could be changed by exposing animals to a probiotic treatment during gestation. We also aimed to study the expression levels of important genes for the principal neurotransmitter systems, the expression of some cytokines as a marker of neuroinflammation and the expression of tight junction proteins that are involve in blood-brain barrier permeability. The behaviour of the rats was evaluated in the 3-Chambered Test, the Open Field Test and the emission of ultrasonic vocalizations by pups (PND7) in an isolated condition. RTqPCR was conducted in microplates, composed of SYBR green master mix, primers, nuclease-free water, and cDNA; with a total reaction of 10uL. Our results shown that probiotic supplementation affected different behaviours (development, motricity, sociability, vocalizations) throughout development and the expression of several genes from the main neurotransmitter systems. In future studies, the proteins where significant differences in mRNA levels have been found should be analysed to provide further empirical support for the molecular data presented here. Genes and proteins in different areas of the brain should also be analysed in adolescence and the composition of the gut microbiota.

P-02- Alcohol consumption in female rats after reinforcer devaluation and the modulatory role of exercising.

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Keywords: Alcohol consumption; Emotional self-medication; Reinforcer devaluation; Physical activity; Female rats

Increased voluntary consumption of alcohol and other anxiolytics has been demonstrated in animals after experiencing frustrative reward devaluation (downshift) or omission. Those results have been interpreted in terms of emotional self-medication. In a previous study, we analyzed the impact of physical activity on alcohol consumption induced by devaluation of an expected reinforcer in a sample of sixty-four male Wistar rats. Animals with simultaneous access to alcohol and a wheel for running did not show increased alcohol intake after reinforcer devaluation, thus suggesting that the possibility of exercising may reduce negative affect induced by reward devaluation and the increased alcohol consumption observed in animals that did not have access to the running wheel. In the present study, we analyzed whether the reported phenomenon also occurs in females. Experiment 1 involved thirty-two female Wistar rats that were divided into four groups (n=8): Sixteen (downshifted) animals received 32% sucrose during 10 preshift sessions (5 min), followed by 4% sucrose during 5 postshift sessions, whereas 16 (unshifted) controls were always exposed to 4% sucrose. Immediately after each consummatory session, animals were exposed to a 2-h two-bottle preference test involving 32% alcohol vs. water, or water vs. water. Half of the animals also had access to a wheel for voluntary running during the preference test. The results showed a weak reinforcer devaluation effect that however was accompanied by increased alcohol consumption only in the group without access to the running wheel. To test for a stronger devaluation effect, we conducted an Experiment 2 with the same conditions as the first one, except that the sixteen (downshifted) animals received 32% sucrose during 10 preshift sessions (5 min), followed by 2% sucrose during 5 postshift sessions, whereas the 16 (unshifted) controls were always exposed to 2% sucrose. Conditions of the preference test were the same as in Experiment 1. The results showed that the 32-2 manipulation increased the reinforcer devaluation effect (vs. 32-4) but did not increase alcohol consumption or preference (vs. Experiment 1). Female rats do not seem to self-administer alcohol as much as males after experiencing reinforcer devaluation, thus being this effect less malleable by the possibility of exercising.

P-03- Effect of Yohimbine on voluntary ethanol intake of adult male and female Wistar rats with different level of drug experience.

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Keywords: Ethanol; Yohimbine; Sexual dimorphism; Stress; Experience

Stress is commonly reported to increase the rewarding effects of alcohol. However, results are not always comparable between laboratories. The numerous variations in experimental methods are contributing to these contradictory results. On the other hand, we must keep in mind the derivative effects of repeated exposure to alcohol. These effects, that reflect an effort on the part of the organism to adapt to the chronic effects of the drug of abuse, have been implicated in the transition from alcohol use to abuse. If these two factors, stress exposure and chronic administration of ethanol, are present simultaneously, the interaction becomes complex. Sex differences must also be considered. There are a limited number of studies that have investigated sex differences in stress-alcohol interactions, and the reported results are inconsistent. In this work, we analyze the effect of stress (induced by Yohimbine, 4 mg/kg) on a free choice drinking procedure (the concentration of ethanol was increased gradually from 2% to 10%) in adult male and female Wistar rats, pre-exposed or not pre-exposed (naïve) to ethanol injections (3 intraperitoneal injections on alternate days). The obtained results show that female ethanol-intake levels were higher than the exhibited by males, especially in the case of ethanol-naïve female rats. The lowest level of consumption was exhibited by naïve males. Thus, differences by sex are observed in the consumption of ethanol, which seem to be determined by the degree of experience with the substance. Regarding the influence of stress, the data seem to show a slight increase in ethanol intake in yohimbine-injected rats, which is independent of sex. However, there seems to be a differential effect of Yohimbine on the consumption of males and females depending on their degree of experience with the substance. Specifically, there is an increase in the consumption of females with previous experience with ethanol, as well as that of males with no previous experience with ethanol. In short, we could say that Yohimbine minimizes the sexual differences determined by the level of previous experience with ethanol, matching the consumption levels of the different groups upwards. These results may contribute to expanding and clarifying the existing database on the influence of factors such as experience, sex and stress, and their possible interactions, on ethanol consumption in rodents.

P-04- Evaluating Reward Downshift in a Context Signaling Naloxone

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Keywords: Reward downshift; naloxone administration; endogenous opioids; negative emotion induced; context associated with naloxone

Ruiz-Salas et al. (2022) reported that the effects of a reward downshift induced by a 32%-to-4% sucrose solution change was reduced when the downshift took place in presence of a context previously associated with morphine, but in the absence of drug. This effect can be interpreted as a result of a reduction of the negative emotion induced by the change in reward mediated by a conditioned release of endogenous opioids triggered by presence of the context. In order to test this hypothesis, we run an experiment with rats that included three groups: A Paired Group received naloxone (US), an opioid antagonist, followed by context (CS) exposure. An Unpaired group received naloxone after context exposure. Finally a Saline Group never received naloxone. We expected a more intense effect of the reward downshift in the Paired as compared to the Unpaired and Saline group, due to the conditioned blocking of endogenous opioids triggered by signals of naloxone. The results revealed that naloxone administration during the preshift phase resulted in a strong reduction of consumption for the Paired and the Unpaired groups, probably reflecting a taste aversion process. Therefore, the results of the post-shift stage, although showing the predicted trend, are difficult to interpret due to the previous differences in consumption.

P-05- Testing the Effects of a Conditioned Anxiolityc Response on Fear Conditioning

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Keywords: Fear conditioning; Valproate; Context; Anxiolityc; Activity

Previous results revealed that presenting a new flavor in a free-drug trial in presence of a context previously associated with Sodium Valproate, an anticonvulsant drug that has showed an anxiolytic action in animal models, attenuated neophobia to a new flavor. This effect was interpreted as the result of an anxiolytic conditioned response elicited by the context that was similar to the unconditioned effect of Valproate. In order to check this conditioned response with other anxious-related behaviors we induced fear conditioning in presence of a context previously paired with the effects of valproate. We expected a reduction in the intensity of fear conditioning, expressed as reduced freezing, and a faster extinction process in a Paired Group that received valproate before context exposure as compared to an Unpaired group that received the drug after context exposure. An additional control group received only saline during context conditioning in order to show the regular intensity of fear conditioning. The results did not confirm the hypotheses since no significant differences appeared between the three groups at conditioning stage, although in the extinction phase the Unpaired Group showed a slower extinction as compared to the remaining two groups.

P-06- Effects of an intruding stimulus on the temporal distribution of schedule-induced ethanol drinking in rats

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Keywords: Intruding stimulus; Schedule-induced behavior; Temporal relations; Ethanol; Rats

In the area of schedule-induced drinking (SID), it has been suggested that the effect of an intruding stimulus on the temporal distribution of water consumption is modulated by its temporal relationship with the delivery of a reinforcement stimulus. To test the generality of this finding in the case of ethanol consumption, food-deprived rats were exposed to a 64-s fixed-interval (FI) or to a 64-s fixed-time (FT) schedule for food. Concurrently, the rats pressed a lever in a continuous reinforcement schedule to obtain 0.4 ml of an 8% ethanol solution. In successive conditions, an 8-s neutral stimulus was presented within the different temporal locations of the interreinforcement interval. The temporal location was represented for the stimulus-reinforcement interval, counted from the beginning of the presentation of the stimulus until the delivery of the subsequent reinforcement. For six rats, exposed to each schedule of reinforcement, the neutral stimulus was presented from the beginning to the end of the interval; the stimulus-reinforcement interval was established at 48, 40, 32 and 24 s. For the other six, the stimulus was presented from the end to the beginning of the interval; the stimulus-reinforcement interval was established at 24, 32, 40 and 48 s. Adding and varying the duration of the neutral stimulus-reinforcement interval modulated the temporal distribution of the lever-pressing for ethanol and the average consumption of the ethanol solution compared to baseline conditions, as reported in previous studies with water. The effect of a stimulus on schedule- induced drinking depends on the temporal relationship established between the presentation of the stimulus and the delivery of the preceding and subsequent reinforcement, and the behavior that the stimulus intercepts during it is presentation.

P-07- Chemogenetic orbito frontal cortex inhibition and chemogenetic amygdala activation in high compulsive rats.

