



XXIX MEETING OF THE SPANISH SOCIETY FOR COMPARATIVE PSYCHOLOGY

OVIEDO, 13 – 15 SEPTEMBER 2017

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SCHEDULE

**WEDNESDAY 13TH OF SEPTEMBER**

- 9:30 – 10:00 Inauguration
- 10:00 – 11:00 **Conference: Clive Wynne (p. 9)**
What Makes Dogs Special?
- 11:00 – 11:30 Coffee Break
- 11:30 – 13:30 **Session: Human Learning (p. 15)**
1. Pavlovian instrumental transfer and outcome devaluation: The effect of emotional impulsiveness (negative urgency) in young women on an appetitive task. IRENE HINOJOSA & FELISA GONZÁLEZ
 2. Stress induces habit formation by disrupting action-outcome control: evidence from a contingency degradation task. EBRYL K. NICHOLLS, MURAT YILDIRIM, JOHN MALTBY, RICHARD W. MORRIS & GONZALO P. URCELAY
 3. Visual attention in human conditioning. JAMES BYRON NELSON, ANTON NAVARRO & MARÍA DEL CARMEN SANJUAN
 4. Stimulus Preceding Negativity as an electrophysiological index of expectation during associative learning in humans. JOAQUÍN MORÍS, DAVID LUQUE & ANTONI RODRÍGUEZ-FORNELL
 5. Learning to learn and generalization in human conditioning. PAULA BALEA CARBAJO, JAMES BYRON NELSON & MARÍA DEL CARMEN SANJUAN ARTEGAIN
 6. Outcome base-rate expectations modulate causal judgments in null contingency settings. FERNANDO BLANCO & HELENA MATUTE
- 13:30 – 15:30 Lunch
- 15:30 – 17:00 **Symposium: Perceptual learning from an associative perspective: current state and future challenges (p. 19)**
1. Perceptual learning with faces: General insights from a specialized system. ROB HONEY
 2. The stimulus comparison process in perceptual learning. ISABEL DE BRUGADA & SERGIO RECIO
 3. Perceptual Learning in animals: salience modulation, inhibitory associations and new perspectives. ANTONIO A. ARTIGAS & JOSE PRADOS
 4. Attention to learn to perceive. GABRIEL RODRÍGUEZ
- 17:00 – 17:30 Coffee Break
- 17:30 – 19:10 **Session: Latent inhibition and extinction (p. 21)**
1. What is happening when we conduct a latent inhibition experiment with humans. LUIS GONZALO DE LA CASA, JUAN CARLOS RUIZ-SALAS & LUCÍA CÁRCCEL & AUXILIADORA MENA
 2. Assessing of the inhibitory properties of a latent inhibitor in a human learning task. UNAI LIBERAL, GABRIEL RODRÍGUEZ, J BYRON NELSON & GEOFFREY HALL
 3. Independent interference training attenuates cue-preexposure effects in a human predictive judgments' task. GABRIEL GONZÁLEZ, JOSÉ A. ALCALÁ, PEDRO M. OGÁLLAR, JOSÉ E. CALLEJAS-AGUILERA, & JUAN M. ROSAS
 4. ABA and AAB designs lead to similar renewal from extinction in a human conditioned avoidance task . PEDRO M. OGÁLLAR, JOSÉ A. ALCALÁ, JUAN M. ROSAS, & JOSÉ E. CALLEJAS-AGUILERA
 5. Reversal training seems to improve subsequent acquisition of a temporal discrimination in human conditioned avoidance. JOSÉ A. ALCALÁ, PEDRO M. OGÁLLAR, JOSÉ E. CALLEJAS-AGUILERA, & JUAN M. ROSAS

Social Activity



THURSDAY, 14TH OF SEPTEMBER

9:10 – 10:30

Session: Operant Conditioning (p. 24)

1. The effect of qualitatively-varied reinforcement in lever-pressing and schedule-induced running. FELIZDANIA HERNÁNDEZ-HERNÁNDEZ, RAQUEL PASCUAL-BEATO, GABRIELA E. LÓPEZ-TOLSA, JESÚS CUITLÁHUAC NÚÑEZ SANTANA & RICARDO PELLÓN
2. Effect of inter-trial interval length on the temporal bisection task. GABRIELA E. LÓPEZ-TOLSA, JESÚS CUITLÁHUAC NÚÑEZ SANTANA, JONATHAN J. BURITICÁ, FELIZDANIA HERNÁNDEZ-HERNÁNDEZ, RAQUEL PASCUAL-BEATO & RICARDO PELLÓN
3. Explaining suboptimal choice: The effects of the difference in reinforcement probability and the overall reinforcement probability. VALERIA V. GONZÁLEZ, ALEJANDRO MACIAS, MARCO VASCONCELOS & ARMANDO MACHADO
4. The valuation cost decreases as a function of extended exposure to a risky-choice procedure. HECTOR O. CAMARENA & ÓSCAR GARCÍA-LEAL

10:30 – 11:00

Coffee Break

11:00 – 12:40

Session: Invertebrate Learning (p. 27)

1. Genetic mediation of rescue behaviour in *Cataglyphis cursor* ants: Some fathers produce kinder progeny. KAREN L. HOLLIS, JASON ANDRAS, KRISTYN CARTER, GENEVIEVE COULDWELL & ELISE NOWBAHARI
2. Effect of starvation on location of novel food sources in the white snail (*Theba pisana*). MARCIAL RODRÍGUEZ-BUJÁN & IRENE GARCÍA-ROJAS
3. How elusive is the nature of blocking? BEATRIZ ÁLVAREZ, RANDOLF MENZEL & IGNACIO LOY
4. The adult oviposition preference can be conditioned in the female of silkworm moth (*Bombyx mori*). A. MATÍAS GÁMEZ & SAMUEL P. LEÓN
5. Preliminary studies about blocking in earthworms (*Aporrectodea longa*). DAVID REYES-JIMÉNEZ, MARÍA JOSÉ F. ABAD & CONCEPCIÓN PAREDES-OLAY

12:45 – 13:45

Conference: Mark Haselgrove (p. 9)

Making and breaking a cognitive map

13:45 – 15:00

Lunch

15:00 – 16:30

Poster session (p. 43)

16:30 – 17:30

SEPEX Conference: Pedro Luis Cobos (p. 10)

Exploring the role of associative processes in human contingency learning.

17:40 – 18:50

Symposium: Psychobiology of reward loss: Omission, devaluation, and uncertainty (p. 30)

1. Partial reinforcement and the incentive hope hypothesis. PATRICK ANSELME
2. Brain mechanisms of reward loss. MAURICIO PAPINI
3. Reward loss and emotional self-medication. CARMEN TORRES

Social Activity



FRIDAY, 15TH OF SEPTEMBER

9:10 – 10:50

Session: Behavioural Neuroscience (p. 32)

1. Effects of $\Delta 9$ -tetrahydrocannabinol administration in adolescence on schedule-induced drinking in adult rats. ESMERALDA FUENTES, RICARDO PELLÓN & MIGUEL MIGUÉNS
2. Differential cognitive deficits in two animal models of Parkinson's disease. INMACULADA MÁRQUEZ NORIEGO, MARIO F. MUÑOZ PINTO, ESTRELLA DÍAZ ARGANDOÑA, ANTONIO AYALA GOMEZ & JUAN CARLOS LÓPEZ GARCÍA
3. Pavlovian conditioning: effects of dopaminergic drugs on locomotor activity. AUXILADORA MENA, LUCÍA CÁRCEL, FRANCISCO JOSÉ PÉREZ-DÍAZ, JUAN CARLOS RUIZ-SALAS & LUIS GONZALO DE LA CASA
4. High fat high sugar diet increases impulsivity. IAN JOHNSTON
5. What clay eating talks about running-based taste avoidance in rats. SADAHIKO NAKAJIMA

10:50 – 11:20

Coffee Break

11:20 – 12:20

Session: Perceptual Learning (p. 36)

1. Mechanisms underlying the comparison process in perceptual learning. JESÚS SÁNCHEZ, SERGIO A. RECIO, ANA GONZÁLEZ, MARTA GIL AND ISABEL DE BRUGADA
2. The role of stimulus comparison in human perceptual learning: The effects of the preexposure schedule and the instructions. ROCÍO ANGULO & FABIÁN CABEZAS-OPAZO
3. Perceptual learning and generalization of sensory-specific satiety. ANA GONZÁLEZ-GÓMEZ, SERGIO A. RECIO, JESÚS SÁNCHEZ PLAZA, MARTA GIL & ISABEL DE BRUGADA

12:30 – 13:30

Conference: Bernard Balleine (p. 11)

Predictive learning and the cognitive control of action

13:30 – 15:30

Lunch

15:30 – 16:40

Session: Comparative cognition (p. 38)

1. Stress and selective learning in a navigation task with rats. DAVID PAMIES & VICTORIA D. CHAMIZO
2. The behaviours associated with guilty look in dogs as calming signals. VERÓNICA ORTÍZ MARTÍNEZ & IGNACIO LOY
3. Do humans behave as non-human animals in foraging situations? LAURENT ÁVILA-CHAUVEY, ÓSCAR GARCÍA-LEAL & ALEJANDRO SEGURA

16:40 – 17:10

Coffee Break

17:10 – 18:10

Meeting of the Society**Gala Dinner**



CONFERENCES

WHAT MAKES DOGS SPECIAL?

CLIVE D. L. WYNNE

Arizona State University

For decades scientists have been arguing about what makes dogs special. One widespread view is that the secret of dogs' success in human society is a special form of social cognition. Perhaps dogs, in the approximately 15,000 years since they became distinct from wolves, acquired skills in reading peoples' actions and intentions that are unique among all animal species. I shall present findings from my own group and others that show that there is in fact nothing remarkable about the social cognition of dogs. Dogs perform well at following the implications of human actions, but no more so than other animals that have been hand-reared from an early age and made completely dependent on human beings to have all of their biological needs met.

Instead, I believe that the essential and unique quality of dogs is their ability to form affectionate bonds with members of other species. Dogs show outstanding motivation to interact with members of other species. I will review evidence that during domestication dogs became exceptionally motivated and reinforced by social interaction. "Man's best friend" may be a cliché, but like many stereotypes, it has some basis in fact.

MAKING AND BREAKING A COGNITIVE MAP

MARK HASELGROVE

University of Nottingham

Human and non-human animals can use information provided by the geometry of the environment to navigate towards hidden goals. Despite a relative paucity of evidence, environmental geometry has been suggested to constitute a key component of global, allocentric representations of space - The cognitive map (e.g.: Gallistel, 1990). Other research, however, has emphasised the role of more local, and egocentric, representations of environmental geometry for navigation (e.g. Pearce, 2009). In this lecture I will present evidence for the use of both of these frames of representation during spatial navigation in virtual environments in human participants. In particular we examined whether navigation based on these two representational frames is susceptible to interference from other spatial information (e.g. landmarks). Our results indicate that both cognitive maps and more local, egocentric, representations of space are susceptible to interference effects such as overshadowing, blocking or the ID-ED effect.



EXPLORING THE ROLE OF ASSOCIATIVE PROCESSES IN HUMAN CONTINGENCY LEARNING.

PEDRO L. COBOS

University of Málaga & Instituto de Investigación Biomédica de Málaga

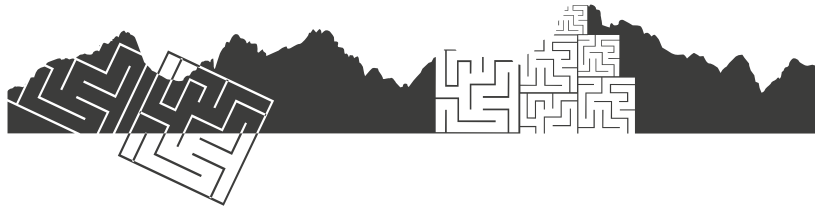
A great part of the research conducted so far to study the role of associative processes in human contingency learning has been strongly influenced by the associative-vs.-propositional-inference debate. In the first part of this talk I will argue that this debate has been largely determined by some assumptions that are not always well grounded, but have consequences regarding the experimental strategies used and the conclusions drawn. One of these assumptions relates to the very definition of human contingency learning. The typical human contingency learning task involves the use of causally-framed scenarios, instructions imposing clear and explicit learning goals, and verbal or verbal-like judgements as dependent measures. The so-called 'allergy task' is the most frequently used example to convey an impression of what human contingency learning is. We will see that this concept of human contingency learning is too narrow, and may promote the use of tasks more related to the study of reasoning than learning. One consequence of this mainstream implementation of human contingency learning is that the tasks used tend to hinder the expression and/or participation of associative processes, leading some researchers to claim that these processes play no role in human contingency learning. Another fundamental assumption concerns the features commonly used to differentiate between associative and propositional inference mechanisms. For example, the dichotomies flexible vs. inflexible, goal-driven vs. goal-insensitive, top-down vs. bottom-up, or conscious vs. unconscious have been commonly used to tell associative processes apart from propositional-inference processes. Closer inspection, however, reveals some problems in these dichotomies, which tend to oversimplify the characterisation of associative processes. The rest of the talk will be dedicated to some studies that have changed the direction of this drift. Their general strategy relies upon the use of tasks and dependent measures that favours the expression of associative over propositional inference processes. Some of these studies have shown that relevant phenomena, such as blocking, can be found when tasks are stripped away of those features that promote reasoning processes and learning is measured through techniques sensitive to very fast processes. Other studies, based on dissociation strategies, found evidence consistent either with propositional inference or with associative processes depending on the conditions under which learning was measured.

PREDICTIVE LEARNING AND THE COGNITIVE CONTROL OF ACTION

BERNARD BALLEINE

School of Psychology, University of New South Wales

The cognitive control of action reflects our ability to extract and encode causal relationships from the environment to guide choice between different courses of action. To investigate this process at both a psychological and a neural level we have adopted a model of cognitive control in rodents in which the influence of predictive learning on action selection is assessed in an instrumental choice situation: the Pavlovian-instrumental transfer paradigm. Over the last several years, we have systematically investigated the core neural systems and cellular circuits that mediate transfer effects of various kinds and, in this presentation, I will describe: the behavioural background to this research project; the psychological theories that best account for these kinds of effect; and our most recent findings at a neural level, focusing on amygdala–striatal interactions and specific modulatory processes within the striatum that enhance motor output via a pallido-thalamic feedback circuit.



