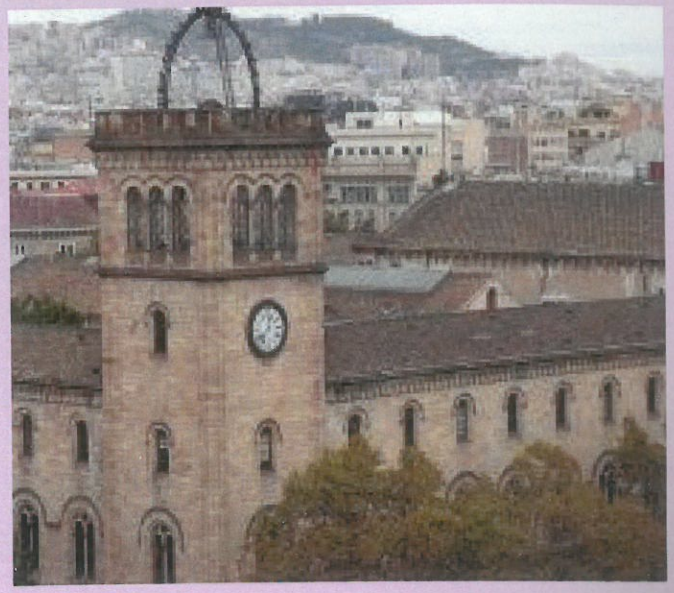

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SOCIEDAD PSICOLOGÍA COMPARADA ESPAÑOLA

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XXVIII International Congress of the Spanish Society for Comparative Psychology (SEPC)

UNIVERSITAT DE BARCELONA

September, 12th – 14th 2016

XXVIII International Congress of the Spanish Society for Comparative Psychology (SECP)

ABSTRACTS BOOK

UNIVERSITAT DE BARCELONA

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SOCIEDAD PSICOLOGÍA COMPARADA ESPAÑOLA

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Mel Slater (ICREA, Universitat de Barcelona): ***Body ownership illusions in immersive virtual reality - a tool for change***.
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Ian P. L. McLaren (University of Exeter). ***Spatial Learning in the Radial Maze: The Role of Symmetry.***

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SOCIAL PROGRAMME

Monday, 12th

18.30 h (Spanish) and 19.00 h (English):
Guided tour of the Historic Building of the Universitat de Barcelona
Meeting point: main lobby of the building (near the stairs)
Address: Gran Via de Les Corts Catalanes, 585
Metro station: Universitat (Lines 1 and 2, the red and the purple ones)

Tuesday 13th

19.00-20.00 h:
Guided tour of the Modernista Historic Site of Sant Pau Hospital
(World Heritage by UNESCO in 1997. Architect: Lluís Domènech i Montaner).
Meeting point: front door of the enclosure
Address: Sant Anton Maria Claret, 167
Metro station: Guinardó-Hospital de Sant Pau (Line 4, the yellow one)

Wednesday 14th

21.00 h:
Farewell dinner of the XXVIII Congress of the SEPC.
Restaurant "1881 per SAGARDI".
Address: Plaça de Pau Vila, 3 (Palau de Mar)
Metro station: Barceloneta (Line 4, the yellow one)

INVITED LECTURES

INAUGURAL CONFERENCE

Sources of Forgetting and the Fate(s) of Forgotten Memories

Ralph R. Miller
University of Binghamton, NY

A taxonomy of sources of forgetting will be presented followed by an argument that most of the supposedly diverse sources of forgetting actually arise from associative interference. Then I will consider the various classes of two-phase associative interference and consider the question of whether they all obey a common set of principles or are there separate rules for different instances of associative interference. Finally, I will discuss evidence from both humans and nonhumans concerning recovery from each of the various types of associative interference, and how reversible lapses seem to be far more common than irreversible losses of information. I will conclude by speculating why natural selection has favored reversible modes of forgetting.

SEPEX LECTURE

Nature versus Nurture: Contributions towards Healthy Cognition and sex differences from childhood to senescence in Mice and Humans

Veronique Bohbot
McGill University, Montreal

A larger hippocampus has been associated with healthy cognition in normal aging and with a reduced risk of numerous neurological and psychiatric disorders such as Alzheimer's disease, Schizophrenia, Post-Traumatic Stress disorder and Depression. The hippocampus is implicated in spatial memory strategies used when finding one's way in the environment, i.e. it is allocentric and involves remembering the relationship between landmarks. On the other hand, a compensatory strategy dependent on the caudate nucleus can also be used, i.e. the response strategy, which relies on making a series of stimulus-response associations (e.g. right and left turns from given positions). Measures of spontaneous navigation strategies from ages 8 to 80 yrs have shown a decrease in spatial memory strategies across the life span, along with a reduction in activity and grey matter in the hippocampus.
Interestingly, those using spatial memory in old age showed increased fMRI activity and grey matter in the hippocampus, suggesting a tight relationship between structure and function maintains in aging. Furthermore, super heathy individuals with the ApoE4 genotype, using response strategies, had atrophy in the entorhinal cortex, a region known to predict conversion rates to Alzheimer's disease. Response strategies also revealed sex differences in the hippocampus, which are absent in spatial strategy users. In order to reverse this process and stimulate the hippocampus, we spent 5 years to develop a 16-h spatial memory improvement program that promotes the use of spatial strategies in 46 different virtual environments, varying in size and complexity. Results indicate that completion of our cognitive intervention was associated with spatial memory improvements, increases in activity and grey matter of the hippocampus. Our findings suggest that spatial memory, which involves learning the relationship

between environmental landmarks, is critical to hippocampal function which in turn, may have an impact on the incidence of neurological and psychiatric disorders.

Support: CIHR

CLOSING LECTURE

Spatial Learning in the Radial Maze: The Role of Symmetry

Ian P. L. McLaren
University of Exeter

Cook, Brown and Riley (1985) demonstrated that, after a 15min delay, rats who had visited 2 or 10 arms out of 12 in the radial maze were better able to recognise visited arms than those who had visited 6 arms in the study phase. Their explanation was couched in terms of an adaptive response to memory load that could be minimised by using prospective coding in the 10 visited arm case so that only the two to-be-visited arms needed to be remembered. I shall offer an alternative explanation that notes that the proportion of symmetrical visited arm configurations varies with number of arms visited, and is less in the 6 arm case than in the 2 or 10 arm conditions for a 12 arm radial maze. The suggestion is that those arms that are related by an axis of symmetry in the visited arm configuration are easier to remember.

The role that symmetry plays in spatial navigation has been relatively neglected in research on both humans and other animals. I will present data that establishes that it is a powerful determinant of both learning and performance in rats and humans, and offer a model that integrates these findings.

SYMPOSIUM

Virtual Multisensory Worlds in Psychology – Science and Applications

Coordination & Introduction:

Maria V. Sanchez-Vives
ICREA, IDIBAPS, Universitat de Barcelona

This symposium will explore how immersive virtual reality is being used as a methodology in psychological science and clinical applications. We focus on the issue of body representation, and how a changed body can lead to changed attitudes and behaviour, and the potential clinical application of this work. We also show how virtual reality has been extensively used in the study and treatment of paranoia.

Body ownership illusions in immersive virtual reality - a tool for change

Mel Slater
ICREA, Universitat de Barcelona

Immersive virtual reality (IVR) has been successfully exploited in the study of body ownership illusions - a topic that contributes to the question of how the human brain represents the body. Embodiment with a life-sized virtual body seen from first person perspective in IVR typically leads to the perceptual illusion of ownership over the virtual body. A person's real body can be visually substituted by a life-sized virtual body seen from first person perspective. This body can be designed to have quite different characteristics compared to the real one - for example, be a different age or race. Here we report how different types of body can at least temporarily influence aspects of perception, attitudes and behaviours of participants, and the consequences of these findings for rehabilitation at both the personal level (psychological rehabilitation) and the social (e.g., reducing outgroup prejudice).

Psychological and Perceptual Embodiment in IVR – Two paradigms

Domna Banakou
Universitat de Barcelona

Growing evidence suggests that the brain does not treat our body as fixed, changing only slowly through time, but that its body representation demonstrates high plasticity. Although this is counter to common sense a number of findings have demonstrated that simple experimental manipulations can generate the illusion that an external object is part of our body, and even a body displayed in immersive virtual reality is our body. Furthermore, evidence suggests that such illusions appear to carry physiological, perceptual and even deep-seated attitudinal correlates. To expand on this research topic, we investigated embodiment of adults in child avatars and how that can influence subsequent age related behaviors. Following on from these findings the fundamental question was whether the factors that lead to a strong illusion of body ownership with respect to a virtual body would also lead to illusory agency over a specific action that was definitely not caused by participants, and where current explanations of agency apparently do not apply. Our results confirm that one's bodily self-representation can have a spontaneous and significant influence on expressed behavior and attitudes, with great potential in various applications and for the interaction between participants. Also, as the theory of agency comes increasingly to the fore in ethical, legal, and societal arenas, we demonstrate why it is crucial to explore and understand this concept scientifically.