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Keywords: Compulsivity; Schedule-induced polydipsia; hM4Di; hM3Dq; OFC-amygdala

Compulsivity is associated with the loss of inhibitory control over a broad range of behaviors that are prone to excess. Preclinical and clinical studies on compulsivity have demonstrated that fronto-limbic structures are implicated in the pathophysiology of compulsive spectrum disorders. The present study was designed to assess the effects of chemogenetic stimulation or inhibition of orbitofrontal cortex (OFC)-amygdala circuit in a preclinical model of compulsivity. Initially, male Wistar rats (approx. 300 g) were selected as either high compulsive (HD) or low (LD) drinkers according to their level acquisition of water intake (ml) on schedule-induced polydipsia (SIP, fixed time schedule of 60s) after 20 sessions. In a first experiment, we used designer receptor–mediated inhibition (hM4Di) in HD and LD rats' OFC. In a second experiment, we used designer receptor-mediated activation (hM3Dq) in HD and LD rats' amygdala. Finally, we re-exposed rats to SIP. Repeated measured ANOVA revealed no significant effects nor by the chemogenetic OFC inhibition, nor by the chemogenetic amygdala activation in the water intake of HD and LD rats on SIP. The chemogenetic inhibition or activation of the OFC-amygdala circuit did not have effect on the compulsive behavior observed on SIP. Future studies should explore other brain areas implicated in the inhibitory control brain circuit with chemogenetic stimulation on preclinical models of compulsivity to identify the underlying mechanisms related to obsessive-compulsive disorder.

P-08- Noradrenergic modulation of acquisition, extinction and reinstatement of a pavlovian conditioning induced by abused drugs

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Keywords: Addiction; Noradrenaline; Clenbuterol; Atomoxetine; Conditioned Place Preference

Extensive evidence shows that noradrenergic signaling plays a pivotal role in memory plasticity. Noradrenergic agonists, administered shortly before or after learning, facilitate appetitive and aversive memory expression and consolidation. Addictive drugs are potent neuropharmacological agents capable of inducing long-lasting changes in brain circuits responsible for learning and memory. Repeated drug use induces maladaptive conditioned memories (context-drug) that promote drug-seeking behaviorand relapse in addicts. The repeated exposure to contexts in absence of the drug promotes extinction, an inhibitory memory that temporarily suppress the expression of drug-conditioned associations. This represents a strategy for weakening pathogenic memories including those involved in drug conditioning. Here we assessed the impact of noradrenergic enhancement in the extinction of a conditioned memory induced by cocaine. Our experiments examined the effects of clenbuterol (CLEN), a β2-adrenergic receptor agonist and atomoxetine (ATO), a NA reuptake inhibitor, on the expression, extinction and reinstatement of cocaine-induced conditioned place preference (CPP) in mice. Male C57BL/6J mice were trained following a cocaine (20 mg/kg)-induced CPP. Following a CPP test, the extinction phase started and animals were divided in two different experiments (Experiment 1; CLEN and Experiment 2; ATO). In Experiment 1, animals received CLEN (0 or 0.5mg/kg) injected 30 minutes before each extinction trial. Reinstatement was tested 24h, 72h and 30 days after extinction. In Experiment 2, and following the CPP test, animals received ATO (0 or3 mg/kg) injected 30 minutes before each extinction trial. Reinstatement was also tested 24h, 72h and 30 days after extinction. Our data indicates that systemic administration of CLEN does not modulate the extinction or reinstatement of cocaine-induced CPP. ATO given before T1 facilitates extinction of cocaine-induced CPP. These findings indicate that NA modulates extinction of cocaine-CPP depending on the initial expression of CPP and before extinction. Future research will elucidate the precise conditions under which the noradrenergic system contributes to the consolidation of extinction of pavlovian memories induced by cocaine in mice.

P-09- Ultrasonic Vocalization in wistar rats prenatally exposed to particular matter air pollution

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Keywords: Particular matter air pollution; Autism spectrum disorder; Ultrasonic vocalization; Neurodevelopment; Environmental factors

Recording of ultrasonic vocalizations (USV) has been considered year after year as a valuable technique to improve the understanding of the behavior of rodents. Particularly, when the focus of the research is in relation to social behavior, such as autism spectrum disorder (ASD), and even more important when the questions to answer point out particular stages related to the development of this disorder. ASD is characterized by deficits in verbal and nonverbal communication, stereotyped behaviors, alterations in attention, impulsivity, and emotional and social interactions. The increasing number of children diagnosed with ASD has provoked an increment of research on the possible causes behind it, and it seems that ASD has a very complex etiology that goes from genetic to environmental factors. Concerning this latter, in the last few years, particular matter (PM) air pollution has received more attention due to some recent results in the scientific literature. Especially, when the exposition to this PM has been studied during the development of the fetus. A very sensible period. Thus altogether, we have performed an experiment observing the characteristics and amount of USV in pups of Wistar rats that have been prenatally exposed to PM<10µm (at a dosage of 200mµ/kg/day) during all the gestation (from GD1 to GD21) in comparison with a control group (CNT) which received only PBS, taking also special attention to the possibilities of sexual dimorphism, which is also an aspect emphasized in the probability of suffering from this disorder.

P-10- Neural activation induced by binge-like alcohol intake in C57BL/6J mice: Evaluation of a multiple bottle choice drinking-in-the-dark (DID) procedure

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Keywords: Binge-like drinking; Drinking-in-the-Dark; Addiction; Ethanol; C57BL/6J

Vulnerability to the development of alcoholism has been associated with recurring binge drinking. Animal models focusing on excessive alcohol (ethyl alcohol; EtOH) intake and binge-like drinking patterns are therefore essential to the study of the neurobiology of alcohol abuse. Over the last decade, the drinking-in-the-dark (DID) procedure has been extensively used to investigate binge-like EtOH drinking in laboratory contexts. In C57BL/6J mice, DID procedures promote voluntary drinking to intoxication and blood EtOH concentrations comparable to those achieved in human binge drinking episodes. Despite the fact that availability of more than one EtOH bottle tends to increase overall intake in rodents, standard DID procedures generally use only one EtOH bottle. In the current study, we introduced a modified version of a DID procedure that presents multiple bottle availability to promote even higher levels of EtOH drinking. Our objective was to enhance binge drinking as well as to evaluate DID's effectiveness at inducing neural activation (measured by c-Fos expression). One-, two-, three- or four-bottle tests were performed with different (separate experiments) EtOH concentrations (5, 10, 20 or 40% v/v), with all available bottles always containing the same EtOH concentration. This modified DID procedure was tested in male C57BL/6J mice aged 8 or 20 weeks old. Apart from the standard 4-day protocol with a 4-h test on day 4, we additionally conducted a 4-week experiment to study the time-course of EtOH intake. Brain samples for determination of EtOH-induced neural activation were obtained 2 or 4 h after the beginning of the 4-h test on day 4. Our results showed that a 4-bottle test significantly increased EtOH intake (compared to 1 bottle) and this effect was found across EtOH concentrations but was not found with water. Using the most common 20% EtOH concentration, we confirmed that the increase in intake associated with the 4-bottle configuration was found in young and older adult mice and that this increased drinking was not only maintained but slightly increased over time. Histological results showed EtOH-mediated increases in c-Fos expression in the Lateral Central Amygdala (CeL), while in the Nucleus Accumbens (NAc) core and shell don't found significant differences.

P-11- Effects of prenatal Particulate Matter Air Pollution <10nm exposure on rats over inhibitory control: a study performed in a preclinical model

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Keywords: Neurodevelopment; Inhibitory control; Air Pollution; Preclinical; Environmental Toxicology

Particulate matter (PM), or also known as particle pollution, is a complex mixture of particles with a specific diameter (commonly classified as <10 nm, 2.5 nm and 0.1 nm). Exposure to PM, gestational or postnatal, have been associated with neurodevelopmental disorders, in both human and preclinical studies, such as autism spectrum disorder (ASD) and attention-deficit/hyperactivity. One of the key components of ASD is a delayed and an abnormal inhibitory control development. However, the influence of PM <10 nm in inhibitory control development have been sparsely studied in preclinical models. In order to clarify that influence, we randomly exposed pregnant Wistar rats to PM <10 nm (at a dosage of 200µg/Kg/Day) or its vehicle (PBS) throughout gestation (GD1-GD21). Pups from both sexes were tested for body weight, developmental variables, inhibitory control, learning and attention, assessed with the 5-CSRTT. PM <10 exposure influenced inhibitory control and developmental variables, where exposed animals weight more than PBS exposed offspring. Future research should focus more on other sub-domains of inhibitory control, such as impulsive decision-making or cognitive impulsivity.

P-12- Sex modulation of acute and chronic effect of methylphenidate on prepulse inhibition

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Keywords: Attention Deficit Hyperactivity Disorder (ADHD); Methylphenidate (MFD); Prepulse inhibition (PPI); Sex; Filtering processes

Methylphenidate is a psychostimulant drug that is commonly used as a treatment for attention deficit hyperactivity disorder (ADHD) in both children and adults. So far, there are few studies on the effects of acute and chronic use of methylphenidate (MFD) in adults and the results are mixed. Studies using animal models can provide us with more specific information on the physiological and behavioral effects of MFD. The aim of this study was to analyze the effects of acute and chronic administration of MFD on prepulse inhibition (PPI) of the acoustic startle reflex. We used 3 prepulses: 75, 85 and 90 dB. In addition, we analyzed whether the effect of MFD was modulated by the sex of the animals. The drug was administered orally, by pipette, at a dose of 2mg/kg MFD dissolved in a saccharin solution. Half of the animals received MFD 30 min before the beginning of the first IPP session (acute phase) and the rest received the saccharin solution without the drug. After seven days of drug treatment, animals again underwent PPI testing (chronic phase). Forty-eight hours later, all animals received additional once-daily exposure to the PPI test session with no drug treatment. The results showed that acute MFD consumption differentially affected IPP as a function of sex. Overall, MFD significantly reduced the effect of IPP in males, but didn´t affect females rats. This effect was obtained for the higher prepulses both for the administration of acute and chronic MFD dose. Therefore, we can conclude that MFD negatively affects pre-attentional information filtering processes in males, but not in females.