ORAL PRESENTATIONS



SESSION: HUMAN LEARNING

PAVLOVIAN INSTRUMENTAL TRANSFER AND OUTCOME DEVALUATION: THE EFFECT OF EMOTIONAL IMPULSIVENESS (NEGATIVE URGENCY) IN YOUNG WOMEN ON AN APPETITIVE TASK

IRENE HINOJOSA & FELISA GONZÁLEZ

Mind, Brain, & Behavior Research Center (Universidad de Granada)

Pavlovian cues bias decision-making in favor of instrumental choices that serve to obtain the same outcome (Pavlovian-to-Instrumental Transfer, PIT). They may also increase instrumental responses trained with other similar outcomes (General Transfer, GT). In this study we used an adapted version of an instrumental learning computerized task (Quail, Morris, & Balleine, 2016) in which participants concurrently performed two instrumental responses (R₁, R₂) in order to (symbolically) get two free snacks (O₁, O₂). In the Pavlovian phase, they observed the relationships between four different cue colors (S₁, S₂, S₃, S₄) and four outcomes (S₁: O₁, S₂: O₂, S₃: O₃, S₄: O₄ or no outcome). During the Transfer test, participants performed R₁ and R₂ in extinction while the Pavlovian cues appeared now and then. Afterwards, either O₁ or O₂ (counterbalanced) was devaluated before testing the performance on R₁ and R₂ again (this time without Pavlovian cues). As outcome devaluation is used as an index of goal-directed action vs. habitual response, we hypothesized that impulsiveness, as a proxy for poor response control, would be negatively related to the devaluation effect. We found both PIT and GT effects, as well as a devaluation effect, validating the adapted version of the task. In addition we found that negative urgency (the tendency to impulsively perform actions in reaction to negative affective states) was related to a poorer devaluation effect, suggesting that decision-making was less sensitive to the current value of the outcome for individuals with this personality trait. Funding: PSI2015-64345-R (MINECO-FEDER).

STRESS INDUCES HABIT FORMATION BY DISRUPTING ACTION-OUTCOME CONTROL: EVIDENCE FROM A CONTINGENCY DEGRADATION TASK

EBRYL K. NICHOLLS, MURAT YILDIRIM, JOHN MALTBY, RICHARD W. MORRIS & GONZALO P. URCELAY

University of Leicester & University of New South Wales

For decades, it has been observed that stress affects cognition and behaviour through a number of different mechanisms. Recently, reports in rodents and humans have shown that stress prompts habit formation, as assessed through outcome devaluation tests during extinction. However, stress also promotes resistance to extinction, so it is not clear whether stress has an effect on goal-directed behaviour (i.e., failure of action-outcome control) or by promoting behavioural persistence during the extinction test. In this study, human participants were exposed to stress (Cold-Pressor task) or control treatments before they performed an action-



outcome task in which we varied the instrumental contingency (ΔP) between actions and outcomes. Stressed participants showed increased heart-rate and skin-conductance during application of the stressor. Stressed and control participants did not differ in terms of observed contingencies, nor in their causal judgements regarding action-outcome probabilities (i.e., they all detected the causal efficacy of their actions). Behaviourally, stress increased responding perhaps due to arousal. In addition, stressed participants failed to adjust their behaviour according to the observed contingencies, in particular when contingency was lower due to outcome presentations in the absence of actions. These observations suggest that stress shifts behavioural control from actions to habits, in particular by affecting inhibitory learning.

VISUAL ATTENTION IN HUMAN CONDITIONING

JAMES BYRON NELSON, ANTON NAVARRO & MARÍA DEL CARMEN SANJUAN

Universidad del Pais Vasco (UPV/EHU)

Two experiments investigated overt visual attention to elements of the experimental setting during simple conditioning in a video-game method. Participants learned to press keys on a keyboard in the presence of predictive sensor CSs to repel invading spaceship USs. Participants responded faster when the spaceship appeared in the same side of the screen as the weapon used to repel it, showing a form of a spatial contiguity effect (Experiment 1). In both experiments participants oriented to the CSs and that orienting declined both within and between trials. In both experiments, in the presence of the CS, participants increased their orienting to the area of the screen where the spaceships would appear. That is, the participants displayed goal tracking. This goal tracking occurred regardless of whether participants were responding to the CS on the keyboard or not (Experiment 2). Participants' pupils dilated in the presence of the predictive CS in both experiments, but this dilation was caused by responding rather than an anticipation of an upcoming event (Experiment 2). The implications of goal tracking for studies of attention in humans are discussed.

STIMULUS PRECEDING NEGATIVITY AS AN ELECTROPHYSIOLOGICAL INDEX OF EXPECTATION DURING ASSOCIATIVE LEARNING IN HUMANS

JOAQUÍN MORÍS, DAVID LUQUE & ANTONI RODRÍGUEZ-FORNELLS

Universidad de Oviedo, University of New South Wales & Universitat de Barcelona

Many studies in the literature have focused on the brain correlates of prediction error during reinforcement learning. However, very little attention has been paid to what cognitive processes are engaged during the generation of the prediction itself, and the expectation of the future outcome. We present the results of two studies in which we show that the Stimulus Preceding Negativity, an electrophysiological correlate that is observed prior to the occurrence of an anticipated relevant outcome, can be interpreted as an index of expectation during reinforcement learning. This index was sensitive to changes in learning, through either direct





experience or verbal instructions and might reflect information seeking in order to adjust future behaviour.

LEARNING TO LEARN AND GENERALIZATION IN HUMAN CONDITIONING

PAULA BALEA CARBAJO, JAMES BYRON NELSON & MARÍA DEL CARMEN SANJUAN ARTEGAIN

Universidad del País Vasco (UPV/EHU)

Each situation we encounter is at least in part unique. Thus, the flexible use of the information acquired in previous experiences becomes a fundamental skill to maximize our chances of success. While stimulus generalization is a form of transfer that relies on the sensory similarities of the stimuli, learning to learn (LTL) denotes a facilitation of learning in the form of an increased learning rate across tasks that share a common structure. The LTL effect has been clearly shown in cognitively oriented tasks, however, it is important to understand the effect at the level of basic processes such as associative learning, since they begin to indicate boundaries for the effect. For instance, it is not clear if extinction learning transfers across different stimuli. Several experiments assessed whether LTL can be obtained in classical conditioning procedures with humans while evaluating the extent to which generalization might contribute to transfer of learning. We used a science-fiction based videogame (Nelson, Navarro, & Sanjuan, 2014) where different conditioned stimuli (flashing lights or a tone) are associated with the appearance of an attacking spaceship (unconditioned stimulus). The procedure requires the participants to give an anticipatory response (charging a weapon) which allowed us to trace the course of learning trial-by-trial along several repeated acquisition and extinction tasks. Our results indicate that the LTL effect is apparent even in situations where no stimulus generalization is present. Furthermore, the effect is present both in acquisition and extinction procedures.

OUTCOME BASE-RATE EXPECTATIONS MODULATE CAUSAL JUDGMENTS IN NULL CONTINGENCY SETTINGS

FERNANDO BLANCO & HELENA MATUTE

Universidad de Deusto

Previous research revealed that people's judgments of causality in null contingency settings can be biased so that causal illusions appear. That is, sometimes causal judgments tend to be high despite the actual cause-outcome contingency being zero. This happens more often if the outcome is presented with high probability. We examined whether this causal illusion is sensitive to prior expectations about the frequency with which the outcome would occur. Thus, in two experiments, we pre-trained participants to expect either a high outcome base-rate (Experiment 1) or a low outcome base-rate (Experiment 2). This pre-training was followed by a standard contingency task in which the cause and the outcome were noncontingent. Subsequent causal judgments were affected by the pre-training: when the outcome base-rate was expected to be



high, the causal illusion was reduced, and the opposite pattern (stronger causal illusion) was observed when the outcome-base rate was expected to be low.



SYMPOSIUM: PERCEPTUAL LEARNING FROM AN ASSOCIATIVE PERSPECTIVE: CURRENT STATE AND FUTURE CHALLENGES

PERCEPTUAL LEARNING WITH FACES: GENERAL INSIGHTS FROM A SPECIALIZED SYSTEM

ROB HONEY

Cardiff University

Some of the most dramatic instances of perceptual learning in humans come from studies of face processing: familiar pairs of faces are more readily distinguished from one another than are novel pairs of faces. Studies of face processing have also provided insights into the nature of the processes that underpin perceptual learning. Here, I will review this evidence alongside analogous studies using (i) other classes of stimuli in humans, and (ii) different species.

THE STIMULUS COMPARISON PROCESS IN PERCEPTUAL LEARNING

ISABEL DE BRUGADA & SERGIO RECIO

Universidad de Granada

Perceptual Learning refers to a phenomenon that occurs when discrimination between two similar stimuli is facilitated by prior experience with those stimuli. This phenomenon has been studied using both human and non-human subjects. Findings from studies with human subjects suggest that stimulus comparison is critical for perceptual learning. However, when animals are used as subjects, the standard procedure that is routinely used does not favor stimulus comparison, and when manipulations are put in place in order to aid comparison, the results are rather ambiguous. Indeed, in a recent review of this issue, Mitchell and Hall (2014) concluded that the difference in the ability to benefit from the opportunity to compare stimuli could constitute an important difference between the perceptual learning phenomenon studied in human and non-human animals. We discuss a series of studies with rats as subjects with a taste aversion paradigm and using a procedure of exposure to stimuli in rapid alternation, similar to the procedure commonly used with humans, to facilitate the comparison process. The result shows that the comparison process also plays a role with rats as subjects when is used a procedure that does not favor the performance of the mechanisms proposed by salience modulation theories. In addition, the results do not support an explanation of the comparison process in terms of short-term habituation, as has been suggested for results found in humans.

Supported by research project PSI2015-63737-P (MINECO/FEDER).





PERCEPTUAL LEARNING IN ANIMALS: SALIENCE MODULATION, INHIBITORY ASSOCIATIONS AND NEW PERSPECTIVES

ANTONIO A. ARTIGAS & JOSE PRADOS

Universitat de Barcelona & University of Leipzig

Since Symonds and Hall (1995; see also Honey, Bateson & Horn, 1994) showed that intermixed pre-exposure to two compound flavours sharing common elements (AX and BX) facilitates their subsequent discrimination by comparison to a control group given blocked pre-exposure. This Intermixed/Blocked (I/B) effect has been at the centre of the theoretical discussions on the nature of perceptual learning. Two main hypothesis have been formulated to account for the I/B effect, one based upon the McLaren, Kaye and Mackintosh (1989) theory of the representation of stimuli (see also McLaren & Mackintosh, 2000) and the salience modulation account put forward by Hall (2003). More recently, we have proposed an approach to the perceptual learning phenomenon based upon salience modulation and its effect on the representation of stimuli; we have referred to as the differential representation hypothesis (Artigas & Prados, 2014; 2016). We discuss here a series of experiments designed to contrast this approach with the traditional models (McLaren, Kaye & Mackintosh, 1989; Hall, 2003) and the selective attention models (Mackintosh, 1975; Pearce & Hall, 1980) which have been recently used to account for some instances of the perceptual learning effect (Mondragon & Murphy, 2010; Rodriguez & Alonso, 2014).

ATTENTION TO LEARN TO PERCEIVE

GABRIEL RODRÍGUEZ

Universidad del País Vasco (UPV/EHU)

Associative learning allows an animal (or person) (i) to encode the relationship between environmental stimuli and their consequences, and (ii) to encode the relationships among the concurrent features of a stimulus. I will discuss how this latter within-stimulus learning might modulate an attentional mechanism responsible for several perceptual learning phenomena. One proposal is that a selective mechanism increases the salience of those most informative cues that predict more accurately the other features with which they are presented (i.e., the unique stimulus features). I will review some previous and new evidence relevant in testing this theoretical proposal, and I will consider a possible way to formalize it by relating the notions of attention, perceptual organization, and entropy.



SESSION: LATENT INHIBITION AND EXTINCTION

WHAT IS HAPPENING WHEN WE CONDUCT A LATENT INHIBITION EXPERIMENT WITH HUMANS?

LUIS GONZALO DE LA CASA, JUAN CARLOS RUIZ-SALAS & LUCÍA CÁRCEL & AUXILIADORA MENA

Universidad de Sevilla

In spite of the big amount of empirical evidence available on Latent Inhibition (LI) both from animal and human experiments, it is unclear whether the procedures used in the different laboratories are evaluating the same processes. This is specially true regarding human research, where many different tasks have been designed in order to reproduce the typical experimental situation employed in animal experiments. We conduct a comparison between some LI procedures appearing in the literature, and present a new procedure intended to evaluate the effect of stimulus preexposure on subsequent learning that comprises a preexposure and a conditioning stage. During preexposure the participants are instructed to locate a different shape that appear within a set of 40 similar shapes. Two different sets of shapes differing in color (e.g., blue and red or yellow and green, counterbalanced) are used. For the conditioning stage, the participants are instructed to locate the position of the different shape on the screen (right or left) and press one of two keys in the keyboard. In this stage there is a 100% correlation between the shape's color and the position on the screen. Both Reaction times and number of errors are registered as indexes of learning. For half of the participants (those in the preexposed condition) the colors in the first and the second stages are the same; for the second half (in the non-preexposed condition), the shapes' color at the second stage are different. In this work we describe several experimental results revealing that the procedure induce a clear LI effect, as well as the effect of different parametric manipulations on LI intensity.

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ASSESSING OF THE INHIBITORY PROPERTIES OF A LATENT INHIBITOR IN A HUMAN LEARNING TASK

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Latent inhibition refers to a retardation of the development of a conditioned response (CR) when the conditioned stimulus (CS) is preexposed alone prior to its pairings with an unconditioned stimulus (US). Previous literature had established that a latent inhibitor does not show an active tendency to reduce the level of conditioned responding when it is presented in compound with other stimuli with excitatory properties. According to our account of latent inhibition, this happens because the preexposure neutralizes the preexisting excitatory value of the stimulus (i.e., the CS initially evokes the expectancy that some event may occur, but this is gradually neutralized by the CS-no event learning during preexposure). This account also predicts that the





target latent inhibitor will become a net inhibitor if it is repeatedly preexposed in compound with novel stimuli that ensure the expectancy that some event may occur (CS+N₁, CS+N₂, CS+N₃...). In the previous meeting of this Society, we presented a series of conditioned taste aversion experiments, with rats, giving support to these predictions. Now, we present new evidence from recent experiments assessing latent inhibition in a human learning task.

INDEPENDENT INTERFERENCE TRAINING ATTENUATES CUE-PREEXPOSURE EFFECTS IN A HUMAN PREDICTIVE JUDGMENTS' TASK

GABRIEL GONZÁLEZ, JOSÉ A. ALCALÁ, PEDRO M. OGÁLLAR, JOSÉ E. CALLEJAS-AGUILERA, & JUAN M. ROSAS

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Five experiments were conducted in a human predictive learning task with the goal of exploring the effect that interference has on a pre-exposed conditioned stimulus. We used a computer task in which colored fertilizers (CSs) predicted or not the growth of flowers (US) in a flowerbed. A given cue (A) was sequentially presented without and with outcomes. Experiments 1 and 2 found that cue A passed the retardation and summation test of conditioned inhibition, suggesting that the preexposure training used in this task led to differential inhibition. Retardation of acquisition of cue A at testing was attenuated by both, extinction (Experiment 3) and preexposure (Experiment 4) of a different cue (B). Experiment 5 found that the attenuating effect upon A conditioning of preexposing B was greater than the effect of extinguishing B. These results are in agreement with the idea that interference treatments leads to general increases on attention that facilitate subsequent learning about different stimuli.