The Hearing Body: Using sound to induce the experience of having a different body

Ana Tajadura-Jiménez
Universidad de Loyola Andalucía and UCL London

The mental representation people have of their own body is crucial for their interaction with the environment as it often impacts on motor, emotional and social functioning. Neuroscientific studies have shown that body-representations are not fixed, but they continuously update through sensing. Here we present results from "The Hearing Body" project where we are demonstrating that the alteration of body-representation is possible through sound-feedback, and not just through other sensory inputs. Using innovative virtual 3D-audio and gesture-sound interactive systems we have shown, for instance, that hearing the sounds produced when one's hand taps a surface as originating farther away leads to represent one's arm as being longer. Also, that one's represented body size changes when the sounds produced when walking appear as if produced by either a lighter body. Our studies have also shown that these alterations in represented body size are connected to changes in motor behavior and emotional state. Our results have important theoretical implications as they suggest that body-representation is supramodal. They also advance our understanding of the mechanisms underlying body-representation, emotion and action and provide a new framework to study them by using multiple stimuli and measures. These findings open opportunities to design audio-based body-centred applications to support wellbeing.

Paranoia and Virtual Reality: An Overview

Daniel Freeman
University of Oxford

Paranoia denotes the unfounded fear that others intend to cause you harm. Many people have a few paranoid thoughts, and a few have many. Persecutory delusions represent the severest form of paranoia seen in clinical practice. Virtual reality (VR) has enormous potential for developing the assessment, understanding, and treatment of paranoia. This talk will provide an overview of a programme of work - carried out by an interaction of psychology and computer science - that has been pioneering the use of immersive VR in each of these ways over the past dozen years. This will include description of the latest results showing how VR can be successfully used to treat persecutory delusions.

TALKS

TALK SESSION 1: Geometry Learning & Interference Effects

Studing Overshadowing in humans using a divided-attention task

Javier Vila, Fátima Iturria, Jesús Pérez
Universidad Nacional Autónoma de México

In overshadowing, when a CS X is presented in compound with a salient CS A, this results in a weaker response to X. The present research was conducted to evaluate a divided-attention task (Maki and Leith, 1973) in the study of overshadowing of landmark cues by geometric cues in humans.

Attention to geometric or landmark cue components of a compound sample was measured when a single component cue might be relevant when it appears as a comparison stimulus in a matching to simple task. Human participants learned to respond to a compound sample, across conditions where the probability of reinforcement for correct matches for two comparison stimuli (geometric or landmark) was varied. The degree of stimulus control by a given component of the compound sample was higher only when it was more relevant than the other component. A divided attention performance was observed by changes in relative reinforcement rate to each separated component. Variations in stimulus control for the compound elements were interpreted as attention shifts to each component of the sample. A performance similar to overshadowing was observed when the probability of reinforcement was higher for one component than another.

Augmentation and blocking in different moments of training with a simultaneous A+ AX+ procedure.

Clara Muñiz-Diez, Judit Muñiz-Moreno, Beatriz Alvarez, Ignacio Loy
Universidad de Oviedo

Many associative learning phenomena imply training with an element (A) and a compound of two stimuli (AX,) both reinforced or non-reinforced, producing different cue interactions. As a result of that training, the associative strength of X can increase, decrease or remain unchanged. These three possible outcomes can be independently predicted by current theories of conditioning. However, associative learning theories cannot predict the occurrence of contrary effects that are observed under the same experimental conditions. Therefore, it is very important to analyze the variables that determine the occurrence of the possible outcomes since this would contribute to tackle some of the weaknesses of Associative Learning Theories. In order to address this issue, we conducted an experiment with rats in which an A+/AX+ intermixed magazine training was used. The results suggested that, at the beginning of the training, animals showed an increase conditioned response to X (similar effect to that named augmentation) while, as training progress, responding to X became progressively weak (blocking).
Results were analyzed by means of Signal Detection Theory, a methodologically and theoretically useful approach for a more comprehensive understanding of the cue interactions.

Checking a "purely geometric module" in the rat's spatial representation in a rectangular Morris pool

M. Urrutia[1], M. D. Calabrese[2], O. Riccio[2], V.D. Chamizo[1]
[1]Universitat de Barcelona, [2]Seconda Universitá degli Studi di Napoli

Cheng (1986) trained male rats to search for food in a rectangular arena which also contained distinctive visual patterns. He found that the rats used the geometric framework of the box itself to find the food instead of the visual patterns, and claimed that geometrical information is processed in a specialised module, which is independent of feature information. The aim of the present set of experiments is to check if the previous results (specifically Experiment 2), with male rats and an appetitive task could be extended to an aversive task while using male and female rats and three dimensional landmarks. In all the experiments, rats were trained in a rectangular-shaped pool to find a hidden platform whose location was defined in terms of two sources of information, landmarks of different salience (less salient in Experiment 1, more salient in Experiment 2) outside the pool and a particular corner of the pool. The results showed that males and females did not differ. In addition, in the two experiments, what the rats learned with respect to the landmarks was negligible. Therefore, the present results support Cheng's suggestion. Finally, Experiment 3 compares two pool-shapes and offers an explanation based on pool complexity.

Funding Institution: research project PSI2013-47430-P (MINECO).

Sex differences in the acquisition and temporal organization of running in an activity-based anorexia procedure in rats

Gabriela E. López-Tolsa, Pedro Vidal, Esmeralda Fuentes, Patricia Rick, Ricardo Pellón, Valeria Gutiérrez
Universidad Nacional de Educación a Distancia

Activity-based anorexia (ABA) is a procedure that consists of limiting access to food over a short period of time and giving access to an activity wheel for the rest of the day. This procedure usually results in rapid weight loss and an increase in wheel running, although certain variables can affect the development of running. For example, it has been observed that female rats are more susceptible to this procedure, losing weight more rapidly than male rats. Those studies, however, have focused on analyzing the relationship between diet and weight loss, giving less attention to wheel-running activity. The goal of this study was to analyze the running pattern throughout an ABA procedure, comparing male and female rats. Eight male and eight female rats were exposed to an ABA procedure (22 hours access to wheel, 1 hour food, 1 hour rest), and it was observed that female rats' weight decreased faster than that of males, but that all rats ingested the same percentage of food in correspondence to their weights.
Female rats ran more than males and developed running in anticipation of food earlier in the procedure, but in the final sessions, the temporal distribution of running was the same for all rats.

Delay of reinforcement gradients drawn from prevention of contact between adjunctive behaviours and reinforcer occurrence

Pedro Vidal, Valeria E. Gutiérrez-Ferre, Ricardo Pellón
Universidad Nacional de Educación a Distancia (UNED)

Male Wistar rats maintained at 80-85% of their free-feeding weights by food restriction were submitted to a fixed time 60-sec food delivery schedule until they reached stable rates of spout licking, wheel running and magazine entering. Animals then received a protective contingency by which food was postponed if they licked, run or entered into the magazine during the last 1, 3, 5, 10, 20, 40 or 58 sec of inter-food intervals in successive phases of the study. For half of the rats delays were signaled by tone and blackout, for the other half delays were unsignaled. In a final phase delays were removed. Behaviors were affected by protective delays differentially dependent on their temporal location within inter-food intervals, being licks more resistant to the disruptive effects of delays, followed by running and then magazine entering. Wheel running appears to depend also on its reinforcing properties given the relative limitation of mobility in the rats' home cages. All rates increased when delays were removed. No significant differences were observed when compared signaled and unsignaled delays, except for licking that was somehow more resistant under the signal condition. The introduction of contingent delays upon responding allows the drawing of response-reinforcer gradients that supposedly reflect the effect of operant contingencies over the responses, showing different sensitivities as a function of their temporal location within inter-food intervals.

Contributions of exercise and diet on reinforcer value of food in a rodent model of Anorexia Nervosa.