P-13- Brain maturation effects on a stop-signal task in autoshaping

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Keywords: Brain maturation; Stop-signal task; Inhibition; Endophenotype; Autoshaping

The maturation processes in the brain allow animals to fit their responses adaptively, modulating them depending on environmental changes. A key structure involved in the ability to flexibly alternate between different kinds of response is the medial prefrontal cortex (mPfc). It is at the end of adolescence when the mPfc reaches a stable state of maturity, facilitating executive functions (Caballero & Tseng, 2016; O'Donnell, 2011; Tang et al., 2018; Serrano-Barroso et al., 2019). Inhibitory processes are included in these cognitive processes, and here we tried to analyze how mPfc modulates inhibitory task in different maturation periods. In this regard, we studied response inhibition in sign (ST) and goal (GT) tracker animals using a stop-signal task (SST). This procedure consists of several trials of a go-signal and after that, the stop-signal starts unexpectedly (Bari & Robins, 2013). The SST measured the ability to stop or cancel an already initiated response to get a reward. The results showed different performance depending on the maturation state and sex. Adolescent group displayed a reduced inhibition compared to adult groups. Furthermore, ST and GT adult group showed differences by gender; that is, female ST adult rats displayed a reduced inhibition regarding GT performance. Although GT decreased the magazine entries across the trials, ST female animals needed more trials to omit response in 50% of the stop trials, which was used as an index of response inhibition. These data indicate that mPfc is necessary in conditioned inhibition and is differentially involved in ST and GT profile, supporting the idea that ST animals could show prefrontal imbalances.

P-14- Effect of methylphenidate consumption on a sustained attention task

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Keywords: Attention; Sustained attention; Dopamine; Methylphenidate; Rat

"Methylphenidate (MFD) is a psychostimulant that causes an increase in dopamine in different areas of the brain. It is a commonly used drug for the treatment of attention deficit disorders. Currently, there is scarce information on how MFD affects higher executive functions, such as sustained attention. This experiment analyzed the influence of MFD on an operant task to measure sustained attention in rats. Training was carried out in operant conditioning boxes with 16 adult Wistar rats (8 females and 8 males). The task requires the subject to respond to the visual stimulus (light) by pressing a lever ('Hit') and hitting the opposite lever when the stimulus was not available ('Correct Rejection'). Once the animals reached the learning criterium, we continued the training administering the MFD 30 minutes before the sessions. All animals consumed water in even sessions and a dose of MFD (0.5 mg/kg, 2 mg/kg, 5 mg/kg or 10 mg/kg) during odd sessions. The results obtained in this experiment show the effect of MFD on sustained attention and the differences between males and females. "

P-15- Mild maternal separation in mice of both sexes affects the dopaminergic system and has an impact in adulthood on vigor to approach or to escape motivational stimuli

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Keywords: Maternal separation; Dopamine; Effort; Sex differences; Nucleus Accumbens

Early-life stress affects brain development and can lead to psychiatric disorders, such as depression, later in life. Little is known about the effect of early-life stress on motivational processes such as effort-based decision-making. Mesolimbic dopamine (DA) regulates activation and effort in motivated behaviors. Stress changes DA systems. Maternal Separation (MS) could act as an early-life stressor depending on its duration and intensity. Using CD1 male and female mice, we evaluated the impact of early but mild MS (PND3-5, 90 min each day), on selection of effortful responses in adulthood under positive or aversive conditions. In a three-choice-T-maze task, engagement in effortful activities such as running in a wheel (RW) versus sedentary eating sweet pellets was evaluated, and in a forced swim task (FST), time dedicated to vigorously escape versus passively floating was measured. In both sexes, MS mice spent more time in the RW, and climbing in the FST, showing an increase in relative preferences for activity-based reinforcers, and persistence in vigorous escaping from aversive contexts compared to non-separated mice. Thus, mild early-life stress potentiates effortful behaviors independently of the emotional valence of the situation. In adulthood, after administering tetrabenazine (TBZ), a VMAT-2 blocker that depletes DA, only males showed anergia: reduced time in the RW, increased time eating in the T-maze, and reduced climbing and increased immobility in the FST. MS increased cerebral dopamine neurotrophic factor (CDNF) in accumbens only among females, suggesting that this neurotrophic factor may protect mesolimbic DA regulated functions.

P-16- Testing the boundaries of suboptimal choice

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Keywords: Suboptimal choice; Delay; Rate of reward; Information; Starlings

Several studies have shown that, under certain circumstances, animals systematically incur substantial foraging losses by preferring a lean but informative option to a rich but non-informative one. Usually, the Informative option delivers food on 20% of the trials after a 10-s delay, signaled by an S+, and delivers no food on the remaining 80% of the trials, signaled by an S-; the Non-informative option delivers food after 10 s on 50% of the trials, regardless of the signal shown (S+/-). We explored the boundary conditions of this bias for information in two experiments with starlings. In Experiment 1, the duration of all terminal stimuli increased or decreased depending on whether starlings preferred the Informative or the Non-informative option, respectively. In Experiment 2, only the S+ and S- duration increased or decreased as in the previous experiment. We found that starlings continued to prefer the informative option even when all terminal stimuli were extremely long (max. 300 s; Experiment 1); when only the S+ and the S- could change (Experiment 2), we found that preference and delays fluctuated in an orderly fashion: as the S+ and S- durations increased, preference decreased and vice-versa. These findings suggest a tradeoff between information and the rate of food reward in determining the value of each option.

P-17- Prevention of dopamine depletion induced- anergia using programmed exercise in young mice: impact on CDNF and DARPP-32 phosphorylation patterns in nucleus accumbens

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Keywords: Dopamine; Physical exercise; Motivation; Nucleus Accumbens; CDNF

The mesolimbic dopamine (DA) system regulates behavioral activation and exertion of effort. DA antagonism or depletion induces anergia in effort-based-decision-making tasks. However, little is known about the neural mechanisms underlying decision-making processes that establish preferences for sedentary versus activity-based reinforcers. Physical activities have intrinsic motivational and reinforcing properties, but the choice to engage in voluntary physical activity is undertaken in relation to the selection of other sedentary alternatives. The present study assessed the impact of previous experience with forced exercise on reinforcer preference and DA-related postsynaptic markers (phosphorylation of DARPP32), as well as the impact of DA depletion via tetrabenazine (TBZ), a catecholamine depleting agent and vesicular transport inhibitor (VMAT-2), on choice behavior. It was also analyzed whether there was an increase in the neurotrophic factor most associated with DA; the Cerebral-Dopamine-Neurotrophic-Factor (CDNF), which has been shown to play an important role in promoting the survival of DA neurons. CD1 male mice were trained daily in programmed-automatic running wheels (RW) that forced animals to move. The control group had locked-RWs. After 9 weeks of training, animals were tested in a T-maze-3-choice task developed for the assessment of preference between physical activity (RW) vs. more sedentary reinforcers (sucrose pellets or a non-social odor). TBZ (2.0 mg/kg) was administered intraperitoneally 120 minutes before the T-maze-test. Both groups (trained and controls) preferred to spend more time interacting with the RW versus the other reinforcers. TBZ produced a relative change in preference in the control group; it reduced the time they spent running, while increasing the time they spent eating. However, the forced-exercise group was insensitive to the effects of TBZ, both in behavior and in pDARPP32-Thr34 expression. In addition, a significant increase in CDNF was observed in nucleus accumbens core and shell in trained animals. These results suggest that DA regulates the intrinsic reinforcing characteristics of voluntary exercise, but not the primary reinforcing characteristics of sedentary reinforcers such as intake of sweet foods. Moreover, mild forced exercise could act on DA-related cellular mechanisms that prevent the anergia-inducing effects of DA depletion.

POSTER SESSION II

P-01- Reinforcement quality effects on schedule-induced drinking and magazine entering

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Keywords: Schedule-induced drinking; Behavioural economics; Essential value; Motivational value; Pellet flavor

Schedule-induced drinking (SID) refers to the development of high rates of licking under inter-reinforcement intervals without explicit arranged contingency between its occurrence and the delivery of reinforcement, only due to the repeated occurrence of intermittent scheduled reinforcers. To determine the nature of this behaviour it is important to study the motivational variables that modulate SID, depending entirely on characteristics relating to the reinforcer (food), such as hunger, magnitude, frequency, and its quality, instead of those relating to water. The quality of the reinforcer and its motivational value can be studied through behavioural economics which provide the concept of essential value to indirectly assess the preference of different types of food. In the present study, the essential value of different pellet flavours was manipulated to assess the motivational value of food in the development of SID. Twenty-eight Wistar Han female rats were used for this experiment. Firstly, a flavour preference test was conducted using a procedure to determine the demand elasticity of each of four pellet flavours (sucrose, berry, chocolate, and banana) for every rat using a series of fixed ratio (FR) food schedules. Then, the animals were selected based on performance on the FR schedule and randomly distributed into two groups: high essential value (HEV) and low essential value (LEV), where they would be exposed to the flavours with the highest or lowest value for each of them in the next experimental phase. In the preference test, 16 subjects had three or more valid demand curves ($R2 \geq .7$). Secondly, development of SID was studied under a fixed time (FT) 60 s food schedule, using the pellets with higher EV for each rat in the HEV group, and pellets with the lower EV in the LEV group. Finally, rats were exposed to FT 30-, and 120- s food schedules under the same conditions. In the FT 60 s SID development phase, rats presented with their higher-valued flavour (HEV) developed lower levels of water intake than those in the LEV group, although magazine entries were substantially higher in the HEV group. These results point to a competition between responses (magazine entries and spout licking) modulated by differences in the motivational value of pellet flavour preference and on the length of the response window in FT schedules, which lead to the third phase of the study, in which a FT 30 and a FT 120 s were used to test these hypotheses.