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ABA AND AAB DESIGNS LEAD TO SIMILAR RENEWAL FROM EXTINCTION IN A HUMAN CONDITIONED AVOIDANCE TASK

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The goal of this research was to test the value of a conditioned avoidance task in humans to explore context switch effects in humans. The task was based on the one commercialized as Space Invaders at the end of the seventies (see also Molet, Leconte, & Rosas, 2006). Participants have to move their ship at the bottom of the screen while shooting invaders to avoid being hit by attackers' shootings throughout the task. In a typical trial, participants have to destroy as many attackers as they can to get as many points as they can. Colored sensors at the top of the screen





were used as warning stimuli. The US was the presence of a mother ship that hit participants' ship and took away most of their points. Participants can avoid the loss of points by hiding their ship in the safety areas on the corners of the screen before the mother ship appeared. Shootings and time on safety areas were used as dependent variables. Two different space backgrounds were used as contexts A and B. The experiment was designed to compare the renewal produced by ABA and AAB renewal designs. During the first stage of training two warning signals were presented in two different contexts (A: X+ / B: Y+). During the second stage both signals were extinguished in context B (B: X-, Y-). Finally, both cues were tested in both contexts. Results showed ABA and AAB renewal from extinction, with no differences between them.

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REVERSAL TRAINING SEEMS TO IMPROVE SUBSEQUENT ACQUISITION OF A TEMPORAL DISCRIMINATION IN HUMAN CONDITIONED AVOIDANCE

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Two experiments were conducted to explore the effect of reversal training upon subsequent acquisition of a temporal discrimination in humans. Participants played with a human conditioned avoidance task implemented in a videogame akin to the one commercialized as Space Invaders at the end of the seventies. Participants have to shoot the invaders throughout the task to get as many points as possible. During the first stage, a warning stimulus announced the presence of a mother ship that hit participants' ship and took away most of their points unless the ship was hidden in the safety areas on the corners of the screen, while the safety stimulus had no outcomes. The role of warning and safety stimuli was switched during stage two in group Reversal (R) while it was kept constant in group Acquisition (A). During the test phase both groups were trained under a Fixed Time 18 sec reinforcement schedule. Temporal discrimination was better in group R than in group A. Experiment 2 tested the effect of reversal on temporal discrimination supported by warning stimuli of different duration (3, and 9 sec). Superposition effect was found in both groups with no differences between them. However, discrimination between warning and safety signals was worse in group R, suggesting that reversal training made participants more conservative.

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SESSION: OPERANT CONDITIONING

THE EFFECT OF QUALITATIVELY-VARIED REINFORCEMENT IN LEVER-PRESSING AND SCHEDULE-INDUCED RUNNING

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Qualitatively-varied reinforcement (QVR) refers to the delivery of two or more consequences in a varied way for the same operant response. It has been suggested that QVR should produce higher response rates than a single reinforcer. The aim of this study was to compare the lever pressing and wheel running response rates during a component in which QVR was available to those in which a single reinforcer was available. Subjects were 8 experimentally naïve rats deprived of food and water. Rats were exposed to a multiple schedule with 3 components in which different consequences were available; food, water or either food or water (QVR) according to a variable interval 120-s schedule. Each component lasted 30 minutes. During the experimental sessions subjects had access to a running wheel. Response rates were higher during the food component, followed by those recorded during the QVR component and response rates were the lowest during the water component. The opposite occurred with wheel-running rates, which were higher with water than with QVR and lower with food. QVR did not produce higher rates of responding, rather it seemed to add the effects of both individual consequences resulting in intermediate rates of responding. Results are consistent with the hypothesis that different reinforcers have different reinforcing traces that will determine the appearance and duration of different behaviours during the inter-reinforcement times and with the hypothesis that behaviours are reinforced as a pattern that changes when the experimental conditions change; both suggesting that wheel-running and other schedule-induced behaviours behave as operants.

EFFECT OF INTER-TRIAL INTERVAL LENGTH ON THE TEMPORAL BISECTION TASK

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The temporal bisection task is a widely used temporal task that consist on training organisms to discriminate between two stimuli of different durations. This task is usually done with long inter-trial intervals, but it is not clear if shorter inter-trial intervals could also be used. The aim of this study was to evaluate the temporal learning in this procedure using long, medium and short inter-trial intervals. Subjects were 24 naïve male rats divided in three groups: long, medium and short. Subjects were first trained to discriminate between 10- and 40-s stimuli, pressing one lever for the 10-s and the other lever for the 40-s durations. The learning criterion was that subjects





pressed the correct lever in 80% of the trials in three consecutive sessions. After they reached the criterion they were presented with five stimuli of intermediate durations (15, 20, 25, 30 and 35 seconds) in non-reinforced trials, and their choices were recorded. Data showed that longer inter-trial intervals resulted in fewer sessions to reach the criterion.

EXPLAINING SUBOPTIMAL CHOICE: THE EFFECTS OF THE DIFFERENCE IN REINFORCEMENT PROBABILITY AND THE OVERALL REINFORCEMENT PROBABILITY

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The most common task used to study suboptimal choice consists in a concurrent chain schedule with two options, A and B. Choosing A leads to one of two outcomes, a Red stimulus with probability 0.2 and a Green stimulus with probability 0.8. The Red stimulus always yields food 10 s later; the Green stimulus never yields food 10 s later. We summarize these contingencies as A: 0.2-Red-1.0 and 0.8-Green-0.0. Choosing B leads to a Blue stimulus with probability 0.2 and to a Yellow stimulus with probability 0.8; 10 s later, each of these stimuli yields food with probability 0.5. Hence, B: 0.2-Blue-0.5 and 0.8-Yellow-0.5. Although option A yields significantly less overall food than B (0.2 vs. 0.5), pigeons prefer A strongly, perhaps because the difference between the terminal link reinforcement probabilities in A ($1.0 - 0.0 = 1$) is greater than the corresponding difference in B ($0.5 - 0.5 = 0$). We hypothesize that preference increases with the difference in reinforcement probabilities within an option (D, a contrast effect) and with the overall reinforcement probability of an option (O, a context effect). We report two experiments to test these hypotheses. In Experiment 1, we varied O while D remained constant. In Experiment 2, we varied D while O remained constant. Preliminary results are consistent with the hypotheses. We discuss the implication of these findings to current theories of choice.

THE VALUATION COST DECREASES AS A FUNCTION OF EXTENDED EXPOSURE TO A RISKY-CHOICE PROCEDURE

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Studies in pigeons and rats have reported a predictable relationship between latencies during no-choice trials and the ulterior preference in choice trials. The Sequential Choice Model (SCM) was proposed in Shapiro, Siller, and Kacelnik (2008) to account for these results, and, more importantly, to make precise predictions about the correlation between latency and preference. Eight male Wistar rats were exposed to 48 sessions in a risk-sensitive procedure, with each session composed of 10 blocks of trials (2 no-choice and 4 choice trials). We analyzed the latencies of response in order to test the SCM's predictions. Our data partially support the SCM's predictions, but a monotonic decrease to a floor effect in all latencies of response did not allow the confirmation of all predictions. The results are discussed regarding a decrease in the valuation



cost as a result of extended exposure, and it is argued that diminishing latencies in this particular procedure contributed to the increased rate of reinforcement.



SESSION: INVERTEBRATE LEARNING

GENETIC MEDIATION OF RESCUE BEHAVIOUR IN *CATAGLYPHIS CURSOR* ANTS: SOME FATHERS PRODUCE KINDER PROGENY

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Certain foragers of the Mediterranean desert ant, *Cataglyphis cursor*, engage in an elaborate rescue operation to free nestmates trapped by collapsing sand and debris or captured by predatory pit-digging antlions. Their rescue behaviour, a highly-organized pattern that reflects goal-directedness, plasticity and memory to increase its efficiency, consists of transporting soil away from the victim, pulling the victim's legs, and precisely targeting whatever object holds the victim in place. However, not all ants deliver such aid. Indeed, some ants completely ignore their nestmate's distress, suggesting the same kind of division of labour that dictates performance of several other tasks in *C. cursor* foragers. Because *C. cursor* is a polyandrous species in which the single queen of each colony mates with multiple males, we asked whether rescue behaviour is heritable. Using a bioassay to identify rescuers and non-rescuers, coupled with paternity assignment via polymorphic microsatellite markers, we show that rescue behaviour is genetically mediated, with roughly one-third of the variation in rescue behaviour explained by paternity. Our results not only identify a new heritable behavioural task in which foragers specialize, but also demonstrate the broad range of tasks included in this species' division of labour, providing support for the critical role of polyandry in increasing reproductive success.

EFFECT OF STARVATION ON LOCATION OF NOVEL FOOD SOURCES IN THE WHITE SNAIL (*THEBA PISANA*)

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Universidad de Granada

After 10 days of starvation snails seem to be hungry because they eat. However, eating after such a deprivation period depends on two factors: the distance to the food and its familiarity. When placed close enough novel as well as familiar foods are ingested but, when placed some centimetres away, novel food is missed and just familiar foods are located and eaten. This fact has led to the conclusion that the function of the snails' posterior tentacles is food-recognition rather than food-detection (Teyke, 1995). Our work, carried out with the white snail (*Theba pisana*) while estivation, at the end of May in Ceuta (coast of the Mediterranean Sea in the north of Africa), questions this idea. Half of the animals remained food-deprived for 45 days after being collected, while the other half was feed 10 days before the food finding test. As expected, results showed that snails failed to find the novel food after the usual 10-day period of food deprivation. However, after 45 days of deprivation, snails did succeed at locating the novel food. The



percentage of successful food finders was similar (70%) to that reported when snails were familiar with the food tested. Theoretical as well as practical implications will be considered.

HOW ELUSIVE IS THE NATURE OF BLOCKING?

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Honey bees, *Apis mellifera*, have long been used as an insect model for the study of animal cognition. Many associative learning phenomena have been extensively explored in this species, but no clear evidence of blocking has been reported with either the free flying or the proboscis extension procedure. One of the factors that could be explaining the lack of consistent blocking effect is the nature of the stimuli used. In the particular case of the proboscis extension procedure, similar alcohols have been used during compound training, and such similarity may have increased the role played by the within compound association, leading to weak effects of blocking. The aim of this work was to explore whether blocking of the proboscis extension response in the honeybee is affected by the nature of the odours employed during compound training. To do so, two clearly distinctive alcohols, 1-hexanol and 1-nonanol, were used in a within-subject experimental design. The results showed that blocking is indeed affected by the stimuli employed.

THE ADULT OVIPOSITION PREFERENCE CAN BE CONDITIONED IN THE FEMALE OF SILKWORM MOTH (*BOMBYX MORI*)

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The Hopkins host selection principle (HHSP) states that insects prefer to oviposit on the host plant they consumed as larvae. Thus, the moth of the silkworm, which only eats mulberry leaves during the larvae phase, should prefer to lay the eggs close to the mulberry leaves. We designed an experiment with two objectives: 1) testing this principle in the case of the lepidopteran *Bombyx mori*, and 2) exploring whether this oviposition preference can be conditioned by associating the mulberry leaves (US) with a novel odor (CS). If so, these female moths will prefer laying their eggs near or on the CS.

Experimental group experienced 30 trials with mulberry and novel odor together. We employed two control groups. One of them (non-contingent group) experienced the two stimuli too, but in a non-contingent way. The other one (only CS group) was exposed only to the CS.

The test consisted of put a female and a male moth together for a day in a box, so that in a corner we placed two mulberry leaves (for half of the group) or five drops of the new odor (for the other half). The results show that the moths of all the three groups tested in the presence of the mulberry prefer to lay their eggs in the mulberry area, according to the HHSP. However, only the oviposition of experimental group took place near the CS.



PRELIMINARY STUDIES ABOUT BLOCKING IN EARTHWORMS (*APORRECTODEA LONGA*)

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Since blocking was discovered by Kamin in 1969, it has been replicated in a wide range of procedures with both humans and animals including species of invertebrates. The blocking effect, as a complex associative phenomenon, has become a reference to test the validity of any theory of learning whether associative or non-associative. While the nature of this effect has also been studied broadly, its study is especially relevant in the invertebrate species in order to compare the learning abilities of animals along the phylogenetic tree. In the experiments presented in this paper, evidence of blocking in earthworms has been shown employing an aversive conditioning procedure with different control groups. The results suggest that the blocking effect exists in earthworms, although this learning seems to be modulated by the nature of the stimuli employed. Apparently, olfactory stimuli are best blockers than tactile ones. We will discuss this idea in the light of our procedure and its characteristics.



SYMPOSIUM: PSYCHOBIOLOGY OF REWARD LOSS: OMISSION, DEVALUATION, AND UNCERTAINTY

PARTIAL REINFORCEMENT AND THE INCENTIVE HOPE HYPOTHESIS

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Acquisition of sign-tracking behavior under partial reinforcement invigorates responding to conditioned stimuli, in comparison with continuous reinforcement. The cause of invigoration remains controversial. After briefly discussing the traditional interpretations, I propose a new hypothesis, called incentive hope, which has revealed capable of accounting for many situations related to partial reinforcement. Its basic message is that the occasional delivery of reward generates a "hope" for reward on subsequent trials, "hope" adding some motivational salience to that of reward itself. I explain that the incentive hope hypothesis can only work provided that reward uncertainty is unavoidable, and that this hypothesis may have important implications for the study of animal foraging.

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BRAIN MECHANISMS OF REWARD LOSS

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Incentive learning in mammals implicates negative emotion in situations involving reward devaluations. One such situation, consummatory successive negative contrast (cSNC), has been well-described in terms of behavioral and pharmacological factors that affect it. In cSNC, animals reject consumption of a mild sucrose solution (e.g., 4% sucrose) after learning that a sweeter solution (32% sucrose) is available in that context, relative to unshifted controls always given access to 4% sucrose. Thus, a 32-to-4% sucrose downshift is an instance of reward devaluation. More recently, several articles have looked at the effects of discrete brain lesions and microinfusions on cSNC and these data have led to a model of the minimal neural circuit activated by reward devaluation (Ortega et al., 2017, *Pharmacol Biochem Behav* 154:39-52). Research leading to this model often included lesions that either reduce or enhance the cSNC effect, suggesting that the circuit has the ability to modulate the effect by exerting opposite influences on the output (i.e., suppression of licking behavior). Using an approach involving lesion/microstimulation followed by testing in several situations involving either reward devaluation, reward omission, or reward uncertainty, has suggested a distinction between two central functions: reward comparisons and negative emotion. The evidence for this model, its limitations, and the future directions it suggests will be presented.