Ana De Paz, Pedro Vidal, Ricardo Pellón
Universidad Nacional de Educación a Distancia (UNED)

Activity based-anorexia (ABA) develops when laboratory rats have food access restricted to a single period in the day and are given access to a running-wheel. Clinical studies have found that patients with anorexia develop high activity levels. These data suggest a possible implication of exercise in the etiology of anorexia and are in line with findings obtained in animals during experimental. It has been found that weight loss increases the value of food. Other studies have found that the possibility of wheel-running reduces the motivation for food in rats. Pierce and Epling (1988) suggested that exercise acquires reinforcer properties that interfere with those of food, reducing its reinforcer value. The objective of this study was to test the implications among diet and exercise on the reinforcer value of food in the development of ABA. Three groups of 8 male Wistar rats were used. An ABA group with 21.5 h of possibility to run and 1 h of food access, a traditional ABA control group with the same time of food exposition and lack of access to running-wheel, and a group yoked in terms of weight loss to that of ABA. All groups were tested daily on a progressive ratio schedule (Richardson and Roberts, 1996). The data will be discussed in terms of the contribution of exercise to the development of the phenomenon.

TALK SESSION 3: Preexposure effects

Generalisation of conditioned suppression in rats: Evidence and analysis of familiarity-based stimulus encoding.

Jasper Robinson[1], Emma J. Whitt[1], & Peter M. Jones[2]
[1]University of Nottingham, [2]Plymouth University.

We report experiments showing modulation of rats' generalization of conditioned suppression from Clicker → Shock learning to testing with a Tone. Modulation of this stimulus generalization was achieved by giving preexposure treatments, before the Clicker → shock conditioning. 4 different groups of rats were exposed to one of 4 preexposure treatments: (1) to the Clicker; (2) to the Tone; (3) to both the Clicker and the Tone; (4) or, to neither the Clicker nor the Tone. We examine (and eliminate) some potential explanations of this finding and conclude that rats' encoding of stimulus familiarity is responsible for this modulation of stimulus generalization.

Funding Institution: The University of Nottingham (England, UK)

Associative analysis of object-in-place learning

Leona Ryan
University of Nottingham

When rats are pre-exposed to two objects (A & B), each in their own context (respectively X & Y), then later presented to A and B in X, they explore B more than A. We report the results of computer-based versions of this task.
Children were presented with faces on patterned backgrounds (i.e., face A on background X and face B on background Y) before being tested with faces A and B on background X. Analogous to the rat version of object-in-place learning, people oriented to B relatively more than to A. We report findings from eye-tracking experiments.

Effects of uncorrelated CS and US preexposure on conditioning with an appetitive procedure with undeprived rats

Luis E. Gómez-Sancho, Gonzalo De la Casa Rivas
Universidad de Sevilla

Non-deprived rats received uncorrelated presentations of a Tone (CS) and food pellets (US) in the first stage of a conditioned magazine approach procedure. With such a procedure, the rate of magazine entries was higher when the CS was present as compared with a pre-CS period of similar duration. This result reproduces previous data showing excitatory conditioning with random CS and US presentations in magazine approach procedures (Rescorla, 2000). In a subsequent stage, the animals received paired presentations of the CS and the US that revealed slower conditioning as compared to a group that had not received uncorrelated CS and US presentations before conditioning. These data are interpreted by considering either the contribution of a learned irrelevance effect, or the independent effects of CS and US preexposure before conditioning.

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Prenatal exposure to alcohol attenuates its unconditioned aversive effects in infant rats

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Acute alcohol administration, depending on the dose as well as the developmental stage of the rat, may act as an unconditioned stimulus (US) and generate aversive or appetitive conditioned responses when paired with different flavors. In previous studies it was found that before postnatal day 10 rat pups tend to acquire appetitive responses to flavors paired with a relatively high alcohol dose, while after that day this same dose generates conditioned aversions; which coincides with the sensitive period described by Sullivan and cols. (2000). Similarly, prenatal exposure to alcohol, even to a relatively high dose, seems to induce appetitive memories. Considering all this together with recent results showing that the US-prexposure effect may be observed in infant rats, we aimed to study whether prenatal alcohol exposure would subsequently affect the capacity of alcohol to act as a US and to induce postnatal appetitive or aversive learning, as a function of age. In this study pregnant rats were administered with ethanol or water on gestation days 17-20, and their offspring received saccharin paired with alcohol on days 9-11(Experiment 1), or 14-16 (Experiment 2). Results suggest that prenatal administration of alcohol impedes the acquisition of a postnatal aversive conditioning in the older pups, an effect that could be explained by a prenatal US-preexposure effect.

A double error-correction model of classical conditioning: dual stimulus associability process.

Niklas Kokkola, Esther Mondragon, Eduardo Alonso
City University London

An elaboration of the Double Error model, a general real-time error-correction model of classical conditioning, will be presented. In the model, stimuli are represented as a set of elements activated following probabilistic temporal distributions whose variances increase proportionally to their mean. Associations are formed between stimuli regardless of their rewarding value, with learning episodes occurring between the temporally overlapping representations of directly and, more importantly, associatively cued stimuli. Critical to the model, the extent and type of learning is influenced by both the predictability of an outcome and of its predictor (the double error rule).

Specific to this new model, the prediction error is modulated by a dual associability: a motivational component or associability of the cue to a reinforcer, and a neutral component, or associability to non-motivational outcomes, which varies depending on previous learning. Despite its apparent complexity, the model relies on a single activation process and a unique learning rule –which renders it parsimonious.

Dual associability and double error are keystones for the model to account for pre-exposure effects such as latent inhibition and its context specificity, general 'silent learning' and mediated conditioning phenomena, as well as some perceptual learning effects. Results of simulations will be reported.

TALK SESSION 4: Learning in Early Species

Sensitization and systemic long-term habituation of the folding response in the sensitive plant Mimosa púdica

Jack Hughes, Jose Prados
University of Leicester

Evidence for habituation has been typically shown in animals, but there is growing support suggesting that plants are also able to habituate. Mimosa pudica exhibits rapid folding of its leaves through physical disturbance.

This is a plastically adaptive predatory defence mechanism; however it is a costly energetic action that inhibits photosynthesis. Therefore, decreasing response to non-predatory stimuli would increase plant fitness.

This paper sought to determine whether repeated exposure of a non-threatening stimulus can cause habituation in the folding response of the Mimosa. Six plants were selected for four days of habituation training, whereby one pinna was stimulated every 20 minutes with a stroke. Within each trial, we measured the folding response of the pinules and their re-opening at 5-min intervals.

The results showed sensitization of the response within sessions and a comparison of the first trial of each of the four sessions showed long-term habituation. Furthermore, stimulation of a naïve pinna on day 4 showed that the folding response was less intense and the re-opening rate faster than the experimental pinna in day 1 of training, suggesting that habituation is a systemic phenomenon. The implications of these findings are discussed along with a proposed physiological model for Mimosa habituation.

Associative phenomena in earthworms (Lumbricus terrestris): Latent Inhibition and Overshadowing.

Concepción Paredes-Olay, David Reyes-Jiménez, María J. F. Abad
Universidad de Jaén

The study of invertebrate learning is an interesting topic in the field of animal learning for at least two reasons: First, the study of conditioning processes in invertebrates has provided useful information for the understanding of the physiological bases of learning and memory.

Secondly, it is essential to understand the phylogenetic evolution of associative learning as a basic mechanism of learning and survival. Our research is part of this proposal: the need for studying the associative processes in invertebrate species in order to get a global vision of comparative psychology. In preliminary studies, we have demonstrated a procedure of classical conditioning in earthworms (Eisenia foetida and Lumbricus terrestris), using a vibration or an odor as conditioned stimuli (CS) and a bright light as the unconditioned stimulus (US). Employing this procedure, we have advanced in the study of some associative effects: latent inhibition (Exp. 1a and 1b) and overshadowing (Exp. 2). The results of these experiments are discussed in terms of an associative analysis of learning.

Different benefits of associative learning in mating performance in Lymnaea stagnalis

Beatriz Alvarez[1], Joris Koene[2], Karen Hollis[3], Ignacio Loy[1]
[1]Universidad de Oviedo, [2]VU University Amsterdam, [3]Mount Holyoke College

Classical conditioning has been shown to increase reproductive fitness in non-hermaphroditic animals. However, whether it can provide any benefits for hermaphroditic species has not been explored. In simultaneous hermaphrodites that mate unilaterally (i.e., perform one role within one mating) conflict can arise over the division of the sex roles.