P-02- The Effect of Impulsivity on Devaluation in Pavlovian Instrumental Transfer

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Keywords: Impulsivity; Devaluation; Pavlovian instrumental transfer; Specific and General effects; Addiction

Impulsivity is a personality trait that plays an important role in various types of addiction (Meda, et al., 2009). Addictive behaviours can be observed from Pavlovian instrumental transfer (PIT) tasks: a conditioned stimulus (CS), previously paired with a specific outcome, can influence the performance of an instrumental response (R). PIT effects can be specific (the CS selectively elevates the performance of an R paired with the same outcome) or general (CSs elevate the performance of an R paired with any outcome of the same motivational value). It has been proposed that individuals with high impulsivity levels keep consuming rewards even if they are satisfied, which results in addiction, this may be because they are insensitive to the devaluation of rewards (Hinojosa-Aguayo & González, 2020). In this study we examined this assertion, employing a novel appetitive task in human participants to examine the effect of outcome devaluation on both general and specific PIT. We also measured impulsivity using the UPPS, to explore the extent to which impulsivity is related to specific and general PIT, and any effect of outcome devaluation on their magnitude.

P-03- Generalization of Contextual Renewal by discrete stimuli in humans

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Keywords: Contextual renewal;Second order matching-to-sample; Generalization; Online task; Humans

Contextual renewal increases an extinguished response due to a context change after extinction. When an operant response is reinforced in context A and extinguished in context B, the response reappears when returning to context A (ABA renewal) or in a novel context (ABC renewal). However, the response is greater in ABA than ABC renewal, suggesting a generalization decrement between contexts when the original context changes. Varying the contexts can allow studying the generalization of the contextual renewal effect to novel contexts. When a context is defined as a discrete stimulus increases experimental control allowing an effective variation that leads to the study of its generalization. The present experiment evaluated the generalization of contextual renewal through multiple generalization tests, employing a second-order matching-to-sample online task where the context was functionally defined as a second-order sample stimulus (SOS). Twenty students learned to emit R1 in the presence of X when presented with an SOS A. In an interference phase, R2 was reinforced in the presence of X when SOS B was present. Finally, for all groups, eight test trials were presented randomly, in which the position of the SOS was varied by 45º. The results showed more responses R1 in the presence of the original SOS A position and a systematic reduction of response to different positions, showing a generalization gradient. These findings suggest the second-order matching-to-sample task as an experimental model to study context functions using an SOS as physical context. The relevance of these findings was to observe the stimulus control processes that underlie contextual renewal.

P-04- Monkeys form associations, memorize lists, and learn relative rules when making ordered choices.

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Keywords: Rule learning; List memorization; Associative processes; Hierarchical ranks; Primates

Rhesus macaques (Macaca mulatta) live in matrilineal dominance hierarchies where transitive inference (A > B, B > C A > C) can potentially be used to infer the hierarchy. The monkeys in a group could also be organized using rules based on physical characteristics, such as relative size. We designed three types of image sets to investigate how six adult, male monkeys would learn hierarchies under varying artificial conditions. Scene Sets were images of natural scenes or cityscapes with no observable pattern by which to rank them. Monkeys had to learn by trial and error how they were ranked. Pattern Sets were shapes arranged according to some physical characteristic like size such that a rule, “pick large”, could be learned. Disordered Sets were the same shapes used in Pattern Sets but rearranged so monkeys could not order them using a relative rule. Monkeys learned Scene Sets more quickly than Pattern Sets and did not learn Disordered Sets. In follow up experiments, we found that monkeys had learned rules for the Pattern Sets, but that there was also an effect of associative strength that influenced their decision making. We also found that monkeys could reverse a relative rule, but not a hierarchy organized by transitive inference. Finally, we designed a set to specifically pit memorization of features against adoption of a relative rule. In the Triangles with Scenes Set, triangles were arranged by size and had unique scene images within them, where monkeys could attend to the rule, the scene images, or both. When given this choice between memorizing and rule learning, our monkeys relied on memorizing the scenes in each triangle and did not show evidence of using a rule.

P-05- Context-specific habituation of the abdominal contraction response in the mealworm pupae (Tenebrio molitor)

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Keywords: Context; Habituation; Insects; Learning; Tenebrio molitor

Habituation can be defined as the decrement of responding produced by a repeated stimulation. In the present experiment we explored whether the habituation of abdominal contractions in the pupa of Tenebrio molitor is sensitive to contextual changes. The experiment consisted of two phases. During Phase 1, both groups were exposed to a continuous stimulus light in Context A. At the beginning of this phase, pupae showed a high number of abdominal contractions, however, during the last minute of Phase 1, the number of abdominal contractions were lower. In the next phase, the pupae were divided in two different groups to test for response recovery. Half of the pupae received the Phase 2 in the original Context A, while for the other half this phase was conducted in Context B. Our results indicated an increase in the abdominal contractions only when subjects were exposed to the light stimulus in Context B. We discussed methodological and theoretical issues of our findings.

P-06- Taste Aversion Learning in the snail Cornu aspersum

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Keywords: Aversive Pavlovian Conditioning; Invertebrates; Quinidine; Habits and goal-directed actions; Tentacle lowering

The present study was conducted to provide evidence of the unconditioned stimulus (US) devaluation in the snail Cornu aspersum, using an aversive Pavlovian Conditioning procedure of tentacle lowering and quinidine as aversive stimulus. Subjects were divided in two groups: paired and unpaired. During devaluation phase, subjects from "paired group" received the US followed by the quinidine exposure, whereas subjects from "unpaired group" received the quinidine and, 30 minutes later, they received the US. Subjects which had received the US followed by the quinidine showed a higher decrease of the conditioned response than subjects which had received the quinidine and the US unpaired. These results provide a useful procedure to observed an aversive conditioning in snails and it allows us to study other complex phenomena as the difference in the context effect between habits or goal-directed actions.

P-07- The type and amount of training in flavor preference learning alters the underlying associative structure

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Keywords: Conditioned Preferences; Overtraining; Devaluation; Sensory-Specific Satiety; Sucrose

Pairing a palatable flavor such as sucrose (Unconditioned Stimulus: US) with an initially neutral flavor cue (Conditioned Stimulus: CS) leads to a conditioned preference for the CS. This conditioned preference has been mostly explained by two associations; flavor-flavor (preference based on hedonic sensory properties of the US) and flavor-nutrient (preference based on the energetic consequences of the US). Nevertheless, the US-hedonic reaction, which has been also suggested to be a possible component that could underlie the acquired preference has been less studied. This type of association would not be mediated by the mental representation of the US, so the conditioned response would be executed automatically in the presence of the CS (Stimulus-Response Learning: S-R). In the present work, we examined whether the type and amount of exposure to the CS-US compound during the conditioning procedure could alter the underlying associative structure of the conditioned preference. We expected that the more exposure to the CS-US compound, the greater the chance of a S-R type learning. Also, as S-R associations are featured by not being sensitive to devaluation procedures, we measured the rats´ preference for the CS when the US had been devalued or not by using a Sensory-Specific Satiety procedure. Results showed how the type and amount of exposure to the CS-US compound altered the US devaluation effect. In addition to discussing the theoretical implications of these results, the possible implications for eating behaviour given the characteristics of current environments are discussed.

P-08- The Effects of Reinforcement Magnitude on conditional discrimination in pigeons

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Keywords: Matching to the sample; Comparison stimuli; Delay; Magnitude; Pigeons

The standard procedure for studying the acquisition of conditional discriminations is the match-to-sample procedure in which, with pigeons as subjects, the first response to a sample stimulus (illumination of a response key of a given color, SS) results in the presentation of two comparison stimuli (CS's). In the similarity match-to-sample version, one of the comparison stimuli is identical to the SS and a response to it (correct) is reinforced with food. Introducing a delay between the completion of the SS and the presentation of the CS's, produces the number of hits decreases. In the present study, the matching procedure to sample was used in order to analyze the effect of varying the magnitude of reinforcement on the number of correct responses in the task. Four food-deprived pigeons were exposed to the matching-to-sample procedure in ABA design. Condition A consisted of a 2-s delay between the response to the SS and the presentation of the CSs. In Condition B the delay between stimuli was zero. Finally, the pigeons were exposed to Condition A but the magnitude of the reinforcer was increased from 3 to 4.5 s of access to a mix of grain. It was found that in the conditions without delay the number of correct responses was greater than in the conditions with delay. Increasing the magnitude of the reinforcer resulted in an increase in the number of hits, even though the delay between the stimuli was in effect. These findings are discussed in terms of the contribution of varying the magnitude of reinforcement on subjects' performance under a delayed conditional discrimination procedure.