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REWARD LOSS AND EMOTIONAL SELF-MEDICATION

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The emotional self-medication (ESM) hypothesis of addiction states that the drug chosen to be consumed depends on its ability to reduce negative emotions induced by stressful experiences, psychiatric conditions, or negative affect associated to withdrawal from chronic drug abuse. In accordance with the ESM hypothesis, we found evidence that animals (rats) exposed to a frustrating reward-loss experience (e.g., reward downshift, reward omission) selectively and temporarily increase the voluntary consumption of anxiolytics (ethanol, chlordiazepoxide). The study presented here aimed at reducing or abolishing the ESM effect by giving animals 50% partial reinforcement (PR) training during the preshift phase of a consummatory successive negative contrast (cSNC) task. This treatment is known to induce resistance to contrast, compared to continuous reinforcement (CR) training. But could adjustment to reward uncertainty (PR training) in the cSNC task attenuate the ESM effect? Rats were food deprived and given daily access to 32% sucrose followed by 4% sucrose. Immediately after each consummatory trial, animals were exposed to a free-choice, two-bottle preference test between ethanol vs. water (E, W). PR groups received 32% sucrose in half of the preshift sessions and distilled water in the other half. Groups E/PR and E/CR had access to 2% E vs. W during the preference test; groups W/PR and W/CR were exposed to two bottles with water. PR groups consumed less sucrose than CR groups after reward devaluation, regardless of the preference test condition (E or W). E/CR showed increased consumption and preference for ethanol in comparison to E/PR during the postshift phase, suggesting that PR training reduced ESM induced by reward downshift. The results will be discussed with respect to the usefulness of animal models of reward loss to understand the connection between ESM and addiction.

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SESSION: BEHAVIOURAL NEUROSCIENCE

EFFECTS OF Δ 9-TETRAHYDROCANNABINOL ADMINISTRATION IN ADOLESCENCE ON SCHEDULE-INDUCED DRINKING IN ADULT RATS

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Adolescence is a critical period of development in which important processes of neuronal maturation occur in the central nervous system, so drug use onset is especially relevant and it has been suggested that exposure to exogenous cannabinoids can produce lasting changes in brain and behavior in adulthood. Schedule-induced drinking (SID) is an animal model which reproduces a compulsive behavior that is present in abusive drug use, but little is known about the effects of cannabis derivatives on this behavior despite that they are the most consumed illicit substances worldwide. The aim of this study was to determine long-term effects of delta-9-tetrahydrocannabinol (THC) administration in adolescence on SID, and to test the effects of different acute doses in adulthood once SID was acquired. Adolescent rats were treated with THC (5 mg/kg i.p.) or its vehicle from 35 to 49 postnatal days (PND) and left undisturbed until their adulthood when its effect was evaluated on SID acquisition, extinction and reacquisition. 1-h sessions of fixed-time 60-s food delivery served to assess SID. In addition, separate sessions were performed to evaluate the acute effects of different THC doses (1, 2.5, 5 and 10 mg/kg) on SID in subjects with and without prior experience with THC. Results did not show THC long-term effects on acquisition, extinction, or reacquisition, but acute administration of THC in adulthood caused an increased variability on SID expression in both groups with higher doses. Our results indicate that THC consumption in adolescence does not alter SID in a lasting way in adulthood, and independently of the previous experience with the drug the high doses of THC cause great variability in the development of this behavior.

DIFFERENTIAL COGNITIVE DEFICITS IN TWO ANIMAL MODELS OF PARKINSON'S DISEASE

INMACULADA MÁRQUEZ NORIEGO, MARIO F. MUÑOZ PINTO, ESTRELLA DÍAZ ARGANDOÑA, ANTONIO AYALA GOMEZ & JUAN CARLOS LÓPEZ GARCÍA

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Instrumental conditioning involved two different processes: 1) Goal- directed behavior, characterized by its dependence on the causal relationship between action and consequence and the sensitivity of action to change; and 2) learning of habits, that is relevant for its persistence and its insensitivity to post-learning changes. Currently we know that the dopaminergic system is involved in both kind of learning. The present experiment analyzed two animal models of Parkinson's disease. The 6-OHDA model, causes selective damage of the catecholaminergic





neurons, specifically affecting the dopaminergic neurons of the nigro-striatal system. This model simulates the clear symptomatology of the degenerative process that occurs in Parkinson's disease. On the other hand, the LPS model acts causing inflammation in the infusion area. This model simulates the early symptoms of this disorder, including neuroinflammation and microglia activation. In order to validate both models, we studied if both parkinsonian models have the same effect at the behavioral level. The results showed that the 6-OHDA model damages the processes involved in habits. In contrast, subjects treated with LPS showed a goal-directed learning deficit. This difference between both models could be due to the different alteration of the sums of neurons of the Substantia Nigra. It is possible that the 6-OHDA model disrupt the nigrostriatal pathway, while the LPS model interferes in the efferences as well as in the afferences from Substantia Nigra.

PAVLOVIAN CONDITIONING: EFFECTS OF DOPAMINERGIC DRUGS ON LOCOMOTOR ACTIVITY

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The aim of this study is to analyze the possible associations between contextual cues and those responses induced by agonists or antagonists of the dopamine system. Our hypothesis anticipates that repeated administration of dopaminergic drugs in the presence of a specific context will result in the establishment of an association between the context and the effect of the drug. Such association will induce a conditioned response to the context similar to that produced by the drug administration. To test our hypothesis, we conducted an experiment that includes a conditioning stage consisting in injecting the rats with a dopamine agonist or antagonist (apomorphine or haloperidol, respectively) immediately before being placed into the animals in the experimental context were they remained for 60 min (this phase was conducted during four consecutive days). Two additional groups received the drug after context exposure and before the animals were returned to their home cages. After conditioning phase, a test day that was similar for all animals was conducted. The test trial consisted in injecting a dose of vehicle before introducing the animals in the experimental cages for 60 min. Mean percentage of locomotor activity was registered as the conditioned response. The results showed that the group that had been exposed to the association between the context and the dopamine agonist exhibited an increase of locomotor activity. No significant results were obtained when the context had been paired with the dopamine antagonist. These results are relevant to understand the implications of classic conditioning on brain activity from both a theoretical and a therapeutic perspective.



HIGH FAT HIGH SUGAR DIET INCREASES IMPULSIVITY

IAN JOHNSTON

University of Sydney

Objectives: To examine if high fat high sugar diet is associated with obesity.

Purpose: There is evidence of correlations between obesity, a high fat, high sugar (HFHS) diet, and low self-control. It is commonly assumed that highly impulsive individuals choose a HFHS diet, and therefore become obese. We tested an alternative hypothesis: That a HFHS diet causes individuals to become highly impulsive.

Methods: Baseline impulsivity was assessed in laboratory rats with a delay discounting task, and were then randomised to either a control diet or a 6 week diet of sweetened condensed milk (SCM; Experiment 1) or a Western cafeteria diet (WCD; Experiment 2). They were then reassessed for impulsivity on the delay discounting task. Memory was also assessed in the novel location recognition task. Neural tissue was collected at the end of the study and assessed histologically.

Results: Initial impulsivity did not predict SCM or WCD consumption. However, SCM or the WCD consumption caused the rats to become more impulsive compared to control rats. The HFHS diets also caused the rats to display poorer spatial memory. The HFHS diets also upregulated the expression of microglial Iba-1 antigens in the prefrontal cortices.

Conclusions: These experiments show that daily consumption of a HFHS diet cause laboratory rats to become more impulsive, and that this diet also causes neuroinflammatory changes within the prefrontal regions of the brain associated with impulsive choice. We argue that there is a dynamic relationship between diet and self-control: Individuals who consume HFHS diets become more impulsive, and therefore may become more obese as a consequence of the effects of the HFHS diets on the brain.

WHAT CLAY EATING TALKS ABOUT RUNNING-BASED TASTE AVOIDANCE IN RATS

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Running in an activity wheel generates pica behavior (kaolin clay intake) in rats. Wheel running also results in Pavlovian conditioned avoidance of the taste solution consumed immediately before the running. Since pica has been considered a behavioral marker of nausea in rats, these findings suggest that wheel running induces nausea, which is the underlying physiological state for establishing taste avoidance. This article reports a replication of running-based pica in rats (Experiment 1) and concurrent demonstrations of running-based pica and taste avoidance in the same animals (Experiments 2 and 3). Also shown is that pica does not alleviate running-based taste avoidance (Experiment 3). Another finding is that pica is generated by a nausea-inducing lithium chloride injection but not by a pain-inducing hypertonic saline injection (Experiment 4).





These results, when taken together, support the hypothesis that pica behavior generated by wheel running reflects nausea feeling in rats.

SESSION: PERCEPTUAL LEARNING

MECHANISMS UNDERLYING THE COMPARISON PROCESS IN PERCEPTUAL LEARNING

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Perceptual learning refers to the increase in subsequent discrimination between two similar stimuli after mere exposure to both. Gibson (1963) explained this effect in terms of perceptual differentiation, pointing out that comparison between stimuli is critical for this process to occur. Accordingly, experiments with humans have shown that with simultaneous or very close exposures the opportunity to compare effectively enhances discriminability. However, with typical animal procedure, this sort of exposures seems to hinder subsequent discrimination, possibly because the formation of excitatory links between the unique elements increases generalization. Previous results from our laboratory have shown that a rapid succession procedure like the one used with humans, improves subsequent discrimination in rats, and that introducing a distractor between the elements to be compared disrupts such comparison, paralleling results with humans. To further explore the mechanisms behind this comparison-like process, we conducted a series of experiments trying to manipulate the conditions when comparison is more likely. Broadly, we investigated the effect of removing one of the unique elements of the compound flavours. According to the common sense understanding of comparison, the presence of both distinctive features should facilitate it. Our results support this interpretation and do not fit well with current theories of perceptual learning under rapid succession procedures, suggesting the need for the simultaneous active representation of the unique features of the stimuli.

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Gibson, E. J. (1963). Perceptual learning. *Annual Review of Psychology*, 14(1), 29-56.

THE ROLE OF STIMULUS COMPARISON IN HUMAN PERCEPTUAL LEARNING: THE EFFECTS OF THE PREEXPOSURE SCHEDULE AND THE INSTRUCTIONS

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This study examined the effects of two preexposure schedules (concurrent and blocked) and four verbal instructions for preexposure (asking for “same/different” judgments, only for “different” or “same” judgments, or requiring the participants only to look at the stimuli) on the subsequent ability of adult humans to differentiate between stimuli, as well as their preference to look at the distinctive elements of the stimuli over the commons during preexposure. The study found evidence for better stimulus differentiation after concurrent than blocked preexposure, except in the case where participants were required to only look at the stimuli. Furthermore, an effect of the instructions was found only for the concurrent preexposure condition. Specifically, the





instructions asking for “same/different” or only for “different” judgments, but not for “same” judgments, improved stimulus differentiation relative to the case in which participants were required to only look at the stimuli. During preexposure, preference to look at the distinctive elements of the stimuli over the commons increased in general for the concurrent preexposure conditions, being it larger for these conditions except in the case where participants were required to only look at the stimuli. In this latter case, preference to look at the distinctive elements was similar to that observed for the blocked preexposure conditions. These results seem to indicate that optimal opportunities to compare stimuli offered by the concurrent schedule might improve stimulus differentiation, boosting an attentional shift toward the distinctive elements of the stimuli, but only when the participants were required to look for stimulus differences.

PERCEPTUAL LEARNING AND GENERALIZATION OF SENSORY-SPECIFIC SATIETY

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Obesity has become a widespread problem in developed countries. One possible factor responsible for this is the ease of access to a great variety of highly caloric foods – an obesogenic diet. Such variety is known to cause an increase in total intake, the so-called “buffet effect”. The explanation for this effect relies on an intake regulating mechanism called sensory specific satiety (SSS). This mechanism is defined as the temporary devaluation of the sensory properties of a given food developed shortly after it is eaten. This devaluation can be generalized to other products that share sensory properties to the satiated food. It is possible that an extensive exposure to a high variety of food could make this mechanism more specific in the long term. That is, exposure could reduce generalization of the satiety to similar foods, thus increasing their consumption. This could be explained by perceptual learning, which would promote an increase in the discrimination between two similar stimuli based on previous perceptual experience with them. Hence, repeated exposure to two similar foods would increase their distinctiveness, potentially decreasing generalization of satiety and increasing total intake. We first tried to establish a procedure suitable to study SSS using rats as experimental subjects. In this procedure we sated one flavoured solution and evaluated its preference in comparison with a non-sated solution. Following this we tried to assess the effect of previous exposure to the flavours on the generalization of the satiety. The implications of these results on our understanding of the influence of variety on food consumption are discussed.

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SESSION: COMPARATIVE COGNITION

STRESS AND SELECTIVE LEARNING IN A NAVIGATION TASK WITH RATS

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The effects of the number of animals in an experimental room (density) were assessed to check the preference for using a landmark or pool-geometry when solving a simple spatial task in adult female rats. For this purpose, two groups of animals were used: one group was kept in a room with high rat population density (DA) and the other in an experimental room with low rat population density (DB). The two groups were trained in an unusual triangular-shaped pool to find a hidden platform whose location was defined in terms of these two sources of information, a landmark outside the pool and a particular corner of the pool. Subsequent test trials without the platform pitted these two sources of information against one another. All rats spent more time in the distinctive corner of the pool than next to the landmark. Further tests revealed that Group DA had learned about the two sources of information by presenting cues individually. That was not the case with Group DB that had learned about one source of information only, pool geometry. Then, the same test trials were repeated a second time and the same results were obtained. Finally, following some re-acquisition trials with a more salient landmark, the same test trials were repeated a third time and on this occasion it was clear that Group DB had learned about the two sources of information, pool-geometry and landmark. These results do not replicate those obtained by Rodríguez et al. (2010). The present results agree with the claim that females can use different types of information in spatial navigation depending of their level of stress. A possible epigenetic problem is currently being studied in the laboratory, which seems to particularly affect female rats.

THE BEHAVIOURS ASSOCIATED WITH GUILTY LOOK IN DOGS AS CALMING SIGNALS

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Since the beginning of the century the research of human cognition has suffered a important change, adding on the dog as experimental model. This is due to the large number of social skills they have developed and the similarity they have to those of children in development. The main interest of this study is to examine the behavioral expression of guilt in these animals as a sign of secondary emotion. For this, previous data on the relational history between the owner and the dog are collected and two tests are carried out. The interaction between the owner and the dog is manipulated. In one trial he is indicated to avoid it, being as restrictive as possible, and in the other test he is asked to scold the dog as usual he does. We used the list of behaviours that are described by Horowitz (2009) to quantify the "repentance" expression in the dog. It is observed that the only variable that affects to these behaviours is the interaction between the owner and the dog, what supports the results of the previous research and the initial hypothesis.





DO HUMANS BEHAVE AS NON-HUMAN ANIMALS IN FORAGING SITUATIONS?

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Foraging situations have been used to understand the mechanism of decision making in non-human animals. When foraging situations are carried to the laboratory, they provide an exhaustive control over the variables that influence on choice. We propose an analogue of a foraging situation to study human decision making; particularly, to study dynamic choice. The situation has been developed in a computer. The user moves an avatar in a foraging situation, where he must capture food, in this case food is represented by pikachus. The pikachus can be obtained in different patches in the absence or presence of other avatars. Our computer application permits to take control over the distribution of food (that means preys), the patches that are active in a particular time (one at a time or several simultaneously at a time), their properties, and most importantly, the number of avatars foraging at the same time (one or several). We present data describing the behavior of one single avatar either foraging in the absence of others or in a group situation. The predictions of Marginal Value Theorem are contrasted in human participants. We also report the effects of either the consequences of their own behavior or the behavior of others on changes in the strategy of foraging used by our participants.