This worked aimed to assess the role that Pavlovian conditioning can play in a mating situation in which different levels of conflict over sex role performance are present. To do so we conducted two different experiments with the great pond snail Lymnaea stagnalis in which the presence of a conspecific was signalled by an odour cue. When a medium level of sex role conflict was induced, subjects belonging to the experimental group showed an increase in male mating performance compared to the control group, for which the cue and the presence of a conspecific were not contingent. When there was no conflict over the sex role, subjects that were able to predict the mating encounter mated (in the male role) faster than those who were not able to do so. The results obtained show that effects of associative learning result in different mating strategies depending on other variables.

Evidence from Planaria that Sucrose Addiction is a Learned Response

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University of Leicester

Sucrose has been found to elicit addictive-like behaviours in rodents, like the development of tolerance and the association with cues present at the time of consumption. Furthermore, the neurochemical response to sucrose binges is equivalent to the one observed in response to the abuse of addictive substances like cocaine. The experiments reported here address the effects of sucrose on planarian behaviour. In our experiments, animals were exposed to a 10% sucrose solution in one context, A, alternated with trials in which they were exposed to water in a different context, B.

Experiment 1 showed that animals developed tolerance to the effects of sucrose; subsequent tests confirmed that tolerance depends on the establishment of a conditioned compensatory response controlled by the context A, associated with sucrose. Experiment 2 showed that animals developed a conditioned place preference (CPP) to the context A; however, animals treated with a dopamine antagonist did not develop CPP. Furthermore, repeated exposure to the context alone extinguished the conditioned response, but a single exposure to sucrose sufficed to reinstate the CPP. These results confirm that addiction to sucrose can be characterised as a learned response in planaria that depends upon the same principles that rule associative learning in rodents.

TALK SESSION 5: Behavioural Neuroscience

Aging-induced changes in the nucleus accumbens activity pattern during flavor recognition memory.

Alejandro Borja Grau-Perales, Enrique Morillas, Beatriz Gómez-Chacón, Milagros Gallo
University of Granada

The attenuation of neophobia to a novel flavor over repeated exposures may implicate changes in its hedonic value as the flavor becomes more palatable.
Previous studies have suggested a role of the nucleus accumbens (Nacc) in the processing of palatability, which is affected with aging.
To explore the role of Nacc in flavor neophobia during aging, we applied c-Fos immunohistochemistry as an index of neural activity in the Nacc. Twenty one adult (5-month-old) and 24 aged (24-month-old) male Wistar rats were exposed to a 3% cider vinegar solution for 1, 2 or 6 days (n=7 adult and n=8 aged rats per group).
Aged rats exhibited slower attenuation of flavor neophobia than adult rats.
This was consistent with the Nacc pattern of c-Fos activity. Adult rats had increased Nacc activity on day 2 compared to day one and six while the increase of Nacc activity was delayed to day 6 in aged rats. This suggests that changes in the activity of neural circuits during normal aging could underlie the slower attenuation of flavor neophobia in aged rats.

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Increased Fos inmunoreactivy in the paraventricular thalamic nucleus in aged rats related to taste neophobia.

Beatriz Juan-Cordoba, Enrique Morillas, Beatriz Gomez-Chacon, Milagros Gallo
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The habituation of taste neophobia is a model of taste memory. It has been previously reported that there are changes in the activity in the relay gustatory thalamus related to taste neophobia and its habituation. In addition, the anatomical connections of non-relay midline and intralaminar thalamic nuclei prompt their potential involvement in encoding salient events related with feeding behaviour. Thus, we assessed the activity of the thalamic mediodorsal (MD), central medial (CM) and paraventricular (PV) nuclei in male adult Wistar rats while drinking a vinegar solution (3%) for the first (Novel), second (FI) or sixth time (FII). Given that aging modifies the pattern of neural activity during taste memory, we also included male aged (24-month-old) Wistar rats.
Both age groups exhibited habituation of vinegar neophobia although it was delayed in old rats. The CM increase in Fos-like immunoreactivity found after drinking the most familiar solution (FII) in adult rats was absent in aged rats. Aged rats also exhibited a higher number of c-Fos positive cells in PV after drinking the novel solution in comparison with adult rats. These results support the involvement of non-relay thalamic nuclei in the habituation of taste neophobia, which is modulated by aging.

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Increased medial prefrontal cortex activation during taste neophobia habituation

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Previous data has shown that the medial prefrontal cortex (mPFC) activation increases with the repetition of an aversive auditory stimulus, but there are no data on the effect of repeated exposure to flavors in this area. Our goal was to apply c-Fos immunohistochemistry as a marker of neural activity to assess the potential involvement of mPFC in the habituation of taste. Male adult Wistar rats (n=7 per group) were exposed to a solution of cider vinegar (3%) and sacrificed 90 minutes after drinking a vinegar solution (3%) the first (Novel), second (Familiar 1) or sixth time (Familiar2). The number of c-Fos -positive cells in the prelimbic area (PRL), infralimbic (IL) and (Peduncular Cortex) was quantified. Taste neophobia was evident in all groups as well as increased intake of the vinegar solution over exposure sessions, indicating attenuation of neophobia. The overall analysis showed greater number of c-Fos -positive cells in PRL after the second flavor exposure (Familiar I) compared with the first one (Novel). The results support a wider role of the mPFC in the habituation processes independent of the sensory modality. Further research is required in order to identify a neural circuit involved in safe taste memory.

Development of medial Prefrontal Cortex is decisive for the modulation of Sensorimotor Gating

Auxiliadora Mena, Sandra López, Francisco Jose Pérez-Díaz, Juan Carlos Ruiz-Salas, Luis Gonzalo De la Casa, López, J.C.
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Prepulse inhibition (PPI) refers to the modulation of the startle response by previous presentation of a weaker stimulus. One of the main brain structures involved in PPI expression is the medial prefrontal cortex (mPFC). This structure plays an important role in modulation processes of PPI along the life span.
Its development takes place from childhood to adulthood. During this period, the maturation process of the mesocortical system facilitates dopaminergic activity from mPFC to the nucleus accumbens.
With the aim to study the dopaminergic involvement in PPI throughout different stages of mPFC maturation, the present experiment analyzed the effect of the administration of dopaminergic agonist or antagonist on PPI in three different age periods, which are early and late adolescence and adulthood.
Results showed that PPI was expressed in all periods; however, PPI was only modulated under the effects of drugs in the adult group. This effect could be due to an immature mPFC, and thereby cause a reduced drug effect. In this regard, these results could indicate that dopamine is important for PPI modulation, but not for its expression, and these findings support the assumption that mPFC maturation is necessary to modulate PPI.

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Two strategies used by rats to solve a navigation task. Are they hippocampal dependent? : 1. Male rats

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The present study addresses whether the two learning strategies which are involved in Experiment 2 of the manuscript by Rodríguez et al. (2010), are hippocampal-dependent. Lesioned group (hippocampus lesioned) and sham group (operated without lesion) rats were successively trained in a triangular-shaped pool and in a circular pool, counterbalanced, to find a hidden platform whose location was defined by a particular corner of the pool in the first case, and by a landmark outside the pool in the second case. Hippocampus lesioned rats learned the geometry task more slowly than sham rats. Subsequent test trials without the platform revealed that all the rats had learned equally well about the two sources of information (i.e., geometry and landmark), which suggests that the hippocampus plays a minor role in the present tasks. Additional training was conducted with the two cues simultaneously present (as in Rodríguez et al., 2010, Experiment 2). Then, a subsequent test trial without the platform pitted these two sources of information against one another and the same preference for the two cues (geometry and landmark) was found in all rats. The results of further tests trials will also be presented and discussed.

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TALK SESSION 6: Contingency and Social Learning

Believers in the paranormal are more likely to overestimate null contingencies

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According to previous research, paranormal beliefs imply a form of erroneous causal attribution. In this study, we aimed to find out whether paranormal believers would be more susceptible to develop a cognitive bias known as causal illusion, which consists of overestimating the contingency between two events that are actually unrelated. Using a standard contingency learning task in which a potential cause and an outcome were presented non-contingently, we found that those individuals who reported holding paranormal beliefs were also more likely to overestimate the contingency than skeptics. In addition, they also showed a bias in their behavior so that they exposed themselves proportionally more to cause-present trials than to cause-absent trials. This behavioral bias actually mediated their tendency to overestimate the contingency (i.e., to develop the causal illusion).

Does outcome density promote causal biases in children?