P-09- Rodent version of the Iowa Gambling Task: Individual differences in risk decision-making behavior

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Keywords: Decision-Making; Rodent Gambling Task; Impulsivity; Individual differences;Risky behavior

The trait of impulsivity is presented in several psychopathological disorders and involve a deficit in decision-making in the Iowa Gambling Task (IGT). Preclinical models of gambling behavior could make a significant contribution to enhancing our knowledge of the behavioral and cognitive strategies that underlie both, good and bad decision-making. The aim of this study was to assess the differences in the individual strategies of decision-making. Here, twenty adult male Wistar rats were trained on the rat Gambling Task (rGT), a rodent analogue to IGT where rats choose among four different holes to gain as many sugar pellets as possible within 30 min. Each hole was associated with the probability to be punished or gain a reward. Animals were divided in two groups, good decision and bad decision, depending on their performance on the rGT and variables related to inhibitory control were measured. Moreover, we explore different decision-making strategies that might be underlying the good/bad performance behavior on rGT. Results will be discussed in terms of win-stay or lose-shift strategies and their relationship with inhibitory control domains. The rGT is a useful tool to study the neurobehavioral basis of gambling behavior and individual characterization of bad performers might be important to improve detection and treatment of gambling disorders.

P-10- Changes in the perception of sucrose solutions in university students according to academic stressors.

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Keywords: Anhedonia; Chronic Stress; Students; Sucrose; Monell

Depression in humans may decrease the ability to experience pleasure in front of usually pleasant activities, a phenomenon known as anhedonia. Anhedonia has also been observed in other non-human animals under chronic stress, where a decrease in preferences for dilute sucrose solutions is described. A recent study found that elderly people who received fewer visits from relatives and who were unable to socialize inside nursery homes, presented higher sucrose perception thresholds and preferences for higher sucrose solutions. University students (UE) are prone to stress and depression, however, there is little research on the effect of academic stressors on their sucrose perception. The objective of the present study was to determine preference and perception thresholds for sweet solutions in UE according to academic stressors. Agronomy students from the Pontifical Catholic University, Santiago, Chile (n49) were tested with the Monell and Shiftman test to determine their preferences and perception thresholds for sucrose solutions. Additionally, the "Beck" inventory test was used to assess risk of depression. Results were analyzed through an ANOVA (SAS), according to student's age, sex, year of the career (1-6), funding (Scholarship, Credit or Family support), Pending subjects (yes or no) and sleep hours. The age, sex and year of career did not affect variables analyzed ($P > 0.05$). Students funding presented an effect on the Beck score ($P = 0.05$), where students who had scholarships tended to present higher scores than students with family support ($P=0.07$). Students with pending subjects preferred higher sucrose concentrations ($P = 0.04$) and presented higher Beck scores ($P = 0.03$). Finally, sleep hours tended to affect the perception thresholds for sucrose ($P = 0.06$) and the Beck scores ($P = 0.08$), where students that sleep less presented the highest thresholds and scores. A delay in the career reflected in pending subjects or a low amount of sleep hours could increase the risk of depression or even could modify sweet perception in university students. Additionally, students who pay for their studies through scholarships tended to present more depression probably because they come from lower economic conditions where other stressors could contribute to higher scores in Beck's inventory.

P-11- Habituation in earthworms: Spontaneous recovery

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Keywords: Earthworms; Habituation; Spontaneous recovery; Vibration; Light

Habituation is a basic learning process essential for survival. This learning and its characteristics have been studied in many different organism like, for example, invertebrates. Our experiments were carried out with earthworms, which have shown characteristics of the habituation such as decrease in the level of response and generalization, between others. In this poster we explore another of the characteristics of the habituation: Spontaneous recovery. With this goal, we run two experiments analyzing the level of response of the earthworms to different stimuli (vibration and light). At first, subjects received an habituation training. After it, each group of earthworms waited for different periods of time until the stimulus was presented again (rehabituation test). The results show a faster and higher recovery of response in the case of light compared to vibration, which increases progressively.

P-12- High anxiety increases acquisition of a discriminated avoidance paradigm in humans.

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Keywords: Avoidance; Generalisation; Anxiety; Discrimination; Conditioning

Avoidance is hallmark of all anxiety disorders, yet it is unclear how learning mechanisms interact with avoidance tendencies. Over generalization of fear has been proposed as a candidate, based on the findings that participants with a diagnosis of anxiety show broader generalization than controls. In this experiment we assessed whether variability in anxiety (assessed with the STAI questionnaire) bears any relationship with the acquisition of discriminated avoidance behaviour. Human participants were presented with fractal images that were either paired with a loud tone (CS+) or not (CS-). They were told they could avoid the loud noise by pressing the space bar on the keyboard, critically this had to be done 1 second before the tone would appear. Participants (n=60) were split into high or low anxiety groups (based on their STAI scores) and discriminated avoidance acquisition was analysed. Participants High in Anxiety acquired better the discrimination between CS+ and CS- than those Low in Anxiety. There was also a tendency for High Anxiety participants to experience less loud noises although this difference was not statistically significant. These findings are at odds with the prevailing literature in fear conditioning (suggesting over generalization), and hence require replication. The discrepancies may be due to potential differences between fear and avoidance protocols.

P-13- Deprivation state during conditioning and testing modulates the expression of conditioned preferences to distal odors

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Keywords: Conditioned Preferences; Nutritional Deprivation; Distal Odors; Sucrose-Saccharine; Caloric-Hedonic

The standard procedure for the acquisition of conditioned preferences has traditionally been conducted by exposing the animal to tastes or odors, or to a mixture of both, for a limited period of time, followed by the presentation of substances with nutritional and/or hedonic value (Holder, 1991; Capaldi & Hunter, 1994). When odors are used as conditioned stimuli, they are usually presented diluted with the reinforcing substance (proximal presentation of the odor). Alternatively, presenting the odor on a disk attached to the bottle allows that the animal to perceive the scent without directly stimulating taste receptors (distal presentation of the odor). In previous experiments (Gómez-Sancho, Traverso & De la Casa, 2018), we found that, in animals not deprived of food during conditioning and testing, reinforcement with a nutritive and hedonic substance (sucrose) produced more conditioned preference for distal odors than if the reinforcement involved only a hedonic value (saccharin). In fact, when the animals were deprived only at testing conditioned preferences were only expressed when the reinforcer had a nutritive value (sucrose). In order to analyze to what extent food deprivation during conditioning might affect the expression of conditioned preferences to distal odors, we used the same design in two experiments with all animals food-deprived during conditioning phase. In Experiment 1, the animals that had been reinforced with sucrose were evaluated in a two-bottle test with the conditioned scent (odor A) versus the unconditioned odor, with half of the subjects food-deprived and the other half with free access to food. The same procedure was employed in Experiment 2, but the reinforcer was saccharin. The results showed that, for sucrose-reinforced rats, there was a significant trend to consume from the bottle with the conditioned odor, but only for the non-deprived animals. When the reinforcer was saccharin, the subjects showed no preference for the conditioned odor, regardless of whether they were food-deprived or not during the test.

P-14- Digital recording of neophobia on land snail's food ingestion

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Keywords: Snails; Food; Neophobia; Scanner; Fiji

Novel foods are avoided or cautiously ingested until the subject assesses they are safe. This adaptive strategy, called "neophobia", has been experimentally probed among vertebrates, specially in rats, but it could be also present in invertebrate species such as snails-- being deprived for one or even two weeks, snails feed on familiar food sources but seem to avoid the novel ones. However, contrary to what can be expected according to the neophobic explanation, right after being avoided, a novel food can be ingested if the experimenter put the snail on it (i.e. on a piece of carrot, which is usually employed as Unconditioned Stimulus). Thus, in order to confirm that the novel food is initially avoided rather than simply missed, it would be necessary to probe that snails eat the novel items less, and/or slower, than the familiar ones. At this point a methodological problem arises-- due to the slim, as well as to the small size of their mouth (radula), it is difficult to record the quantity of food that a snail eats by weighting the food item, specially if it is presented during short periods (i.e. seconds). We test a new procedure with Helix aspersa that estimates the amount ingested by presenting the food through microtome slicing, so that the surface eaten can be then estimated in pixels (subsequently converted in milimiters) after being digitally scanned and processed through Fiji program (ImageJ). Results could have implications for the continuity of the neophobia among species as well as for the snails' pest control.

P-15- Habituation in earthworms is modulated by pre-exposure to the context

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Keywords: Earthworms; Habituation; Preexposure; Comparative psychology; Evolution of cognition

Within the framework of Comparative Psychology, there is an interest in studying the learning mechanisms of different living beings in order to generate a global map of the evolution of cognition. For this purpose, learning processes such as habituation are being studied, since it is one of the most basic and can help us to understand more complex processes. In this research, earthworms (Dendrobaena veneta) have been used as study subjects. By means of two experiments we have analyzed the habituation of the retraction response and the relationship between pre-exposure to the context and the habituation phenomenon. In the first experiment the earthworms were pre-exposed to two contexts differentiated by texture and odor and the habituation response was evaluated in the same or different pre-exposed context. In the second experiment, they were pre-exposed to two contexts differentiated by the presence or absence of vibration. The results obtained suggest a differential effect of context's pre-exposure on speed and response rate in the habituation learning.