POSTERS

**INCIDENTAL LEARNING AND OUTCOME-DENSITY BIAS (Po1)**

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Judgements about causality are usually overestimated when the outcome occurs frequently, a result that is known as the outcome-density bias. Interestingly, most studies reporting outcome-density biases are conducted in intentional settings, that is, participants are instructed to observe or attend to the relation between the potential cause and the alleged consequence. However, findings from the related literature of statistical learning and sequence learning indicate that people are sensitive to covariational information even when it is presented incidentally. Thus, our goal was to explore if the outcome density bias can be observed under incidental conditions. To this end, we conducted one experiment in which we manipulated the participants' approach to the learning task: either intentional or incidental. Participants judged two causal relations: one which they were asked to actively assess, and another one to which they had been passively exposed. Our results suggest that the outcome-density bias may depend on the participants' stance toward the learning setting.

DEBIASING INTERVENTIONS WITH UNDERGRADUATE STUDENTS: THEIR INFLUENCE IS NOT LIMITED TO SAMPLING STRATEGIES (Po2)

ITXASO BARBERIA, JAVIER RODRÍGUEZ-FERREIRO & MIGUEL A. VADILLO

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Previous studies have shown that a short classroom intervention can diminish the intensity of causal illusions. In these studies causal illusions were measured with an active contingency learning task in which participants could freely decide in which trials they wanted to introduce the potential cause. In the present study, we try to extend these results to a situation in which participants are presented with a passive contingency learning task in which they cannot decide if the potential cause is present or not in each trial. In spite of this procedural change, final causal judgments were still more realistic after participating in the short intervention. Unlike the results observed in previous studies, this effect cannot be attributed to differential sampling strategies, because all participants were exposed to the same information. We discuss the potential implications of these results when applied to real life situations in which the prevalence of events that are perceived as potential causes cannot be changed by the observer. Funding: PSI2016-75776-R (AEI/FEDER,UE)



EFFECTS OF SPACING EXTINCTION SESSION ON RESPONSE RECOVERY (Po3)

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Instrumental extinction has been proposed as a model for understanding the suppression of problematic voluntary actions. Consequently, it has been suggested that response recovery after extinction could modelled lapse and relapse. Two experiments with rats used a free operant procedure to explore the impact of spacing extinction session on spontaneous recovery and renewal of an extinguished lever-pressing. Initially, in all experiments, hungry rats were trained to performed two responses (R1 and R2) for food. Then, all responses underwent extinction. For R1, rats experienced a longer intersession interval (72h) than for R2 (24h). During the final restoration test, it was observed that using spaced extinction sessions reduced both spontaneous recovery and renewal. Some theoretical implications are discussed. Moreover, the benefits and limitations of spacing therapeutic sessions for preventing relapse are mentioned.

BDNF AS A TOOL TO DETERMINE THE PARTICIPATION OF BRAIN AREAS IN LEARNING PROCESSES (Po4)

FRANCISCO JOSÉ PÉREZ DÍAZ, FRANCISCO JAVIER VILLADIEGO LUQUE, JUAN PEDRO VARGAS ROMERO, ESTRELLA DÍAZ ARGANDOÑA & JUAN CARLOS LÓPEZ GARCÍA.

Universidad de Sevilla

Brain-derived neurotrophic factor (BDNF) plays a critical role as a regulator of synaptogenesis and synaptic plasticity mechanisms underlying learning and memory in the adult central nervous system. Our laboratory has used this protein to show differences on its concentration related to cognitive learning process on the basis of its specific location. We are focused on analysing the regional involvement of dorsal striatum and prefrontal cortex in latent inhibition. For this behavioural study we trained several groups of rats to different exposition to a future conditional stimulus. A group was exposed to a long presentation of the future CS without consequences, the second group to a short one, and finally a third group with no exposition to the future CS. After the behavioural procedure, we analysed the concentration of BDNF in the dorsal striatum and prefrontal cortex. We found region-specific changes in BDNF expression. Specifically, the data showed a positive correlation of a higher activity in medial prefrontal cortex in regard to the exposition of the CS and a higher activity of dorsomedial striatum with short exposition to the future CS.

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PARTIAL EXTINCTION DID NOT DIMINISH SPONTANEOUS RECOVERY AFTER A 24 HOURS RETENTION INTERVAL (Po5)

MARÍA JOSÉ QUINTERO, MARÍA TERESA GUTIÉRREZ, AMANDA FLORES, JOAQUÍN MORÍS & FRANCISCO J. LÓPEZ

University of Málaga

Fear extinction is not permanent but it may suffer from different forms of relapse. One strategy potentially useful to diminish relapse is the partial extinction treatment, according to which extinction may be potentiated if a gradual and sparse number of CS-US pairings are introduced within the extinction treatment. The present study, using a differential aversive conditioning paradigm, tries to evaluate the efficacy of partial extinction to reduce a specific form of relapse, spontaneous recovery, after a 24 h. retention interval. The results showed that partial extinction did not diminish spontaneous recovery when compared with standard extinction. From a theoretical point of view, the pattern of results found was more consistent with the idea that extinction entails the acquisition of new knowledge than with the idea that there are conditions in which extinction entails the erasure of the original acquisition

SHORT TERM SPONTANEOUS RECOVERY AFTER A PARTIAL EXTINCTION TREATMENT (Po6)

MARÍA TERESA GUTIÉRREZ, MARÍA JOSÉ QUINTERO, AMANDA FLORES, FRANCISCO J. LÓPEZ & JOAQUÍN MORÍS

Universidad de Oviedo & Universidad de Málaga

Human and non-human animal experiments have shown that partial extinction can slow the reacquisition of previously learned relation between a CS and an aversive US. The partial extinction treatment includes intermittent presentations of reinforced trials intermixed during the extinction phase. Potentially, this could make partial extinction a very useful tool to use during extinction based treatments. However, the effect of this manipulation on other relapse phenomena, like spontaneous recovery has been barely studied. In this experiment, we tested if short term spontaneous recovery, with a 6 min delay between extinction and test, would be affected by partial extinction compared to a standard extinction. The results showed no reduction of spontaneous recovery in the partial extinction group, and the tendency was to an increase in its magnitude. Therefore, does not seem to be an adequate therapeutic choice if spontaneous recovery is potentially relevant.



DANCE AND NEUROREHABILITATION QUANTIFIED USING NEUROIMAGING: RSEEG & fMRI (Po7)

SUSANA CARNERO, REBECCA BARNSTAPLE, DEBORA RABINOVICH, REMY COHAN, KAROLINA BEARSS, RACHEL J. BAR & JOSEPH FX DESOUSA

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Dance or movement to music is an intensively multimodal activity, engaging both top-down and bottom-up brain processes (Bar & DeSouza, 2016). Dance simultaneously involves memory, visual-spatial awareness, kinesthetic and vestibular information, motor imagery, touch, imagination, timing, and musical/social elements, challenging the central nervous system (CNS) in novel and stimulating ways (Dhami, Moreno & DeSouza, 2015). Our group uses EEG and fMRI to investigate neural processes involved in dance, specifically looking at learning and therapeutic effects over time (DeSouza et al 2012; 2013; Levkov et al 2014; Barnstaple & DeSouza, 2016; Rabinovich et al 2017). Working at multiple locations and with diverse approaches, we are measuring the effects of dance participation for Parkinson's disease (PD), mood disorders, and chronic pain. Results showed improvements in balance, gait, and depression scores for PD, as well as lateralized differences in alpha power; pre-class alpha was observed to be lateralized towards the right hemisphere in pilot data for a group with depression, this lateralisation effect diminished post-class (8-weeks later). Future research will focus on decomposing multisensory aspects of the stimuli that the dance subjects encounter over time (music, touch, vision, social interactions, etc).

RESPONSE TO PERCEPTUAL NOVELTY IN TORTOISES (Po8)

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The ways of responding to novelty have not yet been thoroughly and comprehensively researched in reptiles, and studies undertaken so far have been conducted mainly on laboratory rats. The purpose of this paper is to present results of research carried out on the land tortoises *Testudo hermanni* and *Agrionemys horsfieldii*. Current research on tortoises as study subjects indicates that while undertaking environmental exploration these animals rely, to a large extent, on their sight, which is why this study employed visual stimuli to measure the tortoises' response to novelty. In the course of the experiment, three objects were presented: the first imitated a biologically significant stimulus, the second was biologically indifferent, while the third was variable, and therefore perceived by the animals as novel. The results obtained suggest that the biologically significant and the variable objects elicited a response which involved the animals' looking more intently at those objects than at the biologically indifferent object. It may be concluded, therefore, that tortoises have demonstrated exploratory responses which varied according to the object presented. While this study was only preliminary, the results obtained substantiate the view that tortoises may be interesting study subjects in comparative psychology.

**ABSENCE OF ABC RENEWAL IN HUMAN SPATIAL MEMORY (P09)**

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We investigated the ABC renewal of spatial memory in humans exposed to a virtual water maze. Three groups of participants had to locate a hidden platform from a set of distal cues. In a Discrimination Phase the platform was located in the center of a specific quadrant and then moved to the center of the opposite quadrant in a Reversal Phase. Subsequently a test without platform was conducted. Each phase was done in a different context for the ABC Group or in the same context for the AAA Group. Group AA performed only the Reversal Phase and the test, both in the same context. All groups learned the location of the platform in the different phases and during the test searched the platform in its last known location. The data show the absence of ABC renewal in spatial memory. The implications for the study of the extinction of spatial memory from an approach of associative learning are discussed.

BRIEF EXPOSURE TO AN ODOR ENHANCES THE EXPLORATION BEHAVIOR TO IT (P10)

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In the one-trial object recognition task, rats first receive exposure to a pair of identical objects (A & A). On a subsequent test in which the preexposed object is presented alongside a novel object (A & N), animals show more and longer exploratory approaches to the novel (N) than to the familiar object (A). This preference for novelty has been interpreted as reflecting the previous formation and encoding of a representation of the familiar object. In the present research, we exploited this procedure but using odors, rather than objects, as target stimuli, and running the preexposure stage at the home cages. Confirming preliminary findings from our laboratory, our experiments suggest that the relationship between the length of stimulus exposure and the vigor of the explorative behavior follows an inverted U-shaped function: a relatively long exposure to an odor (A) generates the usual preference to explore a novel odor (N) concurrently presented. However, when the preexposure to A is quite brief, rats prefer to explore the familiar odor (A). We interpret these results in terms of an attentional process that enhances the vigor of the orienting responses to those sources of information that generate more uncertainty. Our proposal is that, under some circumstances, a partially known stimulus can generate even more uncertainty than a novel stimulus.



PREIMAGINAL CONDITIONING IN THE SILKWORM (*BOMBYX MORI*) (P11)

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The Hopkins host selection principle (HHSP) states that insects prefer to oviposit on the host plant they consumed as larvae. Thus, the moth of the silkworm, which only eats mulberry leaves during the larvae phase, should prefer to lay the eggs close to the mulberry leaves. Hence, oviposition decisions can be influenced by larval experience. To explore this hypothesis, we tested the moths oviposition preference after associating mulberry leaves (US) with a novel odor (CS) in the silkworm larvae.

Experimental group experienced mulberry and odor together during 6 sessions. Control group experienced the two stimuli too, but in a non-contingent way. When a female moth emerged, it was put with a male in a box for a day, so that in a corner we placed five drops of the new odor. The results show that only the moths of the experimental group laid their eggs near the CS.

SPONTANEOUS RECOVERY AFTER EXTINCTION OF THE INSTRUMENTAL RESPONSE IN CHILDREN (P12)

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In Pavlovian and instrumental learning take place some response recovery effects once that response has been extinguished, such as spontaneous recovery, reinstatement and renewal. The instrumental version of those phenomena has been proposed as laboratory models for studying relapse of unwanted voluntary behaviors (e.g., Bouton, Winterbauer, & Todd, 2012). Some strategies have shown be useful to reduce that relapse (e.g., Bernal-Gamboa, Gámez, & Nieto, 2017). With the aim to apply this knowledge to the educative context, we designed a task for exploring the acquisition and the extinction of instrumental responses in 6-7 years old children. In the experiment we present here, children had to learn what balloon can be destroyed depending on the color presented in the computer screen, by clicking on it with the mouse pointer. In extinction phase the participant's response had not been followed by the balloon destruction. Then, to evaluate the spontaneous recovery of instrumental response, all the participants were tested twice. The first test was conducted immediately after the last extinction trial, and the second one took place 24 hours later. The results show the spontaneous recovery of the instrumental response that was previously extinguished. These findings suggest this task could be useful in the study of some effects related to children instrumental learning.



REDUCING REINSTATEMENT OF HUMAN INSTRUMENTAL RESPONSE THROUGH EXTINCTION-CUES (P13)

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The study of post-extinction recovery effects, and how to prevent them, has received important attention. In human beings, research on reinstatement has increased in the last decade, although most of the studies focus on the return of fear responses. The purpose of this experiment was to explore whether an extinction-cue had any impact on the reinstatement of instrumental responses in humans beings. After participants learned to perform R1 and R2, they received an extinction procedure for both responses. During this phase, all participants experienced the presence of an extinction-cue. Then, all participants saw both attackers destroyed by allies (O1 and O2). Finally, testing took place. Only R1 was tested in the presence of the extinction-cue. The results show that performance of R1 was lower than R2.

ESTIMATION OF SODIUM DETECTION THRESHOLD IN WISTAR RATS (*RATTUS NORVERGICUS*) AFTER TASTE AVERSION INDUCED BY LiCl (P14)

CLARA MUÑIZ-DÍEZ, JUDIT MUÑIZ-MORENO, BEATRIZ ÁLVAREZ, SUSANA CARNERO & IGNACIO LOY

Universidad de Oviedo

The maintenance of an adequate sodium balance in mammals is crucial for their proper functioning and survival. One of the mechanisms that animals have to avoid sodium depletion is by means of sodium appetite, which depends on the ability of the animal to detect it, to associate its taste with rewarding consequences and to vary its rewarding value according to the need for salt. The aim of this experiment was to establish NaCl absolute threshold in Wistar rats with a procedure that combines a classic psychophysics' method (limits method) with a procedure from contemporary studies of associative learning (taste aversion learning). Taste aversion was produced by consumption of a 0.15M LiCl solution, which flavour is indistinguishable from that of NaCl, and produces gastric discomfort. Using a two-bottle preference test, NaCl concentrations ranging from 0.0005 to 0.0065M were tested. Results indicated that subjects cannot detect NaCl at a concentration lower than or equal to 0.0025M but that they can detect concentrations higher than or equal to 0.0035M. Thus, the sodium chloride detection threshold in Wistar rats can be estimated to be 0.003M.