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Causal illusions occur when people perceive a contingency between two events that are actually not related. One of the factors that have shown to promote these mistaken beliefs is the outcome probability: When an effect is frequent, the relation between a potential cause and this effect is usually overestimated. Childhood may be considered an outstanding period for implementing educational programs aimed at reducing the negative consequences that may arise from causal misconceptions. However, the outcome density bias has been mainly explored in adulthood. The purpose of this research was to evaluate the outcome-density bias in children. Participants were exposed to two similar setups, both showing a non-contingent relation between the potential cause and the outcome. These two scenarios differed only in the outcome's probability, either high or low. Children judged as stronger the relation between the two events on the high probability of the outcome setting, revealing that, like adults, they develop causal illusions when the outcome is frequent. Implications for early educational interventions aimed at preventing causal illusions are discussed.

Intolerance of uncertainty predisposes to avoidance habit acquisition

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Many mental disorders are characterized by the presence of compulsions and incontrollable habits. Most studies on habit learning, both in animals and in humans, are based on positive reinforcement paradigms.

However, the compulsions and habits involved in some mental disorders may be better understood as avoidance behaviors, which involve some peculiarities, such as anxiety states, that have been shown to promote habitual responses.

Consequently, we studied habit acquisition by using a free-operant discriminated avoidance procedure. Furthermore, we checked whether intolerance of uncertainty could predispose to avoidance habit acquisition.

Participants learned to avoid an aversive noise presented either to the right or to the left ear by pressing two different keys. After a devaluation phase where the volume of the noise presented to one of the ears was reduced, participants went through a test phase identical to the avoidance learning phase except for the fact that the noise was never administered. Habit acquisition was inferred by comparing the rate of responses to the stimulus signaling the devalued reinforcer and to the stimulus signaling the non-devalued reinforcer. The results showed that intolerance of uncertainty was related to the absence of differences between the referred conditions, which entail avoidance habit acquisition.

Social learning influences flavour preference but not palatability

Patricia Gasalla Canto, Dominic Dwyer
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In two experiments, the social influence on choosing between two novel diets was analysed. In Experiment 1, a group of rats (demonstrators) ingested a novel cue presented in powdered food or in a 4% sucrose solution. Afterwards, demonstrators interacted with a group of observers for 30 minutes. Preferences for the cue flavour were tested in observers using a two-option choice test in the same or in the opposite modality (food/liquid) as their demonstrators. Observers preferred the socially exposed diet only when it was tested in the same modality as exposed to their demonstrators. Experiment 2 examined the effect of social exposure on diet preference in terms of both consumption and palatability. The modality of the cue at test was also manipulated: either with the flavour as an aquous odour solution, or as a solution plus aerosol presentation. There was again a social learning effect on consumption, but this effect did not modify hedonic responses to the cue flavours. Nor were these effects influenced by the method of cue presentation at test. This result suggests that socially conditioned food preferences do not influence the perceived palatability of foods, which is consistent with a dissociation between socially enhanced preparatory and consummatory responses.

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Reducing overestimations of contingency by reducing automatic processing

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When two events repeatedly occur close in time to each other, people often tend to overestimate the contingency between them, particularly when the probability of the outcome, or the probability of the cue, or both, are high.
Associative learning theories predict the overestimation effect by assuming that, early in training, cue-outcome coincidences increase the strength of the association between them, and this inflated association would be responsible for the overestimation effect. These theories, however, are silent with respect to the effect that reducing automatic processing might have, which is a strategy that has been shown to reduce other cognitive biases in the literature. Our experiment aimed to reduce automatic processing in a standard contingency learning task by using a hard-to-read font in one of two groups of participants. The results replicated the overestimation effect in the group exposed to the standard procedure, and showed that the effect was significantly reduced in the group exposed to the hard-to-read font. This suggests that overestimations of contingency can be reduced by reducing automatic processing in a similar way as has already been shown in relation to other cognitive biases in the literature.

TALK SESSION 7: Early Life Experience and Extinction

A retrieval cue for extinction attenuates spontaneous recovery and reinstatement

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Universidad Nacional Autónoma de México

Two experiments with rats used a free operant procedure to explore whether an extinction-cue could prevent the recovery of an extinguished lever-pressing. Both experiments consisted of four phases:
Acquisition, Extinction and Test 1 and Test 2. First, rats were trained to perform one instrumental response (R1) for food in context A, and a different instrumental response (R2) in context B. Then, responses were extinguished within the same context: R1 in context A and R2 in context B. Throughout this phase all rats received brief presentations of a tone (extinction-cue). In both experiments animals were tested twice. The first test was conducted immediately after the last extinction session. In this test, rats received the extinction-cue for both responses. During the second test, all rats experienced the tone only for R1, although in Experiment 1 they were tested after 5 days, and in Experiment 2 test 2 took place after a single session of re-exposure to the food. Both experiments showed a recovery effect (spontaneous recovery in Experiment 1 and reinstatement in Experiment 2) for both responses. However, a cue featured in extinction-attenuated recovery of R1 in both experiments when presented on the test. Some theoretical and clinical implications are discussed.

Evidence for hierarchical association through the extinction in human instrumental learning

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There is evidence for a hierarchical association between Discriminative stimuli (SD), the Response (R) and the Outcome (O) in instrumental learning of both humans (Gámen & Rosas, 2007) and animals (Colwin & Rescorla, 1990). However, as far as we know, there is no work focused on exploring if that association remains active after extinction.
The experiments presented here are aimed, on the one hand, at evaluating the implication of this hierarchical association for human instrumental learning (Experiment 1) and to then explore the state of this association after extinction (Experiment 2). Results of Experiment 1 show new evidence about the hierarchical association in human instrumental learning, whilst the results of Experiment 2 show that this association does not remain active after extinction in human instrumental learning.

Extinction makes acquisition context-specific in rats' appetitive conditioning (EMACS Effect)

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Universidad de Jaén

According to the Attentional theory of context Processing (ATCP, Rosas, Callejas-Aguilera, Ramos-Álvarez & Abad, 2006) extinction makes acquisition context-specific (EMACS effect). The EMACS effect has been reported in both, human and nonhuman animals. However, Nelson, León and Lombas (2011) have reported a null effect of extinction on acquisition in rats' appetitive conditioning. Interestingly, the associative value of the training and test contexts was equated in their experiment by presenting different cues followed by the outcome in both contexts. Equating the associative value of the extinction and test context precludes the action of one of the mechanisms that occasionally underlie context-switch effects:
Context-outcome associations. The study presented here tested the EMACS effect in rats' appetitive conditioning in conditions in which the associative value of extinction and testing context was the same (reinforced cues were presented in both contexts), or different (reinforced cues were presented only in the training context). Contrary to what was reported by Nelson et al.(2011), EMACS effect was reported in both conditions, though it was close to undetectable in the condition that equated the associative value of the context. The implications of these results for the mechanisms underlying the EMACS effect are discussed.

Perinatal lighting environment modifies the actions of the non-image formation system

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Early life experiences affect the health and the behaviour of individuals. Light information leaves the retina through the axons of the intrinsically photosensitive retinal ganglion cells that mediate the regulation of most of the so called non-image forming functions, which include entrainment of circadian rhythms, pupillary light reflex (PLR), sleep, alertness, mood and cognitive function.
Here, we tested whether lighting conditions during suckling may affect the circadian behavior and the PLR. To do so, Wistar rats were exposed to constant bright light (LL) or to 24h light–dark cycles (LD) during suckling. After weaning all were entrained to dim 24h LD cycles for 3 months and PLR to 30 seconds of blue light pulses of 3, 10, 30, 100 and 300 μW/cm2 was studied.
Results show that, LD-rats showed a stronger pupillary contraction with low light intensity pulses, and that this difference disappeared at high intensities pulses. Circadian rhythm expression under LL was different among groups, but no differences in entrainment to LD cycles were found. Results indicate that the lighting conditions in the early life modify the functioning of the non-image formation system and thus, could have far-reaching consequences in the physiology and behavior of the individuals.

TALK SESSION 8: Latent Inhibition and Perceptual Learning

Comparison and inhibitory connections in perceptual learning with a rapid succession procedure

Adela F. Iliescu, Sergio A. Recio, Isabel de Brugada
Universidad de Granada

It has been shown that rapid alternation exposure to two compound flavours (AX and BX) results in worse discrimination between them than intermixed exposure. In such procedures, after exposure, one of them is conditioned, and then generalization to the other is tested. This failure to find perceptual learning has been attributed to the formation of excitatory connections between the unique elements of the compound, which would increase generalization. According to this interpretation, when the test is modified to control this, by conditioning a new flavour (Y+) and testing it in compound with the unique elements (AY), we have found perceptual learning with rapid alternation exposure. However, this control does not allow the exploration of other mechanisms that might be involved as well in perceptual learning, such as inhibitory links between the unique elements. Prolonged exposure has been shown to allow the formation of inhibitory links, which could overcome the excitatory links that are formed with a rapid alternation procedure. To test this, we ran a series of experiments with a rapid alternation procedure and long preexposure. The results are discussed in terms of the relative involvement of different processes such as comparison and inhibitory links in perceptual learning.