P-16- Inhibitory Control in Spanish Military Pilots

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Keywords: Decision making; Risk; Impulsivity; Inhibitory control; Expert/novice

The purpose of this study is to evaluate the variables that compose the higher executive processes involved in decision making in high risk situations in order to obtain a clear description of the expert profile required for official pilots of the Air Force and thus, subsequently, to be able to design training programs for flight students of the Spanish Air Force Academy. A group of pilots of the Spanish Air Force Academy with more than 1000 flight hours, average age 35 years, of which 2 were women, who were called "experts"; and a group of new students, with no flight hours, average age 18 years, of which only 1 was women, who were called "novices". Each of them performed 1 computer neurocognitive task assessing impulsivity and inhibitory control (Go/NoGo). They also answered the Barratt Impulsivity Questionnaire (BIS-11) and the Maudsley Obsessions Compulsions Questionnaire (MOCI). Significant differences were found in the measure of omission errors in the Go/NoGo test, being the novice group the one that made more errors in these trials. In the rest of the measures no differences were found between both groups. According to these results, expert pilots present fewer omission errors, which seems to be related to a greater inhibitory control of their responses. During flight and simulations these personnel must execute very effective actions to ensure operational results, therefore their inhibitory control is superior to that of military personnel without aeronautical training.

P-17- Sexual dimorphism in the estimation of temporal differences in a young population

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Keywords: Temporal perception; Memory; Dimorphism; Hippocampus; Spatial ability

The hippocampus is responsible for encoding both spatial and temporal aspects of information. Given that the hippocampus is dimorphic between the sexes, it might stand to reason that if there are differences in spatial ability, there are also differences in temporal ability, but there isn't much evidence to explore this. In both abilities it has been possible to verify that in different tasks there are significant differences in performance according to the age and sex of the participants. For this reason, the objective of this study was to verify whether dimorphism occurs according to biological sex in temporal perception tasks. For this, 55 participants were evaluated, of whom 25 were men and 30 women, all of them students at the University of Almería. This evaluation consisted of carrying out two tests of temporal perception similar to each other in the programming. They were presented with an object (in one task a car and in the other a square) that passed from the left to the right of the screen, having a different speed on each trial. In the center appeared a rectangle that caused the object to disappear for a variable time. The participants had to decide if the speed of the object was higher or lower in the invisible part when compared to the visible part. The results showed that there were differences between men and women in both tests, with men making fewer errors. This seems to be in line with the results found in the evaluation of spatial ability, which could indicate that there are apparently differences in the hippocampus between men and women. Another reason why these differences could appear is the use of strategies, both for spatial and temporal skills, different between both sexes. Future works can extend this evidence through the use of electroencephalography (EEG).

P-18- Reinforcement delay produces interaction of compound stimulus elements in operant discrimination

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Keywords: Overshadowing; Reinforcement delay; Potentiation; Matching-to-sample; Humans

Overshadowing is a phenomenon where a compound CS (AX) is associated with the US; during a test with each component separately, one of them, (A), produces a higher R than the other (X). Recently, an interaction of both components has been observed by varying the temporal contiguity between the compound CS and the US showing an increase in the CR of the overshadowed component (Urcelay & Miller, 2009). The present experiment employs a matching to sample task with a compound sample-stimulus (SS) AX in humans. Three groups received a delay between the correct R and the reinforcer (G0, G8, G16); all participants received training with a compound SS AX. Correct responses were reinforced with different delay values for each group (0, 8, and 16s). The test phase presented components A and X separately. The results showed the overshadowing of component X in group G0 with a minor delay and a similar number of R in both components in group G8. In contrast, group G16 showed more R for component X (potentiation). Results showed the interaction of the AX components as a function of delay between the correct R and the consequence. Differential forgetting of each component is suggested as being responsible for the effect.

POSTER SESSION III

P-01- Perceptual Learning After Rapidly Alternating Exposure to Taste Compounds: Assessment With Different Indices of Generalization

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Keywords: Perceptual Learning; Associative learning; Flavor aversion; Licking microstructure; Stimulus generalization

Exposure to two similar stimuli (AX and BX; e.g., two tastes) reduces the extent to which a conditioned response later established to BX generalizes to AX. This example of perceptual learning is more evident when AX and BX are exposed in an alternating manner (AX, BX, AX, BX,….) than when AX and BX occurs in separate blocks (e.g., AX, AX,..BX, BX,..). We examined in male rats (N = 126) the impact of rapid alternation to AX and BX on generalization of a taste aversion from BX to AX. Experiment 1 showed that such alternating presentations (with 5-min intervals between AX and BX) reduced generalization relative to blocked exposure; but only as assessed by consumption levels and not by lick cluster size (an index of hedonic reactions). Experiment 1 also showed that the nature of exposure did not affect how A influenced performance to a novel conditioned taste, Y. Experiment 2 replicated the pattern of results involving the different influences of rapidly alternating and blocked exposure on generalization from BX to AX, and showed that this effect was only evident when rats received access to water during the 5-min intervals between AX and BX. These results reinforce parallels between perceptual learning effects in rats and humans, both at empirical and theoretical levels.

P-02- Scarcity reduces the causal illusion by triggering a limited use of resources

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Keywords: Causal illusion; Scarcity; Causal judgment; Cognitive bias; Decision making

Scarcity is at the root of major economic and social problems such as poverty and hunger. Previous studies have proved that scarcity influences human decision-making processes. Thus, many negative effects of scarcity on judgments and decisions have been identified. Nonetheless, some authors have stressed that scarcity can also have a positive influence. In this research, we hypothesized that scarcity might reduce causal illusion.

Causal illusion is a cognitive bias that consists of believing that one event is the cause of another one, when in fact it is not. This bias has been widely studied in relation to superstitions, irrational thoughts, and pseudoscientific practices. We conducted an experiment in which participants played the role of medical doctors deciding whether to use a drug for healing patients. The drug was completely ineffective, as the healings were programmed to be independent of the drug intake. There were two different groups of participants: scarce and wealthy. The differences between the groups were in the instructions and the number of available drug doses (i.e., scarce in one group, vs. abundant in the other group). Nevertheless, both groups had enough doses for treating all patients. Our results show that participants in the scarce group provided fewer doses, that is, the occurrence of the potential cause, or P(C), was lower in this group as compared to the wealthy group. As a result, participants in the scarce group exhibited a lower causal illusion than those in the wealthy group, which means that the judgments of the participants in the scarce group were more accurate. Previous experiments had already reported the effect of the P(C) on causal illusions. We replicate this effect and provide evidence that manipulating the available resources can affect the P(C) without explicitly asking people to do so. These findings extend the existing literature about the P(C) effect and connect the causal illusions literature to the scarcity literature.

Understanding how scarcity (and abundance) influences causal illusions has implications in real life, when the accurate detection of causality is important. This includes not only medical contexts but also finance, nutrition, education, and consumer decisions in general.

P-03- The effect of cue pre-exposure survives conditioning in a multi-outcome video-game task

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Keywords: Latent Inhibition; Negative Transfer;Humans; Multi-outcome; Associative Models

One experiment followed up on two previously reported (Aranzubia-Olasolo et al., 2019). Participants used sensors (C1) to predict attacking spaceships (O1 & O2) and learned to prepare their weapons by pressing different keys prior to the arrival of different spaceships. The keys could be pressed independently and did not appear to interfere with each other. In those experiments C1 was first paired with O1 and later with O1 and O2 simultaneously. We showed that: a) C1-O1 conditioning delayed conditioning with O2 (Negative Transfer, NT); b) Pre-exposure to C1 retarded conditioning to both O1 and O2 (Latent Inhibition, LI); c) When C1 received both non-reinforced and reinforced pre-exposure (LINT) the retardation effect was greatest; and d) C1-O1 training did not make O1 inhibitory for O2, indicating that mutual outcome inhibition was not involved. A control group in the first experiment suggested that LI did not survive a time delay between pre-exposure and conditioning. The new experiment, using the same video-game task (Nelson et al., 2014), avoided the potential loss of LI in a control by eliminating the delay between pre-exposure and testing. Results showed robust effects of LI and NT for both the LI and LINT groups, and a lower response rate for the LINT group during the entire experiment suggesting summation of the two effects. Aspects of the findings are consistent with interference approaches (Bouton, 1993) and attentional accounts (LePelley, 2004). Overall, they are consistent with hybrid theories of latent inhibition (e.g., Hall & Rodriguez, 2010).

P-04- Eating with eyes: attentional bias towards food brand logos

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Keywords: Attentional bias; Food cues; Environmental cues; Associative learning; Pavlovian conditioning

In our environment we are exposed to cues such as images and smells that remind us of the great availability of highly caloric and palatable foods. These cues, through associative learning, can predict the presence of food as a rewarding stimulus and motivate eating behavior, leading to excessive food consumption even in a satiety state. Several studies have investigated how food has a great capacity for capture attention and how this effect can be transfer to arbitrary stimuli that had been artificially paired with food in the laboratory. The present research examined whether this attentional bias is also present in food cues that are naturally present in our environment, such as logos and food brands. In Experiment 1, we replicated the effect of attentional bias towards food images. In Experiment 2, we examined the attentional capture by food logos. To test our hypothesis, we used the Posner cueing task to measure attentional bias with pictures of food and neutral objects (Experiment 1) and pictures of food-related logos and neutral logos (Experiment 2) as distractor stimuli. Additionally, we conducted an online survey to study the familiarity and emotional value (hedonic and appetitive properties) of a set of logos and food brands. We used this information to select the images presented in Experiment 2. This study will allow us to better understand how environmental stimuli influence our attention and food consumption.