THE ROLE OF MOTIVATIONAL STATE ON THE US-PREEXPOSURE EFFECT USING NON-NUTRITIVE UNCONDITIONED STIMULUS (P15)

MARTA GIL, ANA GONZÁLEZ, JESÚS SÁNCHEZ, SERGIO A. RECIO, GEOFFREY HALL & ISABEL DE BRUGADA

Universidad Internacional de La Rioja, Universidad de Granada & University of New South Wales

Prior exposure to a stimulus will result in a retardation of subsequent conditioning when that stimulus is employed as an unconditioned stimulus (US) in a classical conditioning procedure. Previous results have shown that this effect can also be obtained using an appetitive conditioning procedure with sucrose or saccharin as the unconditioned stimulus when the animals were both hungry and thirsty. In a series of experiments, we compared the impact of the motivational state on producing this effect using a non-nutritive stimulus (i.e. saccharin). Our results showed that the US-preexposure effect was found both when animals were only thirsty, or thirsty and hungry. The implications of these results regarding the role of the motivational state in obtaining this effect with a non-nutritive stimulus are discussed.

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SIGN-TRACKING IS MORE RESISTANT TO CONTINGENCY CHANGES THAN GOAL-TRACKING IN BOTH SIGN- AND GOAL-TRACKING RATS (P16)

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Cardiff University

When rats receive pairings of the temporary insertion of a lever into an operant chamber with the delivery of an outcome (e.g., food or sucrose) individual differences emerge in the tendency to interact with the lever (called sign-tracking) or approach the site of food delivery (called goal-tracking). There is evidence showing that sign-tracking is more resistant to some manipulations (e.g., extinction) than is goal-tracking. However, such dissociations might either reflect the phenotype of the rats (sign-tracker or goal-tracker) or the susceptibility of the two types of behaviour to change per se. Here, we examined the effects of two types of contingency change on sign- and goal-tracking: reversing which of two levers predicted food; and changing the reinforcer (e.g., from food to sucrose) that was maintaining behaviour (food maintains higher overall levels of both behaviours than does sucrose). In both experiments, the dominant behaviour of the sign-trackers was more resistant to the change than was that of the goal-trackers. Importantly, this difference was also evident – at different levels of performance - when sign-tracking was examined in goal-trackers and goal-tracking was examined in sign-trackers. These results indicate that differences in resistance to contingency changes are a property of the two behaviours rather than the phenotypes in which they are expressed.



A REPLICATION ATTEMPT OF A SEQUENCE LEARNING TASK WITHOUT AWARENESS

(P17)

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Rosenthal, Kennard and Soto (2011) published the results of an implicit sequence learning experiment. They used a dichoptic presentation of the stimuli using a mirror stereoscope to present a second-order conditional sequence of twelve stimuli that was repeated 96 times during the training phase of the experiment, while carrying out a secondary task to ensure an adequate level of attention. This sequence was based on features that were not consciously accessible in this paradigm (i.e., the eye of presentation of the stimulus). Then in a test phase two types of stimuli were presented, either parts of the original training sequence or new sequences that although were equivalent from a conscious point view to the training sequence, differed in the critical feature. Participants had to provide a familiarity judgement for each sequence, using a six-points scale.

In our replication we successfully recreated the paradigm, obtaining a binocular fusion in all of the participants. However, contrary to the results of Rosenthal et al. (2011) we did not find evidence of learning. Our sample size was twice the original. Bayesian analysis showed support for the null hypothesis. Performance in the secondary task did not correlate with the degree of discrimination in the test phase.

Rosenthal, C. R., Kennard, C. & Soto, D. (2010). Visuospatial Sequence Learning without Seeing. *Plos One*, 5(7) - e11906

ALTERNATIVES TO ASSOCIABILITY IN EXPLAINING LEARNED PREDICTIVENESS

(P18)

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In three experiments, participants were trained in an associative learning paradigm in which they learned the relation between consumption of certain foodstuffs and the type of allergic reaction shown by a fictional patient. Experiment 1 demonstrated the learned predictiveness effect, showing that cues that had served as good predictors of outcomes in an initial phase of training were especially effective in a test given after a second phase of training in which learning about the same cues, but with different outcomes, had been required. Experiment 2 tested, but failed to support, the hypothesis that this positive transfer reflected an enhancement of the associability of the predictive cues that facilitated learning about them in phase two. This experiment showed that the learned predictiveness effect could be obtained when the two phases of training occurred in reverse order, so that the critical cues were established as good or bad predictors only after the associations tested in the final test had been acquired. Two alternatives to an explanation in terms of associability were considered: (a) that training a cue as a good predictor increases its effective salience, thus enhancing its power to evoke responding



on test: (b) that learned predictiveness is the result of an inferential process in which subjects integrate information acquired in the separate phases of training. Support for the latter came from Experiment 3 which showed that a modified test procedure, designed to reduce the tendency to integrate across phases, eliminated the learned predictiveness effect.

LOSS OF SALIENCE AS A SOURCE OF LATENT INHIBITION IN HUMAN ASSOCIATIVE LEARNING (P19)

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Two experiments made use of a procedure known to generate latent inhibition in human associative learning. Participants received training consisting of exposure to a list of actions performed by a fictitious Mr X. For most of his actions an outcome was described, but some were not followed by any outcome. The last action performed by Mr X was novel for participants in the NOVEL condition. For participants in the EXPOSED condition, Mr X had performed that target action on repeated occasions, without its producing any outcome. After training, all participants were tested on their ability to retrieve what was the last action performed Mr X. In both experiments, retrieval of the target action was poorer in the EXPOSED than in the NOVEL condition. Experiment 2 also included a condition in which the target action was followed by a novel outcome and demonstrated a latent inhibition effect -- poorer performance in the EXPOSED condition on a test of the association between the target event and its outcome. These results are interpreted in terms of an attention-reducing mechanism, triggered by the repeated preexposure to the target in the absence of a following event. It is argued that the attentional change involves a reduction in the effective salience of the stimulus of the target event, that reduces the processing necessary for encoding in memory and the ability of the event to enter into associations.

TRAINING WITH DIFFERENTIAL OUTCOMES IMPROVES LONG-TERM MEMORY IN ELDERLY PEOPLE (P20)

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Differential outcomes procedure (DOP) facilitates both learning of conditional relationships and memory for the conditional stimuli in animal subjects. Moreover, it has been demonstrated that this procedure also improves discriminative learning and short-term memory in humans. In the present study, we aimed to test whether the memory improvements after DOP arrangement extend also to long-term memory in older adults. Participants showed a significantly better performance when differential outcomes were arranged and the training sessions were



sufficient. This finding suggests that the DOP can be a technique to facilitate long-term memory performance in humans.

FACTORS AFFECTING THE SEQUENTIAL LEARNING OF TWO GEOMETRIES IN A NAVIGATION TASK IN RATS (P21)

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Male and female rats were trained either in an unusual triangular-shaped pool or in a kite-shaped pool to find a hidden platform, whose location was defined in terms of a single source of information, a particular corner of the pools. The kite-shaped pool rats learned to swim to the platform more rapidly than the triangular-shaped pool animals. This was especially true in the females. A subsequent test trial, without the platform, revealed that both males and females had learned more about the kite geometry than about the triangular geometry. Following this, all rats received a second training and test trial. Those animals trained and tested in the triangular-shaped pool were trained and subsequently tested in the kite-shaped pool while the rats trained and tested in the kite-shaped pool were trained and subsequently tested in the triangular-shaped pool. Would the previous experience with geometry improve equally the learning of second task (for example due to selective attention to the different corners of the pool) or would the different levels of difficulty of the first task affect differentially the learning of the second one? The results clearly showed that only those rats (both males and females) that had learned initially in the difficult, triangular-shaped pool, had a clear advantage in the second, easier, kite-shaped pool. But not vice-versa. The final test trials, without the platform, support this claim.

CHANGES VALUE OF OUTCOME DECREASES THE ATTENTION TO IRRELEVANT CONTEXT (P22)

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Konrad Lorenz University Foundation (Colombia) & Laboratorio de Neurociencias Aplicadas, Neurociencias y Educación Asociación Educar para el Desarrollo Humano (Argentina)

The main of this study began in the exploration of effect the changes value of outcome on the attention to irrelevant context, as an important factor to the information of the associations cue-outcome in a human predictive learning task. The participants received training in which evaluate if a product (cue) was followed by discount (outcome) in a determinate store (context) while another of commercial products were not followed by the discount in the same or different store (A: X50+, F1- Z30+ and B: Y-, F2-). Where in context at the participant evaluated what product had a discount of 50%, 30% and another stimuli, in context B any product had a discount. After training the cues (X, Z and Y) were tested in their training context and in the alternative setting. The results of this study during of acquisition the relation between cue-outcome are actively



processed while during testing the context switch was not found differences evidencing what the attention to the irrelevant context would be decreased during learning. The implication of the changes of value of outcome could be selected during the acquisition while the test the efficacy of the context is reduced by competition between cues modulated for their value.

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EVALUATIVE IDENTITY CONDITIONING (EIC) VS. EVALUATIVE CUE CONDITIONING (ECC) (P23)

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Evaluative conditioning (EC) is defined as the change in the evaluation of a conditioned stimulus (CS) due to its pairing with a positive or negative unconditioned stimulus (US). According to sensitivity to extinction procedures, it has been distinguished two types of EC effects: evaluative identity conditioning (EIC) and evaluative cue conditioning (ECC; Hütter, Kutzner y Fiedler, 2013). Whereas EIC is bounded to an individual stimulus object, ECC is bounded to a stimulus attribute which should transfer to all stimuli with reference value shared (equivalence class), but not to stimuli with opposed reference value (contrast class).

These effects could explain some of the revaluation findings that we obtained in previous experiments. In this sense, we propose that the generation of an equivalence class would facilitate a generalization of the changes produced on one of the elements belonged to a class to the others elements of the same class. However, the opposite effect should be observed with the evaluative identity conditioning.

In the first experiment we promoted the creation of an equivalence class based on the perceptual and affective properties of CSs and USs respectively. In the second experiment, different types of CS were paired with each US groups to favor the EIC.

The results showed that the revaluation effects increased when the ECC was promoted but these effects were eliminated when EIC was favored.



MOTIVATION FOR FOOD IN THE RODENT MODEL OF ACTIVITY-BASED ANOREXIA: CONTRIBUTIONS OF EXERCISE AND DIET IN FEMALE RATS (P24)

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Clinical studies have found that patients with Anorexia Nervosa develop high activity levels suggesting possible implication of exercise in its etiology, in line with findings obtained in animal models. Activity-based anorexia (ABA) develops when laboratory rats have food access restricted to a single period a day and are given free access to a running wheel. It has been found that weight loss increases rats' motivation for food whereas other studies have reported the possibility of wheel running reducing it, pointing that exercise acquires reinforcer properties that interfere with food reinforcer value. A decrease in the value of food reinforcer would be crucial for the validation of the animal model, given the fact that in human patients a decrease in food intake is observed. The objective of the current study was to test the implications among diet and exercise on the reinforcer value of food in the development of ABA in young female rats, which is the most vulnerable population, including humans. Three groups of 8 naïve female Wistar rats were used. An ABA group with 21 h of possibility to run and 1 h of food access, a traditional ABA control group with the same time of food exposure and lack of access to the running wheel, and a yoked group in terms of weight loss to ABA rats' weight. All groups were tested daily on a progressive ratio schedule. The data will be discussed in terms of the contribution of exercise to the development of the phenomenon.

ASSESSMENT OF ATTENTION AND INHIBITORY CONTROL IN NEURODEVELOPMENTAL DISORDERS THROUGH A VIRTUAL REALITY TEST (P25)

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Attention Deficit Hyperactivity Disorder (ADHD), Autism spectrum disorders (ASDs) and Language Disorders (LD) are most common neurodevelopmental disorders present in preschool and school childhood population, but can continue through adolescence and adulthood. These disorders present clinical and etiological heterogeneity, but share deficits in execute functions, especially in attention, motor activity and inhibitory control. The virtual reality (VR) technology is proposed as an useful tool that allows the evaluation in an ecological and motivating environment for a better understanding of behavioral performance deficits improving intervention. Our goal was compare the neuropsychological profiles of ADHD, ASDs and LD groups of children (6-11 years old), by traditional neuropsychological evaluation test (WISC-IV) and a VR test (Aula de Nesplora) specially designed for the evaluation of attention, vigilance, inhibitory control and activity level.



Beyond the differences in omissions and commissions between ADHD and TEA respectively, ASD group had more difficulties with visual task and ADHD group with auditory task. LD group performed better than the other two groups. In addition, motor activity and distractors does not always interfere with attention and inhibitory control.

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EMOTIONAL REACTIVITY TO INCENTIVE DOWNSHIFT IN ADULT RATS EXPOSED TO BINGE-LIKE ETHANOL EXPOSURE DURING ADOLESCENCE (P26)

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Adolescent alcohol use is often characterized by binge-like ethanol consumption pattern during adolescence but also during adulthood. Adolescence is an important period of brain development during which this pattern of consumption causes long-lasting alterations in anxiety-related neurobiological systems such as corticotropin releasing factor (CRF) or melanocortin system (MC). Given that it has been demonstrated that negative affective state may drive escalated ethanol consumption, it possible to suggest that increased likelihood of abusive alcohol use in rats exposed to ethanol during adolescence may be related with differences in anxiety behavior. For this, the aim was to study the performance of rats exposed to binge-like ethanol exposure during adolescence in a successive negative contrast (SCN), a demonstrated method to study affective state in rodents. For that aim, adolescent Sprague-Dawley rats were treated with ethanol (2.5 g/kg ip; BEP) or saline (SP) for 2 consecutive days at 48-h intervals over a 14-day period (PND30-PND43). Following 25 free-ethanol days, in adulthood, food-deprived BEP and SP rats were exposed to a reduction in the amount of food presented in the goal of a runway. We demonstrated that both BEP and SP groups trained with 12 food pellets and shifted to one food pellet showed a significant instrumental SNC effect. These data suggest that pre-exposure to ethanol in adolescence did not increased SNC effects under the conditions studied. This work was supported by CONICYT, Fondecyt (1140284 and 11150308).



BETWEEN-PHASES INTERVAL EFFECT OVER CLASSICAL CONDITIONING ACQUISITION IN EARTHWORMS (P27)

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The study of invertebrate learning is an interesting topic in the field of animal learning and cognition. In particular, the study of conditioning processes in invertebrates had provided useful information to the understanding of the physiological bases of learning and memory. Moreover, it is essential to understand the phylogenetic evolution of associative learning as basic mechanism of learning and survival.

Currently we are employing a classical conditioning procedure in earthworms using an odour or a vibration as conditioned stimuli (CS) and a bright light as unconditioned stimulus (US). With this method we have replicated classical conditioning acquisition and other associative phenomena (latent inhibition, overshadowing, blocking...). Along our experiments we have been employed different parametrical variables (number of trials, interval between them, etc.) and we realized how sensitive these animals are to slight changes in these variables. Moreover, in order to get standardized methods of conditioning, we need to face some parametrical research. In this experiment we compare the effect of the interval between experimental phases (conditioning and testing) over the acquisition of the conditioned response. More specifically, we compared intervals of 2 and 10 minutes, which we have employed in our experiments with different effects.