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Effects of pre-exposure, extinction, and sex on the generalization of a conditioned taste aversion

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Universidad Autónoma de Chile

In three experiments conducted with rats as subjects, a conditioned taste aversion was established to a compound of flavors (AX), before testing the generalization of the resulting aversion to another compound (BX). Generalization of the aversion between AX and BX was lower after pre-exposure to the test stimulus, BX, than after pre-exposure to the to-be-conditioned stimulus (CS), AX (Experiments 1 and 2). The same finding was obtained irrespectively of whether the rats received four or eight pre-exposures to the stimulus (Experiment 1). Further, after 8 pre-exposures to the stimulus and conditioning to AX, generalization between AX and BX was similar to that observed after conditioning of this compound and 8 extinction trials (Experiments 2 and 3). Finally, some evidence was found for the possibility that neophobia might be greater for females than male rats, whilst latent inhibition might be attenuated in females with respect to males (Experiment 3). In addition, pre-exposure to the CS appeared to decrease generalization only in females. The extent to which associative learning theories can account for these findings is discussed.

Effects of Motivational and Emotional Changes on Stimulus Exposure

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Universidad de Sevilla

Latent Inhibition, the reduced conditioned response observed after repeated exposures to the to-be-conditioned stimulus without consequences, has been traditionally interpreted as the result of attentional, memory, and/or associative processes. However, there are other aspects that modulate the intensity of the effect that have received less attention in the literature. In this paper we present data from several experiments with animals and human participants designed to check the effect of changes in motivational and emotional factors on preexposure and subsequent conditioning of a neutral stimulus. The experimental results revealed that processing of the preexposed stimulus is extended and/or enhanced when motivation is increased (either by manipulating deprivation in experiments with rats or by increasing the relevance of the task in experiments with humans), or when preexposure occurs after the induction of a negative affect. These results are compatible with the hypothesis that attributes the relatively poor CS-US association to a reduction in attention to the CS that is developed during the stimulus preexposure stage.

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Inattentional Blindness and Visual Perceptual Learning: stimulus salience effects do not depend on a location bias

Gabriel Rodríguez
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Innattentional blindness (IB) is the failure to notice unexpected events in a visual scene when attention is focused elsewhere. A series of experiments used the IB procedure as an "attention tracker" to assess the attentional changes that may occur during preexposure to a pair of relatively similar stimuli (e.g., AX and BX). Participants received concurrent and intermixed presentations of two visual stimuli that contained several common features (X) and only a unique feature (A or B). On the initial concurrent presentations of the stimuli, all the stimulus features occupied a fixed spatial location. However, on the subsequent intermixed presentations, the location of all the features changed randomly between trials. On the critical trial after exposure, the stimulus AX was presented but included an unexpected visual event. The unexpected event was detected more frequently when it involved an A-unique than an X-common feature (the IB effect was greater for the common than for the unique features). These results provide support for the notion that the critical factor modulating the ability of the stimulus features to capture attention is their learned condition of being unique or common.

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Inhibitory properties of a latent inhibitor

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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...). We present a series of conditioned taste aversion experiments giving support to these predictions.

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TALK SESSION 9: Contextual Learning and Instrumental Phenomena

Behavioural responses to contextual stimuli paired with nausea and internal pain

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Using the orofacial reactivity method, we examined the nature of the responses that develop to contextual cues associated with LiCl and hypertonic NaCl. During conditioning, rats were exposed to a novel context for 5 min and then injected with either LiCl (0.15M; 10 ml/kg), hypertonic NaCl (1.5 M; 10 ml/kg), or isotonic NaCl (0.9%; 10 ml/kg). After the injection, the animals remained in the context for 30 min. On testing, disgust reactions, indicative of nausea, were the predominant responses when context was paired with LiCl, whereas immobility responses, indicative of fear, were seen after pairing the context with hypertonic saline. After testing, the rats were implanted with an intraoral cannula and then infused with saccharin in the experimental context for 3 min. Animals were then tested for second-order conditioning in a taste reactivity test conducted in a different context. Saccharin elicited disgust reactions in the lithium group, but passive dripping and immobility emerged in the hypertonic group (as well as reduced appetitive responses). These results suggest that context cues support conditioned responses in the same way that flavour cues, implying that the differences in responses are driven by the nature of the US, and not by the nature of the CS.

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Testing the emotional self-medication hypothesis: Effects of voluntary consumption of anxiolytics on anxiety

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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, which suggests that animals preferred these drugs over water because of the reinforcement derived from their anti-frustration effects. Three experiments were designed to test this hypothesis.
Food-deprived, male Wistar rats were first exposed to the preference test (2 h, 15 sessions) with two bottles, one containing water and the other ethanol (2%, v/v), chlordiazepoxide (1 mg/kg), or water. Immediately after sessions
11 and 12, rats were exposed to the open-field (Experiment 1), the elevated plus-maze (Experiment 2), or cSNC (involving a downshift from 32% to 4% sucrose; Experiment 3). Voluntary consumption of ethanol did not affect behavior in the open field or cSNC, but it increased closed-arm entries in the elevated plus maze—an index of increased locomotor activity. Animals that consumed CDP, however, showed a faster recovery from cSNC. These results partially support the emotional self-medication hypothesis applied to frustrating situations involving reward loss, as opposed to tests probing unconditioned fear.

Reversal training boosts context conditioning in rats' appetitive conditioning

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Attentional Theory of Context Processing (ATCP) predicts that subject`s attention to the context is boosted when information becomes ambiguous. Recent research from our laboratory has shown that reversal training also facilitates new learning about time and space in rats. The present experiment analysed whether reversal training facilitates learning about a new cue within an appetitive conditioning situation. Two groups of rats were trained to discriminate between two stimuli (X+ Y-). In a subsequent phase, a new cue (Z+) was trained intermixed with previous two stimuli, though in group Reversal contingency between X and Y and the outcome was reversed (X- Y+). Learning about Z+ did not differ between group Reversal and group Constant. However, magazine entries in the absence of stimuli were higher in Group Reversal than in Group Constant, suggesting that Group Reversal developed contextual conditioning. Analyses conducted with a number of experiments conducted with different purpose but with the same methodology consistently found higher contextual conditioning in the groups receiving reversal training. Results are in agreement with an increase in attention to the context in the presence of ambiguity expected from ATCP and they suggest some limitations in the role of ambiguity in the facilitation of new learning.

The role of theta oscillatory activity in outcome valence and reward prediction error

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In our daily life we are constantly making predictions about the consequences of our actions. These predictions, however, need to be updated in order to adapt to changes in the environment. The goal of the present study was to uncover the neural mechanisms underlying the reward prediction error, that is, the difference between the real and the expected outcomes. Seventeen healthy subjects performed a reversal learning task in two different experimental sessions, one involving Electroencephalography and the other involving functional Magnetic Resonance Imaging (fMRI). Mid-frontal theta oscillatory activity (4-8 Hz) was modulated by both outcome valence (gain or loss) and unsigned prediction error (UPE). FMRI revealed that valence and UPE were processed in two different sub-regions of the medial Prefrontal Cortex, which in turn engaged different functional networks. Therefore, while valence engaged the Salience Network (including insula, putamen and substantia nigra), UPE was related to the Central Executive Network (dorsolateral Prefrontal Cortex, ventromedial Prefrontal cortex and Parietal Cortex). In addition, results suggested that theta oscillatory activity had a main role as a common neural mechanism for the integration of different functional Networks.

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Why rats are not sub-optimal in Z's-protocol?

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The preference for the non-optimal alternative in Z's protocol is a ubiquitous result. It is usually reported in pigeons. Basically, Z's-protocol consists of presenting concurrently two alternatives, associated with different rate of reinforcement in the long-term. The cue point is that the alternative associated with a smaller probability of reinforcement goes to two stimuli associated with the presence or absence of reinforcement (called discriminative alternative), but the alternative with the bigger probability of reinforcement goes to two stimuli associated with uncertainty about the delivery of the reinforcer (called non-discriminative alternative). Recently, a preference for the optimal or the non-discriminative alternative has been reported in rats. In this study we explore the mechanisms that account for the differences reported between species. We report similar results, thus the rats' preference for the discriminative or non-optimal alternative when changes in the dimension of the stimuli through the experimental procedure are done.

POSTERS

Is the anxiogenic agent Yohimbine able to induce flavor aversion learning (FAL)?