P-05- Design of an emotional facial recognition task in a 3D environment

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Keywords: Emotional facial expressions recognition; Serious Game; 3D Environment videogames

The recognition of emotional facial expressions is an essential skill for social relationships. Previous studies have highlighted that clinical and subclinical populations such as those diagnosed with schizophrenia or autism spectrum disorders (ASD), as well as those with high levels of schizotypy or broad autism phenotype (BAP) traits may show impairments in facial emotion recognition. This deficit could underlie difficulties in achieving an adequate social functioning. Given the importance of this type of this social functioning, in these populations and others, we aim, in the present study, to design a tool to measure the recognition of emotional facial expressions with the Unreal Engine 4 graphic engine in a 3D environment, with the aim of increasing psychological realism. The use of IVE (Immersive virtual environment) can help mitigate the problem of low psychological realism observed in experimental contexts. We compare the performance in this assignment with performance in a typically employed facial emotion recognition task. 94 undergraduate students from the University of Almería (aged between 18 and 32 years old) took part in the study. We also assessed usability and satisfaction experience by adapting a questionnaire that had evaluated them in an exergaming platform, and generated a series of questions to check whether there are differences between the two versions of the matching tasks (3D environment vs. classic format).

The results obtained in this study suggest that the students who completed the 3D environment task perceived it as more attractive, easy and satisfactory than the classic task. Regarding the recognition of emotional facial expressions, both tasks were similar in 4 of the 7 emotions evaluated, and the statistical analyses carried out suggest that this task is as useful as classical matching tasks for measuring the recognition of emotional facial expressions. We believe that this study represents the beginning of a new line of research that may have important repercussions at the clinical level for the development of assessment tools and training programs.

P-06- Can previous experience influence the illusion of control effect?

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Keywords: Illusion of control; Causal illusion; Illusion of causality; Contingency learning; Cognitive biases

The purpose of this study was to explore the influence of the experimental manipulation of expectations on the illusion of control effect (i.e. the tendency to overestimate our chances of success beyond the objective probabilities). In an initial passive task, 198 undergraduate psychology students were shown fictitious patients receiving (or not) an experimental drug and the feedback regarding whether the patient recovered (or not) from a disease. In a second phase, participants had to assess the same drug's effectiveness from an active role deciding whether to provide or not the drug to the patient. Participants in the experimental groups were pre-trained with a passive contingency judgment task to expect either a high (0.7) or a low (0.3) efficacy of the drug without being exposed to the baseline rate. Then, all participants performed an active contingency judgment task that had either a high (0.7) or a low (0.3) spontaneous recovery rate. The actual contingency was null. Thus, the participants were under 3 different conditions (high efficacy expectations, low efficacy expectations, and control) and 2 test conditions (high baseline and low baseline for spontaneous recovery). Results regarding participants behavior, P(R), suggest that participants do respond differently to the distinct conditions on the passive task. The illusion of control effect is replicated in this study, as well as the results found in previous studies showing a significant difference between test conditions (high / low baseline). However, the results indicate that the manipulation of expectations does not lead to any significant difference between groups on the illusion of control effect, in contrast with our predictions.

P-07- Telework and its effects on mental health: A systematic review

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Keywords: Systematic review; Telework; Mental health; Workers; Employees

Unsurprisingly, the recent needs and demands of global employment situation have altered the ways of working, as well as posing new risks for the health of employees. Teleworking is the emerging way of working which is carried out from distance and is supported by Information and Communication Technologies. The aim of the study was to analyze how teleworking affects the mental health of a worker or employee, through a systematic review of the literature. CINAHL, MEDLINE and PsycINFO were employed for this propose. In total 495 manuscripts were selected and examined. Titles and abstracts of the articles searched were evaluated using the Rayyan QCRI online system. Two independent reviewers assessed the inclusion of articles and a third reviewed the conflicts. Mainly, it is observed that teleworking can have a detrimental impact on the mental health of the worker, leadind to anxiety, depression and stress. In addition, social interactions may be affected, producing a weakening. However, other psychological consequences, such as feelings of loneliness, impaired physical activity, sleep problems, should also be considered.

P-08- Nutritional labels and food intake regulation: The role of external cues in the facilitation effect of food picture detection in visual search tasks

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Keywords: Food; Visual search; Nutritional labels; Eating behaviour; Attentional bias

In our current societies we are continuously exposed to food cues that indicate its accessibility (e.g., smells, advertisements, logos). These cues, learned through Pavlovian conditioning, when they are present in the environment are able to activate a variety of appetitive responses to food (e.g., craving, cephalic responses, initiation of consumption), and can even disrupt those mechanisms that contribute to the optimal regulation of our intake. The aim of this project is to study the role of one of these external cues, the nutritional labels, and its influence on eating behaviour. Previous research has observed a facilitation effect in visual search tasks when using pictures of food as a target, finding that these are detected faster than neutral pictures. In the present research we proposed through two different experiments to explore whether this effect depends on the caloric value of the pictures used (Experiment 1), and whether it can be modulated through a prior learning phase where participants were exposed to the nutritional value of the food (Experiment 2).

P-09- Is there any effects in risky decision making behavior after a ischemic stroke? Preclinical evidences

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Keywords: Decision-making; Stroke; Rodent Gambling Task; Medial Prefrontal Cortex; Endothelin-1

Clinical stroke patients show relevant cognitive impairments including inhibitory control deficit; however, preclinical research on stroke has focused almost exclusively on motor deficits. In the present study, we assessed impulsive decision-making behavior in a preclinical model of stroke. Male Wistar rats were trained on Rodent Gambling Task (rGT), a rodent analogue to Iowa Gambling Task, where rats choose among four different holes to gain as many sugar pellets as possible within 30 min and each hole was associated with the probability to gain a reward or to be punished. Once learning criteria stability was achieved, animals underwent focal ischemia induced in the medial Prefrontal Cortex (mPFC) using bilateral intracerebral injections of endothelin-1, or sham surgery. Subsequently, we carried out a second phase of rGT in both groups of rats to assess impulsive decision making after the stoke damage. The results will be discussed in terms of the effects of stroke on mPFC and the long term alterations in inhibitory control deficit behaviors such as impulsive risky decision making, perseverative responses and behavioral flexibility. Preclinical models of focal stroke in the mPFC could help to understand the cognitive impairments and the association with the neuroplastic changes after damage.

P-10- Efficacy of two types of Transcranial direct-current stimulation on frontal cortex in a preclinical model of compulsivity

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Keywords: Compulsivity; Schedule-Induced Polydipsia; Transcranial direct current stimulation; Neuromodulation; Inhibitory control

Compulsivity is a failure to stop an ongoing behavior that is becoming inappropriate to the situation. Clinical research indicates that compulsive spectrum disorders often are refractory to current treatments. Transcranial direct current stimulation (tDCS), non-invasive neurostimulation, has been proposed as a safe and effective treatment for obsessive-compulsive disorder, schizophrenia, depression and addiction. The aim of the present study was to assess the therapeutic effectiveness of cathodal (c) and anodal (a) tDCS on Schedule Induced Polydipsia (SIP), a preclinical model of compulsivity. For that purpose, male Wistar rats that developed high rates of drinking behavior on SIP were divided into three equivalent experimental groups: atDCS; ctDCS; control. All animals were subjected to a constant current of 0.5mA intensity applied for 20 min/8 days; control group were connected without stimulation. In both types of stimulation, the center of the electrode was placed at the midpoint of the lateral angle of the eyes to stimulate the frontal cortex and the other electrode was located on the ventral torso. One day after animals were re-exposed to SIP. The results will be discussed in terms of the possible effects of neurostimulation by cathodal and anodal tDCS on frontal cortex to reduce compulsive behavior on SIP. Neuromodulation using tDCS might induce neuroplastic changes in the inhibitory control brain circuit, pointing towards a potential treatment for compulsive spectrum disorders.

P-11- Is there any influence of compulsivity on decision-making behavior? Preclinical evidence

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Keywords: Compulsive behavior; Schedule-Induced Polydipsia; Decision-making; Generalized Linear Models; Bayesian inference

Compulsivity has been considered a transdiagnostic dimension in obsessive-compulsive and related disorders, characterized by heterogeneous cognitive and behavioral endophenotypes associated with different alterations. Moreover, the development of compulsivity has been associated with a deficit in other behaviors related to inhibitory control. These features make compulsivity a good candidate to evaluate its quantitative relationship over other variables of interest, such as risky decision-making. The current study aims to explore whether the compulsive drinking behavior on Schedule-Induced Polydipsia (SIP), a preclinical model of compulsivity, might predict the risky decision-making behavior. Wistar rats carried out 20 SIP sessions to evaluate their compulsive drinking behavior. Then, decision-making behavior was evaluated in all animals using a rodent gambling task (rGT). Subsequently, using Generalized Linear Models (GLMs) and Bayesian inference we estimated the relationship between water intake on SIP and the probability of making disadvantageous choices during the rGT, as well as of performing premature and perseverative responses on this task and, additionally, the effect that water intake during SIP might have on learning during rGT sessions. These results are discussed highlighting the importance of mapping different behavioral and cognitive patterns and their relationship to better understand, diagnose, and treat obsessive-compulsive and related disorders.