DISSOCIATION BETWEEN EXPLICIT AND IMPLICIT AFFECTIVE EVALUATIONS OF HIGH-CALORIE FOOD PICTURES IN YOUNG WOMEN WITH RESTRAINED EATING (P28)

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Hedonic food cues may trigger affective responses in a relatively automatic, implicit or effortless way. At the same time, people may explicitly assess affective dimensions. In this study we presented participants (young women with a normal BMI) with pictures of high- and low-calorie foods (HIGH and LOW pics hereafter) using the Implicit Association Test (IAT). In a separate session, they were also asked to explicitly evaluate valence, palatability, and desire-to-eat for both kinds of food pictures. During the IAT we registered the time participants took to categorize HIGH and LOW pics both in the congruent (according to the explicit scoring, high-pleasant, low-unpleasant) and the incongruent (high-unpleasant, low-pleasant) blocks of trials, order counterbalanced. They also completed the Restraint Scale (RS). We found an effect in the congruent block, where participants were slower to categorize HIGH pics as pleasant. Moreover, RS scoring predicted the congruent-incongruent difference in time response for HIGH pics; that was not observed in the case of explicit evaluation. The results suggest a goal conflict related to high-calorie food for young women with restrained eating that causes them to categorize this kind of food in a peculiar way; they explicitly evaluate it as more positive, palatable, and

desirable, as participants without food restriction but, at the same time, they are also slower to label it as pleasant, which may be a consequence of the attempts to exert control over its consumption. Funding: PSI2015-64345-R (MINECO-FEDER).

EFFECTS OF EXPOSURE TO METHAMPHETAMINE IN ADOLESCENCE TO THE CONTROL OF IMPULSES AND LEARNING PROCESSES OF FLAVOR-CONDITIONED AVERSION

(P29)

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From infancy to adolescence the brain undergoes a series of functional and structural changes. Even after adolescence certain structures continue to be immature, such as the prefrontal cortex, which culminates in maturity in late adolescence. Because of this, adolescents are shown with a need to search for new sensations and a lack of impulse control, which sometimes leads to the consumption of psychoactive substances. It is important to know clearly how these types of substances can influence our brain to the point of creating modifications that are then reflected in our behavior patterns. And since substance use at this stage could influence optimal brain development, this research was oriented to the study of the effects of psychoactive substances, specifically methamphetamine, related to impulse control and learning processes.

Some of our results indicated that 7 days after chronic methamphetamine use, subjects (in late adolescence) showed behavior patterns similar to those of impulsivity, which appeared to be compensated, even reversed after 40 days (in adulthood). As for learning processes, we observed that more than 7 days after consumption, the phenomenon of latent inhibition was altered (attenuated), and this effect remained in the long term (more than 40 days later). Therefore, chronic methamphetamine use in the adolescent stage may lead to certain changes at the brain level that could alter both the behavioral patterns as well as cognitive processes involved in learning.

This research was supported by PSI2015-65500-P grant (MINECO, FEDER, UE)

HIPPOCAMPAL CA1 BLOCKADE DISRUPT SPATIAL MEMORY RECOVERY NECESSARY FOR EXTINCTION AND MODIFIES PREFRONTAL CORTEX AND ACCUMBENS NUCLEUS ASSOCIATED ACTIVITY (P30)

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There is a body of evidence supporting the idea that the dorsal hippocampus present a time-dependent involvement in spatial memory extinction tasks, but its specific role on this process remain unclear. In this study, we applied the GABA-A Muscimol antagonist to temporally inactivate the dorsal CA1 field of the hippocampus in rats, in order to evaluate the role of this structure and its functionally connected structures in a spatial memory extinction task in the Morris water maze. Results showed that bilateral inactivation of the dorsal hippocampus resulted in an impairment of the retrieval and posterior extinction of the hidden platform task performance. To further evaluate the brain regional related changes in this process, a cytochrome oxidase histochemistry was carried out as a brain metabolic marker, and a c-Fos immunohistochemistry as an immediate early gene expression analysis. The study of the cytochrome oxidase activity disclosed regional differences between groups in cortical areas as the medial prefrontal and perirhinal cortex. As to the subcortical regions, the core nucleus of the accumbens also showed changes related to the task. Similarly, c-Fos analysis revealed an activation of the medial prefrontal cortex and the dentate gyrus of dorsal hippocampus after spatial memory extinction task. This study demonstrated that the integrity of the dorsal hippocampus along with areas of the limbic cortical are essential for the maintenance of rewarded spatial memory tasks extinction successful completion in the Morris water maze and this results supports the notion of a key role for the prefrontal cortex in the process.

PARTIAL REINFORCEMENT ATTENUATES PREFERENCE FOR ETHANOL AFTER REWARD LOSS (P31)

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Animals exposed to a reward loss experience (e.g., consummatory successive negative contrast—cSNC) increased their preference for anxiolytics (e.g., ethanol, chlordiazepoxide) tested in a subsequent two-bottle preference test against water. These results have been interpreted in terms of the emotional self-medication hypothesis (ESM), which suggests that animals preferred these drugs over water because of the reinforcement derived from their anti-frustration effects. We tested this ESM hypothesis by assessing preference for ethanol after partial reinforcement training. Partial reinforcement induces a chronic frustrating experience that can lead to resilience in the face of frustration. We predicted that partial reinforcement would reduce or prevent the ESM effect. In this study, each cSNC session was followed by a preference test. In the cSNC task, continuously reinforced animals received a 32% saccharose solution for 20 sessions, whereas partially reinforced animals received 32% sucrose and water (10



sessions with each outcome) in a pseudorandom sequence (preshift). Then, all animals were downshifted to a 4% sucrose for 10 sessions (postshift). In the preference test, one group from each condition received a choice between 2% ethanol and water, whereas animals from the other groups were given two bottles of tap water. Preference testing was administered after each of the 30 training sessions in the cSNC task. As expected, reward downshift after continuous reinforcement increased ethanol preference, but did not change preference in the water-control group; however, exposure to partial reinforcement eliminated this ESM effect. These results support the hypothesis that frustration induced by reward loss causes an increase in preference for ethanol (the ESM effect). This effect can be attenuated by the development of resilience to frustration after exposure to partial reinforcement. The relevance of these results for an understanding of the initial stages of drug addiction will be discussed.

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METHODOLOGICAL FACTORS INVOLVED IN LABCLOCK WEB TO STUDY CAUSAL BINDING EFFECT (P32)

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Libet's clock has been used since the early 1950s to study consciousness, sense of agency or the causal binding effect. This paradigm consists of the presentation of a clock face and a dot that spins around its outer edge. Participants are asked to give a response, such as pressing a button, at any time they want and are then provided with feedback, usually in the form of a tone. Participants may be asked to indicate where the dot was when they took this action, or when the feedback appeared, for example. Although it has been widely used, this procedure usually requires complex apparatus that not all laboratories are able to afford. Garaizar, Cubillas and Matute (2016) designed Labclock Web, an easy to set up and open source tool to conduct online experiments based on the Libet's clock paradigm. Moreover, using this task, they found causal binding effect, consisting of a misestimation in the judgment of the occurrence of action if feedback is delayed to the action (500 ms) compared to when feedback is presented immediately after the action (1ms). The goal of these three experiments was to extend the results of these authors and: 1) to analyze whether Labclock Web is able to detect causal binding when the two kinds of trials have a more similar lapse between response and feedback, 1 vs 100 ms instead of 1 vs 500 ms, 2) to explore whether the apparition order of the two kinds of trials have some effect on the causal binding effect, 3) to change feedback presentation to visual instead of auditive. We found a causal binding effect with the three manipulations, showing that Labclock Web is a powerful and precise tool to conduct experiments in this area of knowledge.





FLAVOUR-NAUSEA AND AUDIO-PAIN SELECTIVITY IN TASTE AVERSION LEARNING: DIFFERENCES OF DEGREE AND NOT OF KIND (P33)

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Classic studies suggest that taste aversion learning might be highly selective: with taste-nausea pairings more effective than audio-nausea, but taste-pain pairings less effective than audio-pain. We re-examined this issue using the analysis of licking microstructure to assess palatability changes in two experiments: In both studies, injections of lithium chloride (LiCl – nausea) and hypertonic saline (hNaCl – internal pain) were paired with flavour and auditory CSs. Experiment 1 demonstrated interactions between CS and US type: For both consumption and lick cluster size measures, flavour-LiCl pairings were more effective than flavour-hNaCl pairings, while audio-hNaCl pairings were more effective than audio-LiCl pairings. However, conditioning was weak overall for audio CSs, complicating the comparison between stimulus types. Experiment 2 used larger doses of both USs resulting in clear learning with all CS/US combinations, and confirmed that for flavour CSs LiCl was more effective than hNaCl, while for audio CSs hNaCl was more effective than LiCl. In addition, examination of extinction revealed that the reduction in lick cluster size associated with learnt palatability change recovered more quickly than did the reduction in consumption of flavour CSs previously paired with LiCl or hNaCl. In contrast, for audio CSs, consumption recovered more rapidly than did the reduction in lick cluster size. Taken together, these results demonstrate that there were no qualitative differences of kind because all CS/US combinations resulted in changes to both palatability and the amount of consumption. However, there were differences in the degree of learning which extend into extinction.

LATENT INHIBITION AND MEMORY REPRESENTATION IN HUMANS (P34)

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In experiments of perceptual learning it has been interpreted that a better processing of an element causes more latent inhibition. This idea has been used to explain results in which the unique elements receive more processing resources (because of short-term habituation of the common element) and subsequently showed a learning retardation (Artigas, Contel, Sansa, & Prados, 2012). However, it is also possible that better processing causes a better memory representation, which would interfere more with the conditioned response to other flavour (an external inhibition test of the sort Y+ / AY). We aimed to dissociate these processes – latent inhibition and memory representation – in an experiment with humans. We replicated the procedure used by Escobar, Arcediano and Miller (2003) of latent inhibition without a masking task. Coloured letters are repeatedly presented, and without transition a previously exposed letter and a new one are followed by an outcome (a white cross). After that, we evaluated learning of the letter-outcome event with an expectancy scale; and memory representation with a colour-matching task. Results are discussed in terms of unitization of the features of the stimuli and automaticity of processing.



Artigas, A. A., Contel, D. M., Sansa, J., & Prados, J. (2012). Salience modulation in serial preexposure: implications for perceptual learning. *Journal of Experimental Psychology: Animal Behavior Processes*, 38(1), 66–73

Escobar, M., Arcediano, F., & Miller, R. R. (2003). Latent inhibition in human adults without masking. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 29(5), 1028–1040

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PERCEPTUAL LEARNING AND GENERALIZATION OF SENSORY-SPECIFIC SATIETY (P35)

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Obesity has become a widespread problem in developed countries. One possible factor responsible for this is the ease of access to a great variety of highly caloric foods – an obesogenic diet. Such variety is known to cause an increase in total intake, the so-called “buffet effect”. The explanation for this effect relies on an intake regulating mechanism called sensory specific satiety (SSS). This mechanism is defined as the temporary devaluation of the sensory properties of a given food developed shortly after it is eaten. This devaluation can be generalized to other products that share sensory properties to the satiated food. It is possible that an extensive exposure to a high variety of food could make this mechanism more specific in the long term. That is, exposure could reduce generalization of the satiety to similar foods, thus increasing their consumption. This could be explained by perceptual learning, which would promote an increase in the discrimination between two similar stimuli based on previous perceptual experience with them. Hence, repeated exposure to two similar foods would increase their distinctiveness, potentially decreasing generalization of satiety and increasing total intake. We first established a procedure suitable to study SSS using rats as experimental subjects. In this procedure we sated one flavoured solution and evaluated its preference in comparison with a non-sated solution. Then we assessed the effect of previous exposure to the flavours on the generalization of the satiety. The implications of these results on our understanding of the influence of variety on food consumption are discussed.

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EFFECTS OF UNCORRELATED CS AND US TRAINING MEASURED ON AND OFF THE BASELINE (P36)

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The uncorrelated presentation of a nominal CS and an US (CS/US) has effects that can be measured both on and off the training baseline: during a CS/US procedure evidence of CS conditioning is observed, and after CS/US procedure evidence of slower CS conditioning, compared with subjects with no previous EC/EI experience, is observed. These two effects were studied in a two-phase experiment: a CS/US phase, and then a CS-US (or paired) phase. A magazine entry preparation was used with a tone as CS and a food pellet as US. Several measurement techniques were employed: magazine entry responses during both pre-CS and CS were compared throughout the first phase; next, lever press responses during both pre-CS and CS were compared in an instrumental transfer test; finally, responses throughout the second phase were compared to responses of subjects with no previous CS/US training. In the same experiment, evidences of conditioning during the first phase with two different techniques, and evidence of retarded conditioning during the second phase were obtained. These data are discussed in relation to the hypothesis of learned irrelevance of CS and US versus the hypothesis of "learned irrelevance" effect as a particular case of latent inhibition effect.

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CONDITIONED PREFERENCE AND LATENT INHIBITION: AN EXPLORATORY STUDY WITH ORTHONASAL PRESENTATION OF THE ODOR STIMULUS (P37)

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The repeated pairing of odors and/or tastes with caloric and/or hedonic consequences of appetitive nature increases the preference for those odors or tastes in a subsequent test phase. This phenomenon is known as conditioned preference, either to odors, tastes or to combination of both. In a study of Garcia-Burgos, González and Hall (2013), the latent inhibition (LI) effect in conditioned preference to an odor diluted in water and paired with a 10% sucrose solution was evaluated. When rats were water and food deprived during training, the expression of LI was critically dependent on food deprivation during the test (Exp. 1). This result was repeated even when food deprivation had not taken place during the training (Exp. 2). Thus, the motivational state during the test appears to be a relevant factor for the expression of LI in flavor-preferences conditioning. The aim of our study were replicate the results described above using odors presented on a disk, which favors the orthonasal uptake of odor by the rat (e.g. Holder, 1991). Thirty two male Wistar rats were divided into four groups, half of them deprived of food and water throughout the experiment, while the other half were only water deprived. In addition, to observe a possible LI effect, half of the animals were pre-exposed to the odor. All animals were tested in a two-bottle test, with the disk containing odor in only one of them. Although the



procedure was not useful for obtaining conditioned preferences, a LI effect was obtained in the groups deprived of food. The results are discussed based on procedural factors, as how the odor is presented during the test.

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LEARNING FROM THE EARTHWORM LEARNING AND BEHAVIOR: CLASSICAL CONDITIONING (P38)

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Since Darwin (1981) had pointed out the intelligence of the worm in his work, there have not been many researches on his topic. Recovering this tradition of Comparative Psychology, we argue that interest in their behavior goes further and can become an animal model for research in other fields. For example, earthworm avoidance behavior test is an important screening tool in soil ecotoxicology, the earthworm ventral nervous system is a good model for the study of cellular and synaptic plasticity associated with memory acquisition of classical conditioning. In order to understand that psychological/physiological phenomena are common in different species and not only find similarities, but also the possibility of categorizing differences and capacities between species.