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Yohimbine (YOH) is an α2 adrenoceptor antagonist and 5-HT1D partial agonist that enhances anxiety in human beings as well as in animal models of anxiety. We intended to use this drug in our experiments to induce stress in rats with the aim of evaluating the influence of this state in the ethanol intake behavior of the animals. Even though there are no previous reports on the ability of YOH to induce FAL, we considered it necessary to check this possibility. If YOH were able to induce FAL, it would mean that this drug has negative effects that can act as aversive unconditioned stimuli (US), reducing the preference for stimuli (alcohol, for instance) associated with the administration of the drug. Thus, we subjected the animals (male wistar rats) to a delayed procedure of FAL, with three acquisition trials and a two-bottle choice test. Solutions of strawberry or coconut extract were used as conditioned stimuli (CS). Injections (ip) of YOH (4 g/kg) and saline were used as US. The results indicated that YOH is able to induce FAL, given that the level of preference for the CS associated with YOH significantly decreased through the acquisition trials, the test and the extinction trials.
Further experiments are warranted to study in greater detail the ability of YOH to induce FAL.

The role of the unique elements unitization on perceptual learning

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McLaren and Mackintosh (2000) proposed unitization as one of the mechanisms that explained perceptual learning. According to them, during intermixed exposure there would be less unitization of the unique elements, which would cause a higher salience and thus better discrimination.
However, unitization can also be considered as a better memory representation of the stimulus (Lavis et al, 2011). Such better memory representation could also support better discrimination, and thus more unitization should be expected after intermixed exposure. To explore how unitization works we presented rats with two compound flavours consisting of a pair of unique elements (AP or BQ) and one common element (X). After either intermixed or blocked exposure, one of the unique elements of the compound was conditioned (A), and the other part of the pair was tested (P). A higher unitization should cause more generalization, via second order conditioning. Our results show that, at least under certain conditions, there is more unitization after intermixed than blocked exposure. The results are discussed in terms of salience and associability of the unique elements.

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Long-term retention of spatial memory in humans

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Data acquired in rodents show spatial memory retention from hours to several weeks after acquisition, although with some extent of spontaneous forgetting. However, there is scarce literature on the spatial memory throughout prolonged retention intervals in humans. We assessed the spatial memory in humans trained to locate a hidden platform in a virtual water maze and then exposed to a test without a platform. The training-test retention interval employed was either 0 hours (Immediate testing group, ITG), 48 hours (Delayed testing group, DTG) or 168 hours (Long delayed testing group, LDTG). During the test, all groups showed an equivalent motivational level and remained in the reinforced quadrant for a time period longer than that expected by chance, although it was significantly shorter for the LDTG group, which also displayed decreased accuracy in seeking behavior. These results could be explained by a loss in the spatial information (i.e., spontaneous forgetting), by a recovery deficit, or even by an improvement in goal location knowledge, so that when failing to find it in the expected location, it was sought in a different place.

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Memory-based large quantity discrimination by angelfish (Pterophyllum scalare)

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Rudimentary quantification abilities have been shown in a variety of animal species, including human infants, which are able to discriminate between quantities differing in numerical size. In angelfish such discrimination ability has been investigated using binary choice tests when the numerically different stimulus groups (shoals) of conspecifics were fully visible to the test fish. Here, we investigated whether angelfish are able to discriminate between the contrasting shoals using their memory. After a period of full visual access to the contrasted shoals, the test fish had to make a choice while being able to see only a single member of the stimulus shoals on each side of their test tank. With this cognitively more demanding procedure we tested discrimination between numerically large shoals (≥ 4 fish per stimulus shoal). Angelfish consistently chose the location where they used to see the larger of the two shoals when these shoals differed by a 2:1 or higher ratio, but not when they differed by a 3:2 or 4:3 ratio. The results followed Weber's law in that performance became poorer as the ratio approached one, and lend support for the analogue magnitude representational system. Furthermore, our findings demonstrate that angelfish remember the different shoals presented to them.

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A short intervention diminishes causal illusions and specific paranormal beliefs in undergraduate Psychology students

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We present a short classroom intervention that aimed to provide students with tools to avoid the development and maintenance of causal illusions. The intervention started with a bias-induction phase where students were lead to experience the well-known Forer effect and a confirmation bias in two different computer tasks. The goal of this first phase was to show students the ease with which our judgements are affected by cognitive biases. After this induction phase, some popular pseudoscientific and superstitious beliefs were discussed, with a special focus on the cognitive biases that might underlie these beliefs. At the end, participants completed a paranormal beliefs' questionnaire and a standard computerized contingency task that usually promotes the development of strong causal illusions. Participants in the intervention group, compared with a control group that had not yet participated in the intervention, showed a lower score on the precognition subscale of the paranormal beliefs'
Questionnaire and were less prone to develop causal illusions. The implications of the intervention as a way to enhance critical thinking and improve scientific reasoning are discussed.

Discrimination of quantities decreases with increasing working memory in fish

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The ability to discriminate between groups of different sizes may provide adaptive advantages in different functional contexts, and it has been shown in different animal species. Quantity discrimination has frequently been investigated using dichotomous choice tests. In the present study, using angelfish (Pterophyllum scalare), a memory component was introduced in the choice between two groups of conspecifics. The visual access of the test fish to the groups was prevented for 30 seconds prior to the election. In a control group (0 vs. 4 fish contrast) subjects discriminated the group with fish over an empty compartment, and they also discriminated the larger group when the groups differed by a 1:2 (4 vs. 8 fish) or lower ratio (1 vs. 4 fish). However subjects failed in the discrimination of 1 vs. 2 and in 2 vs. 3 conspecifics. The results suggest that angelfish can discriminate between groups when one of them has, at least, twice as many elements as the other. The failure when the differences between groups are small, suggest the existence of a limit in the discrimination or, alternatively, that when facing such a memory demand, the salience of the stimulus takes priority.

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Conditioned oviposition preference in the silkworm (Bombyx mori): a preliminary study

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According to the natal habitat preference induction hypothesis (Davis & Stamps, 2004), phytophagous insects female usually lay their eggs on the host species on which they developed as larvae. Thus, the moth of the silkworm, which only eats mulberry leaves during the larvae phase, should prefer to lay the eggs on or close to the mulberry leaves. Moreover, we wonder if that preference can be conditioned by associating the mulberry odor (US) with a novel odor (CS). If so, the female moths will prefer laying their eggs near the CS.
Experimental group experienced 30 trials with both odors together. Control group experienced both odors too, but in a non-contingent way. The test consisted of put the female and the male together for a day in a box, so that in one corner of the box 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 experimental and control groups tested in the presence of the mulberry prefer to lay their eggs in the mulberry area. However, only the oviposition of experimental group took place near the CS.

Warsaw Wild Captive Pisula Stryjek Rats - model of the early stages of the domestication process

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This paper describes a series of comparative studies on a laboratory line of wild Norway rat. Warsaw Wild Captive Pisula Stryjek Rats (WWCPS) provided interesting data in the field of species specific behavior patterns, play-fighting, response to novelty, food neophobia, circadian pattern, and response to environmental enrichment. The experiment on neophobia showed that Wistar rats exhibited less neophobic responses and were more often trapped. WWCPS rats showed highly neophobic behaviour and were rarely trapped in this experiment. The experiment on swimming showed that WWCPS rats showed more complex water tank related activity than their laboratory counterparts. They swam and explored under surface environment.
Laboratory rats, and WWCPS rats showed different profiles of response to maintaining in the enriched laboratory conditions. WWCPS are at an early stage of adaptation to laboratory conditions, and we can hypothesise that enriched laboratory environment provides them with conditions much closer to a natural habitat than standard laboratory cages. Moreover, we propose, that for animals at early stages of domestication, information seeking is more important in the regulation of their behaviour than it is for fully domesticated animals. In the latter, it is stimulus seeking that dominates behaviour regulation.

Theory of Mind in competitive and cooperative contexts: preliminary results from 6-year-old children

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The capacity to attribute mental states to others (theory of mind, ToM) might have evolved as a solution for social problems faced mainly in cooperative or rather in competitive contexts. In the current study we have investigated the use of ToM by 6-year-old children in both contexts.
Children participated in pairs, taking turns in choosing containers to receive stickers hidden in them. Subjects could use their ToM to infer their partner's past or future choices in order to maximize the stickers obtained.
We carried out three experiments, each one focused on a different ToM level: perspective taking, understanding of other's knowledge and understanding of other's' beliefs. Children solved the perspective taking task and performed better than in understanding knowledge or beliefs tasks. Moreover, in the perspective-taking task they used better their ToM in competition than in cooperation. Contrary to previous results, 6-year-olds did not show understanding of other's knowledge whereas they showed understanding of other's beliefs only in a cooperative context. From an evolutionary point of view, these results present further evidence that perspective taking was a first step in the development of other ToM levels. Also, they suggest that this might have happened mainly in a competitive, rather than a cooperative context.