P-12- Influence of context on the mental timeline

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Keywords: Mental timeline; Conscious and non-conscious; Images; Individual differences; Past and future

The mental timeline refers to a kind of spatial schema in which we represent words with time meaning (e.g., past or future) in a specific location. Thus, the spatial location of certain temporal information depends, among others, on cultural factors such as the direction of writing (Starr & Srinivasan, 2021; Fuhrman & Boroditsky, 2010). In this way, Spanish or English speakers place the past on the left and the future on the right (Santiago et al., 2007). The aim of the present study was to explore if this mental scheme is applied to contextual images with meaning of past and future that are presented under different perceptual processing conditions. Context is known to influence performance on a task (DuBrow & Davachi, 2013), so we will use images made up of various items in different environments that represent either the past (e.g., two dinosaurs in a meadow) or the future (e.g., four robots performing autonomous tasks). The participants were instructed to classify this type of images appearing in the foveal location by pressing the "A" key with their left hand for images that mean past, and the "L" key with their right hand for images that mean future. This was so for half of the trials. In the remaining trials the order (response hand-time meaning) was reversed. Stimuli were presented under conditions of conscious processing (delayed mask condition), where subjects consciously recognized the stimulus presented, and under conditions of non-conscious, or subliminal processing (immediate mask condition), that is, below the threshold of consciousness. The results showed a differential pattern according to the meaning of the stimuli and the response hand: left-past and right-future. People responded faster to stimuli that represented the past with the left hand and stimuli that evoke the future with the right hand under both conditions: conscious and non-conscious processing. Our data adds further evidence in favour of the automaticity of this behavioural pattern, in a way that the mental timeline is possible with images that evoke context even in a non-conscious way.

P-13- Analysis of the US-preexposure effect with a conditioned preference to odors paradigm, and the influence of food deprivation

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Keywords: Conditioned Preferences; US-Preexposure; Diluted Odors; Nutritional Deprivation; Sucrose

A disruption of conditioning after Unconditioned Stimulus (US) preexposure has been extensively analyzed in the field of classical conditioning. The most accepted explanation of such effect is based on a blocking effect due to an association between the context and the US during the preexposure phase that would be responsible of the reduced CS-US association typically obtained in the preexposed group. This phenomenon has been demonstrated with different experimental paradigms, including conditioned taste aversion (de Brugada, Hall & Symonds, 2004), or conditioned preferences (Gil, Symonds, Hall & de Brugada, 2011). In the present study, we tried to replicate the US-preexposure effect using a conditioned preference procedure with diluted odors. In addition, we analyzed whether a food restriction can act as an internal context, modulating the effect through a change in the deprivation state between preexposure and conditioning phases. In Experiment 1, half of the animals were preexposed to sucrose while the other half received only water during the preexposure period. In addition, half of the animals were food deprived, while the other half had unlimited access to food. During conditioning and testing stages all animals remained food-deprived. The results of a two-bottle test revealed a preference for the conditioned stimulus (odor A) in all groups, although this trend was significantly higher for the animals deprived during the entire experiment as compared to those non-deprived rats in the initial phase. The conditioning process was not affected by sucrose preexposure. In Experiment 2, the procedure for the preexposure stage was the same as described for the first experiment, but now all animals had free access to food during conditioning and testing sessions. All groups showed a similar tendency to drink more from the bottle with the odor that had been previously paired with sucrose. Therefore, US preexposure did not interfere with conditioned preference. The results are discussed considering the adequacy of the procedure, and the potential effect of contrast on consumption.

P-14- US preexposure effects with a non-nutritive US: Effects of motivational state and retention interval

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Keywords: Retention interval; Flavour preference; Motivational factors; Saccharin; Exposure

It is now well-established that preexposure to a stimulus to be used as a US will retard subsequent conditioning, and a variety of explanations have been offered to explain this US preexposure effect, including associative (blocking) and non-associative (e.g., habituation) accounts. Using the conditioned flavor preference paradigm, two experiments are presented to examine in more detail whether a US preexposure effect can be found when the target US is a non-nutritive sweet taste. Rat subjects were exposed to saccharin (or plain water), after which a novel flavor, A is paired with the saccharin. Evidence for the US preexposure effect was found by showing that the preference for flavor A on a subsequent test was weaker in those that had received preexposure compared to those that were given plain water. In both experiments, the magnitude of this US preexposure effect was compared between subjects that received a retention interval between preexposure and the conditioning test/phase and those that did not. However, in the second experiment we also manipulated the motivational state of the animals (thirsty or hungry) to determine whether the effect of a retention interval is dependent on subjects being in a state of hunger or thirst throughout the experiment. We discuss the implications of our findings for current theories of the US preexposure effect.

P-15- Progress in the volume of scientific production around the latent inhibition phenomenon: the momentum of theories on research intensity.

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Keywords: Latent inhibition; Bibliometric analysis; Associative learning; Scientific production; Experimental work

The discovery of the latent inhibition (LI) phenomenon (Lubow and Moore, 1959) has led to considerable scientific output. The volume of research and the aspects of the phenomenon that have attracted the most interest have varied over the years. A bibliometric analysis of these changes was carried out in this study. It was observed that the period of greatest scientific production takes place from 1980 to 2012 and seems to be driven by the proposal of theoretical approaches. From this period onwards, the decrease in the volume of work on this phenomenon is notable. It is discussed whether this decline is part of a general trend within the area of associative learning and whether in the case of IL, theories have driven experimental work but not vice versa.

P-16- Non-invasive transcranial brain stimulation (NIBS) for motor and cognitive recovery in animal models of stroke: A systematic review

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Keywords: Animal models; Cognition; Motor function; Noninvasive brain stimulation; Stroke and systematic review

Introduction: Stroke is a health major problem and one of the main causes of death and chronic disability worldwide. Motor and cognitive dysfunction occur very frequently in stroke patients severely affecting its quality of life. Current therapies have limited efficacy, so animal models to assess new treatment strategies, such as non-invasive transcranial brain stimulation (NIBS), are required.

Objective: Evaluate the effectiveness of non-invasive transcranial brain stimulation to recover motor and cognitive functions after stroke in animal models.

Material and Methods: The systematic review will be based on the PRISMA statement. Search strategy will be carried out independently in different databases combining key terms. All animal model of stroke will be included without restriction of animal species or type of stroke. Any NIBS technique in which sham stimulation is used as a control group will be included. Motor tests evaluating balance, coordination and locomotion, and cognitive tasks evaluating associative learning, memory and executive functions, will be the main outcomes. SYRCLE´s risk of bias tool will be used to assess study quality.

Results: A summary of the results of the main studies will be analyzed. Meta-analysis will be considered if the results are homogeneous enough.

Conclusions: Many publications show the effectiveness of the different NIBS techniques to improve cognitive and motor functions in animal models of stroke. A comprehensive analysis of the literature is essential to determine a gold standard stimulation protocol, which can be further translated into clinical practice.

P-17- Previous extinction attenuates overshadowing in humans

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Keywords: Overshadowing; Contextual dependence; Attention; Mathcing to sample; Humans

Previous extinction makes second learning context-dependent. Recent data has shown that extinction's prediction error activates attention to context during second learning (Rosas et al., 2006). However, the context in these studies was subjectively defined, and it was not possible to identify the element attended. The present experiment evaluated the activation of attention to a defined cue, studying the influence of previous extinction learning on overshadowing in a matching-to-sample task with humans. Using a compound (AX) sample-stimulus (SS), three groups learned to respond with R1 to the SS (Y). During a second phase in a first group, SS (Y) was extinguished, and R1 in the presence of SS (AX) was reinforced. While in second group, SS (Y) was not extinguished, but R2 to compound (AX) was reinforced. In the third group R1 in presence of SS (Y) was extinguished and R2 to X alone was reinforced. This results showed attenuation of overshadowing to the less salient component X, only in the first group. Suggesting that prior extinction increases attention to the less salient component X. This effect is similar to the previously observed increase in context-dependence of second learning but using a defined attention stimuli.

P-18- Gestational Particulate Matter influences ASD-like behaviors in Wistar rats

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Keywords: Autism; Particulate Matter; Neurodevelopment; Sociability;Motor behavior

Autism spectrum disorders (ASD) are a complex and heterogeneous set of maladaptive and dysfunctional behaviors characterized by decreased sociability, communication, and altered motor function, amongst others. Along with their genetic and physiological roots, different environmental factors have been associated with their diagnosis and degree of severity. Exposure to Particulate Matter (PM) during specific developmental stages has been associated with this kind of alteration. However, little is known about the short and medium-term effects of the exposure during the whole pregnancy regarding ASD-like behaviors in the offspring of the exposed generation. We hypothesize that this exposure will increase ASD-like behaviors (sociability, motricity, and anxiety) and development. We found that this exposure significantly influenced developmental milestones and social and motor variables in both sexes. Future guidelines should focus on the physiological basis of these behavioral alterations, specially regarding gene and protein expression and metabolomics profile.

P-19- Probabilistic reinforcement impairs transitive inference and induces individual differences

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Keywords: Transitive inference; Transitivity; Probabilistic reinforcement; Symbolic distance effect; Serial position effect

Transitive inference (TI) occurs after training in conditioned discrimination between five-terms sequence of stimuli -A+B-, B+C-, C+D-, D+E- when a subject prefers B over D when this stimulus pair is newly presented. Transitive inference can be explained by differences in associative strength as a result of training procedure, instead of a logical conclusion inferred from the stimulus pairs trained. In this experiment, we analyze the effect of task complexity on TI using a five-terms sequence of stimuli, introducing probabilistic outcomes during training, in pigeons. Thus, both stimuli are reinforced in each pair but with different probability, 0.8 for + stimulus and 0.2 for the – stimulus. Using probabilistic outcomes distorted the two main effects associated with TI: serial position effect (SPE), during training phase, and symbolic distance effect (SDE), during test phase. Additionally, preference for the crucial pair BD did not differ from chance, showing TI absence (not for all subjects). The results are discussed in terms of discrimination deficits on learning and individual differences solving the task.