In this study, we proposed to develop a reliable experimental protocol for establish classical conditioning in earthworms, specifically the worm *Eisenia foetida*, is able to acquire a basic learning, such as associative learning, product of conditioning. Two training procedures were used: paired conditioning, random conditioning, In the paired conditioning group, one session consisted of CS-US. The US (light) duration overlapped the last 3 s of the CS (vibration) period. In the random group, worms received the same number of CS and US presentations, but the ITI was varied randomly. To evaluate the CR induced by CS alone, 8 s vibrations (test stimulus, TS) were applied ten times at the end learning session.

To perform paired pairs with precision, a stimulation device for invertebrates was designed under specific control software programmed in Python and whose stimuli were precisely controlled through a Raspberry PI mother board and relay control module.



SEX DIFFERENCES IN SENSITIVITY TO AVERSIVE EFFECTS OF ETHANOL OF ADULTS WISTAR RATS (P39)

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Vulnerability to ethanol abuse may be a function of the balance between the opposing (aversive and rewarding) motivational effects of the drug. The study of these effects is particularly important for understanding alcohol addiction. This work explores sex differences in sensitivity to aversive effects of ethanol using the procedure of flavor avoidance learning (FAL; 3 acquisition trials, a choice-test and 4 extinction trials) in adult wistar rats. In order to examine whether the possible differences are concerned to ethanol aversive effects or instead they are generalizable to other aversive agents, it was also manipulated the unconditioned stimulus used (US; ethanol or Lithium Chloride, LiCl). The results obtained indicate absence of a significant effect of the US used on the FAL acquisition, while they point out a slight sex based difference in the amount of FAL acquired in that females acquisition was weaker. With respect to the extinction phase, the data show no differences between groups in the extinction rate, but they indicate a lower global level of aversion in the group of females subjected to ethanol-induced FAL. This result might indicate that this group extinguished slightly faster than the females subjected to LiCl-induced FAL (and than the males in general), and it might suggest that females are less susceptible to the aversive effects of ethanol in particular (at least when they are evaluated via FAL procedure). A relative sensitivity of males as compared to females with this preparation is generally reported, although the strength of the sex difference varies across studies. Further studies are warranted to elucidate this issue and especially its relation with the associated behavior of ethanol intake.

DISCRIMINATION OF FOOD QUANTITIES IN ANGELFISH (*PTEROPHYLLUM SCALARE*) (P40)

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The ability to estimate and compare quantities is fundamental in many functional contexts. Such competence allows individuals to assess the size of the rival groups, the number of mates, the larger social group for protection, or places with more food for optimizing foraging behaviour. This cognitive ability has been observed in a variety of animal species, including fish. In binary choice tests, fish have been shown to be able to discriminate between groups (shoals) of conspecifics that differ in numerical size, both in the small (≤ 4) and in the large number range (> 4). However, the food choice task, despite of being the most common test employed in diverse animal species, has rarely been investigated in fish. In this study, also using a free choice test, food items were presented as stimuli and we examined whether angelfish (*Pterophyllum scalare*) could discriminate between two sets of discrete, similar-sized food items simultaneously presented and differing in numerical size. The results demonstrated that angelfish reliably chose the larger set in the contrasts 1 versus 4, 1 versus 3, 1 versus 2, 2 versus 4, 2 versus 3 food items,



but failed in the contrasts 3 versus 4, and 4 versus 5 food items. The preference for the larger quantity of food suggests that angelfish are able to process quantitative information in order to maximize food intake when multiple items are available. The quantitative abilities shown by angelfish are compatible with the hypothesis of the existence of an object-file mechanism for representing and discriminating small quantities in vertebrates, suggesting a common evolutionary origin.

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COUNTING ON GIRAFFES (*GIRAFFA CAMELOPARDALIS*): QUANTITY DISCRIMINATION IN GIRAFFES (P41)

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Nowadays a lot of animal species have demonstrated their ability to spontaneously discriminate quantities. Here we present the first quantity discrimination study on giraffes (*Giraffa camelopardalis*). We used three tasks to test giraffes in Barcelona and Leipzig Zoos on their ability to discriminate quantities (Experiment 1), and how this is affected by changing the size of the rewards (Experiment 2) and the distance between the elements of each array (Experiment 3). In Experiment 1, we tested basic quantity discrimination in giraffes. Giraffes saw two grids of 5x5 with different number of holes filled with food, and then they could choose one of the two. Preliminary results indicate a significant preference for the grid with more pieces of food, suggesting that they are able to distinguish between different sets of arrays depending on their quantity. In Experiment 2, we tested whether giraffes distinguish between different sized pieces of food and also whether they rely more on size or number of stimuli to make their choice. We used the same procedure as in Experiment 1, but using food pieces of different size. Preliminary results show that giraffes have no preference for size nor number. Experiment 3 investigated their ability to discriminate quantity in sparse versus dense arrangements of food pieces. We used the same procedure as in Experiment 1, but arranged food either in sparser or denser arrays. Preliminary results show that giraffes fail to distinguish larger arrays when comparing sparse versus dense arrays. Overall, these results provide a first picture of giraffes' cognitive skills on quantity discrimination, which may also be useful to better understand the behavior and ecology of wild and captive giraffes.



THE ROLE OF ODOR AND UNCONDITIONED STIMULUS INTENSITY IN OVERSHADOWING OF ODOR BY TASTE (P42)

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The presentation of an odor (typically, in a disk attached to the bottle spout) while a taste is consumed usually results in potentiation of odor conditioning rather than overshadowing (e.g. Rusiniak et al., 1982). This phenomenon seems to respond to an adaptive predisposition that favors the memory of olfactory stimulation that is processed along with flavors that are in turn followed by significant gastrointestinal consequences (Garcia et al., 1985). In this work, we analyzed the effect of manipulating odor intensity on potentiation of odor by taste. In the first experiment two groups of rats were used that received the presentation of Almond + Saccharin, followed immediately by an injection of LiCl. For one of the groups the odor was of high intensity (100%), and for the other it was of a weak intensity (20%). The test of odor revealed that the level of conditioning was high and equivalent in both groups. Since the level of conditioning in the first experiment was very high, both for odor and taste, we conducted a second experiment with a weaker US (by decreasing the molarity of the LiCl) that was intended to reduce conditioning intensity, which could have affected the results in the precedent experiment. In addition, a group of rats received the odor-taste compound, while a second group the odor with water. The test of odor revealed a higher level of conditioning for the odor alone as compared to the group that received the compound, which seems to indicate an effect of overshadowing of the odor by the taste. On the contrary, in the taste test, the group that had been exposed to the odor alone during conditioning showed a lower level of aversion.

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EFFECTS OF MK-801 ON OVERSHADOWING OF ODOR BY TASTE (P43)

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The relationship between odors and tastes when both are presented in a compound has traditionally been a controversial issue (e.g., Durlach & Rescorla, 1980; Rusiniak et al., 1979). Thus, two results can be observed depending on the form of stimuli presentation, their relative intensities, the strength of the Unconditioned Stimulus (US), etc.: 1) Potentiation of conditioning of the weakest stimulus by the most salient one when it is compared to a group where the weak stimulus has been conditioned alone, or 2) Overshadowing that results in a reduction of conditioning of the weaker stimulus by the presence of a more salient stimulus that competes to acquire the associative strength derived from the US. Previously, we have observed that overshadowing occurs both when we reduce the intensity of the odor in the compound and when the intensity of the US decreased. In this work we explore the extent to which the emergence of the overshadowing of odor by taste could be hindered by the MK-801, a NMDA antagonist. Four groups of rats were used. For the first group the odor (Almond 100%) was impregnated in a disk



located next to the bottle spout while the animal drank water. After odor exposure, a dose of saline was injected, and 30 minutes after the animals received the administration of the US (LiCl). In a second group the odor was present while the animals drank a sucrose solution, being the procedure similar to that described for the first group. For the third and fourth groups, the procedure was similar to that described for the second group, with the difference that instead of saline the animals received an injection of 0.05 or 0.2 mg of MK-801, respectively.

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ATTENTIONAL EFFECTS OF A SECONDARY VISUAL SEARCH TASK ON IMPLICIT PERCEPTUAL LEARNING (P44)

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We present the preliminary results of two perceptual learning experiments using stimulus preexposure during a masking task, examining whether perceptual learning could take place implicitly, and the potential role of locus of attention generated by the masking task. Experiment 1 consisted of a preexposure phase and a test phase. For one of the groups the preexposure phase had an intermixed schedule, for the other it was blocked. Participants did not receive instructions regarding the perceptual learning task, but instead regarding a visual search task, the masking task. They were told to find a small semi-transparent square presented over the preexposure stimulus image in a random location. Then, in the second phase they were required to provide same/different judgements for the preexposed stimuli presented in pairs. The results did not show a main effect of the preexposure schedule on test performance, but in the case of the intermixed group there was a correlation between accuracy in the visual search task when the target was in the quadrants with the distinctive elements and performance in the test phase. In the second experiment two groups were used, both with an intermixed schedule during the preexposure phase. The first group had presentation of the visual search target only in the quadrants in which the distinctive elements appeared, while the second had presentation only in the quadrants in which the distinctive elements did not appear. In both groups there was a correlation between accuracy in the visual search task and performance on the test phase. These results, although preliminary and in need of future replications, suggest an interaction between attentional processes and perceptual learning that could be more complex than that proposed by current theoretical models.





HEDONIC RESPONSES ELICITED BY CONTEXTUAL CUES PAIRED WITH NAUSEA OR WITH INTERNAL PAIN (P45)

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The experiments reported here examined, using the orofacial reactivity method, the nature of the hedonic responses elicited by contextual cues paired with either nausea produced by injection of LiCl or with internal pain produced by injection of hypertonic saline. In Experiment 1, rats were placed in a distinctive context, where they spent 5 min before being injected with either LiCl (0.15M; 10ml/kg), hypertonic NaCl (1.5 M; 10 ml/kg), or isotonic NaCl (0.9%; 10 ml/kg). Immediately after the injection, the rats were returned to the context for 30 min. On testing, aversive orofacial reactions, indicative of nausea, were the predominant responses when context was paired with LiCl, whereas immobility responses, reflecting conditioned fear, were seen after pairing the context with hypertonic saline. In Experiment 2, one context was paired with either LiCl (0.15M; 10 ml/kg) or hypertonic NaCl (1.5M; 10 ml/kg), whereas a different context was paired with isotonic saline. The LiCl-paired context elicited more aversive reactions than the control context, while the hypertonic NaCl-paired context elicited more freezing and passive dripping than the control context. In addition, a second-order conditioning procedure was used to further investigate the selectivity of conditioning with LiCl and hypertonic LiCl. After discriminative context training, the rats were orally infused with a flavor (CS+) in the trained context for 5 min where they remained for 10 min; a different flavor (CS-) was infused to the animals in the untrained context. They were then tested for second-order conditioning in a taste reactivity test conducted in the untrained context.

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EVIDENCE THAT SUCCESSIVE NEGATIVE CONTRAST INCREASES ETHANOL CONSUMPTION IN ADULT RATS EXPOSED TO BINGE-LIKE ETHANOL EXPOSURE DURING ADOLESCENCE (P46)

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Binge-drinking is very common pattern of consumption among adolescent population characterized by drinking excessive amounts of alcohol in a short period of time. It can cause long-lasting neuroadaptive changes and also, enhance vulnerability to ethanol abuse during adulthood. Moreover, some studies have showed that increased risk to ethanol abuse in adulthood do not emerge until subjects exposed to ethanol during adolescence have a significant level of anxiety. Successive negative contrast (SNC), or incentive downshift procedures have been widely used to model emotional reactivity (usually described as anger, frustration, anxiety or disappointment) in rodents. Given that it has been demonstrated a correlation between



emotional stress and the consumption of psychoactive substances, the aim of this study was to evaluate if emotional reactivity induced by SNC increase ethanol consumption in adult rats exposed to ethanol during adolescence. For that aim, adolescent Sprague-Dawley rats were treated with ethanol (2.5 g/kg ip; BEP) or saline (SP) for 2 consecutive days at 48-h intervals over a 14-day period (PND₃₀-PND₄₃). Following 25 free-ethanol days, BEP and SP rats exposed to a 12-1 pellets devaluation were given 2-h free access to ethanol (6% w/v) and water immediately after instrumental training. Both BEP and SP groups exhibited a successive negative contrast effect. This effect was accompanied by an increased ethanol consumption post-session only in the BEP group. This finding suggest that animals exposed to ethanol during adolescence could consume ethanol to attenuate emotional distress triggered by reward loss. Acknowledgements: This work was supported by CONICYT, Fondecyt (1140284 and 11150308).

CONDITIONED TASTE AVERSION INDUCED BY COCAINE: AN ASSESSMENT OF CHANGES IN PALATABILITY USING DIFFERENT ADMINISTRATION ROUTES (P47)

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Pairing a taste with nausea (e.g. LiCl injection), pain (e.g. hypertonic saline injection), or drugs of abuse (e.g. cocaine injection) all result in subsequent reductions in voluntary consumption of the taste. However, these treatments differ in the effect on hedonic responses: pairing with nausea decreases appetitive taste reactivity responses and increases aversive taste reactivity responses, while pairing with pain decreases appetitive responses with little or no change in aversive responses (and increases freezing, indicative of fear). The pattern of learning produced by drugs of abuse has much debated: Traditional studies using taste reactivity found that drugs of abuse decrease intake and appetitive responses without affecting aversive responses. However, recent critiques have suggested this may be due to an inability of taste reactivity methods to detect mild changes in palatability. Here, in two experiments we used the analysis of the licking behaviour, an alternative method to assess palatability, to examine the nature of the learning produced by taste-cocaine pairings. Since the strength of conditioning might depend on the method of drug administration, we varied the administration route (s.c or i.p). Regardless of administration route, taste-cocaine pairings decreased consumption and produced a small but transient decrease in lick cluster size. These results suggest that cocaine produces at least some change in palatability. However, further work increasing the dosage and number of pairings is needed in order to determine if drugs of abuse produce similar effects to pain (conditioned fear) or to nausea (conditioned aversion).





RETRIEVAL OF THE INFORMATION ABOUT A CUE-OUTCOME RELATIONSHIP IS DETERIORATED AFTER EXTINCTION OF A DIFFERENT RELATIONSHIP WHEN A PHYSICAL RATHER THAN A VERBAL CONTEXT IS CHANGED (P48)

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Attentional Theory of Context Processing suggests that retrieval of the information becomes context dependent in any situation in which the context is attended. Some of the evidence for this idea comes from the use of what has been called "The restaurant task" in which participants have to give a judgment about the relationship between the ingestion of a given food by a given client and a gastric malaise within a restaurant that plays the role of a context. Restaurants in this task are represented by verbal labels which cast some doubts about whether they could be considered background contexts as the ones used in other tasks. In the present experiment the role of contexts was played by the picture of the restaurant as the background of the screen. The picture of a food was paired with a gastric malaise in context A (A: X+). Cue X was then extinguished while a different cue was paired with the outcome (A: X-, P1+). The new cue was then tested in both, the trained context (A: P1) and in the alternative context (B: P1). Performance was worse in context A, replicating with physical contexts the results that were previously found when verbal labels were used as contexts.





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