Learning curve in earthworms (Lumbricus terrestris) with a classical conditioning procedure

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Different techniques, and different kind of animals, have been used in the study of invertebrate learning. For example, classical conditioning in earthworms using vibration as the conditioned stimulus (CS) and a bright light as the unconditioned stimulus (US) has been employed by different authors.

However some parametrical differences between their procedures (stimulus intensity, interval between trials, etc.) are observed. This could be a problem for the generalization of results, so it would be interesting to get standardized behavioral techniques in this field.

In order to contribute to this goal, we try, on the basis of our own procedure of classical conditioning in earthworms (Reyes-Jiménez, Abad, and Paredes-Olay, 2015) to outline the learning curve throughout different phases of training and testing. In these experiments we manipulated the intensity of vibration (CS). However, our pattern of results was different than expected.

We discuss these ones in terms of interference of basic processes as habituation or preexposure effects.

Reyes Jiménez, D.; Abad, M.J.F. y Paredes-Olay (2015). Preliminary studies of classical conditioning in earthworms (Eisenia foetida).). XVII Congreso Internacional de la Sociedad Española de Psicología Comparada, Sevilla.

Attention instructions during test can change overshadowing in humans

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Task instructions can atenuate or increase information recovery (Alvarado et al. 2009). In a similar way focused attention instructions can attenuate spontaneous recovery of initial learning (Miller et al., 2014). In overshadowing, when a CS X is presented in compound with a salient CS A, this results in a weaker response to X. The present research was conducted to evaluate if attention instructions during test can change overshadowing. In three groups, human participants learned a search task where a landmark cue was overshadowed by a more salient geometric cue. One group, after 8 trials with the compound CS, received focused-attention instructions before the tests with each cue alone. A second group, after training, received unfocused attention instructions before the tests. And a third group did not receive instructions after training. Results showed that attention instructions can decrease overshadowing of a landmark cue by a geometric cue. When instructions were not presented, overshadowing was observed, agreeing with theories that consider attentional changes to the CS (Mackintosh, 1975). Therefore attention paid to an overshadowed cue during initial training can change its associability using instructions, as contextual attentional theories predict (Rosas et al., 2006).

Extended contingency training prior to non-contingency attenuates illusion of control

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The illusion of control is the belief that our behavior produces an effect that is actually independent from it. Nissebet and Ross (1980) suggest that information from previous knowledge could mitigate the influence of available evidence. Yarritu and Matute, (2015) demonstrated this idea using causal judgments. The purpose of this study was to evaluate the effect of prior extended contingency training on the development of illusion of control using a behavioral task. A three-phase experiment was designed.

Participants initially received instrumental training for two responses associated with different outcomes; One group (ST) received 12 training trials for each response-outcome, while the other group (LT) received 36 trials for each one. During the second phase, one outcome was contingent for one response, and a second outcome was non-contingent for the other response. In a final test without consequences, participants in both groups responded similarly to the contingent response, while Group LT responded less than Group ST to non-contingent response. Results suggest that a previous contingent response-outcome experience decreases non-contingent response-outcome learning. These data support the hypothesis that previous experience expectations affect the development of causal illusions by the mediation of behavior.

Effect of intermittent reinforcement on Temporal Weighting Rule with human beings

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According to Temporary Weighting Rule (TWR), information recovery depends on subjective value of the experiences and their relative temporal distance at test time. This idea has been demonstrated in instrumental tasks where learning experiences had a positive and negative subjective value, as well as a relative temporal distance recent and distant (Lopez, et al., 2013).

According to TWR, reinforcement density is important in the amount of information to be recovered, because the subjective value of each learning experience will be different. This idea was tested in two experiments. In the first experiment, 4 groups were trained with the same or different subjective value of the experiences learned (A = B; A> B), where both experiences were reinforced on 75% of the trials, and the test was conducted at 0 or 24h after training. In Experiment 2, four groups, were trained under the same conditions (A = B; A> B) and tested (0 and 24h) but both experiences were reinforced on 50% of the trials. The results showed that participants integrate information considering: subjective experience value, reinforcement density and relative temporal distance at test. So, the effect of intermittent reinforcement changes the subjective value of the learned experiences in information retrieval.

Reduction of aba renewal by using attentional instructions

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One experiment with human participants in a predictive learning task evaluated whether using focused-attention instructions could prevent the response recovery of an ABA renewal. Forty-eight undergraduate students participated in the present study. During the first phase all participants learned that a particular cue (food) caused a particular outcome(diarrhoea) in a particular background (restaurant A). In the next phase, all students received an extinction procedure in restaurant B. Finally, testing took place in the original restaurant A. During this phase, participants were presented with the cue and a response was asked. Participants in the group ABA, received testing immediately after the extinction phase ended. For groups ABA-f and ABA-nf, test was received after thirteen minutes. During those minutes, participants in the ABA-f group received a breathing exercise induction while students in the ABA-nf group underwent a control exercise.
The data show that using a focused-attention induction significantly attenuates the ABA renewal of predictive judgments. Results are discussed in the framework of the Attentional Theory of Context Processing.

Analysis of expectations in Evaluative Conditioning and Affective Priming tasks in human participants.

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Evaluative conditioning (EC) is a kind of learning through which a neutral stimulus gets an affective value after pairing it with an unconditioned stimulus that has a hedonic value. The most studied feature of EC is its notable resistance to extinction. In this research study we explored whether the extinction procedure used affects not only the expectation of the presentation of US, but also its reference value, by evaluating affective judgments and the affective priming task. The results obtained show a dissociation effect between the affective judgments and priming. The extinction procedure caused a significant decrease of affective judgments of extinct stimulus and a re-valorization effect based on cue evaluative conditioning (Hütter, Kutzner, & Fiedler, 2013). However, this decrease of affective judgments did not affect the priming task, where the reaction times in congruent trials were higher than in incongruent trials (reverse priming effect) for both the extinct and re-valorized stimulus and for the conditioned stimulus. For this reason, we think the task used produces two types of learning that are differentially sensitive to verbal measures and the reaction time.

Prefrontal cortex involvement in controlled processing of a future conditional stimulus in latent inhibition.

Francisco J. Pérez-Díaz, Auxiliadora Mena, Juan Carlos Ruiz-Salas, Juan Pedro Vargas, Estrella Díaz
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Prefrontal cortex has been included in controlled processing strategies, and we studied if this structure could be involved in the habituation to a stimulus without consequences. It is likely that long-term exposure to future CS determines the shift from controlled to automatic processing. That is, once the associative relationship between the stimuli and their consequences is established, subjects would use an automatic processing strategy. In this experiment we studied the role of Prefrontal Cortex in the processing of pre-exposure learning. We analyzed the effects of an infralimbic prefrontal cortex lesion before the pre-exposure phase of a latent inhibition (LI) procedure using two conditions, long and short presentations of the future conditioned stimulus. Result showed a clear involvement of the infralimbic prefrontal cortex. Lesion to the frontal infralimbic areas produced a release in the LI to long exposure and conditioning to a short exposure to the future CS. This effect indicates that the infralimbic cortex is necessary for controlled processing and the lesion of this structure facilitates automatic processing because of decreased attention.

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AAB renewal is smaller than ABA renewal in human predictive learning

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According to Bouton's (1993) retrieval theory of forgetting, contexts are not processed as relevant for retrieval of the information until the information becomes ambiguous. Renewal is then explained because the ambiguity that generates pairing the cue with the presence and the absence of the outcome makes extinction context specific.
Accordingly, the key factor in the renewal effect is the change in the context between the extinction and testing phases (i.e., AAB renewal), rather than returning to the acquisition phase (ABA renewal). An experiment in human predictive learning tested this idea. During acquisition two cues were followed by the outcome in two different contexts (A: X+ / B: Y+); during extinction both cues were extinguished in context B (B: X-, Y-) before receiving the test in both contexts A and B. Thus, cue X was tested for ABA renewal, while cue Y was tested for AAB renewal. Renewal was smaller in the AAB design than in the ABA design extending results in nonhuman animals to human predictive learning, and qualifying one of the main assumptions of Bouton's retrieval theory of forgetting.

Extinction increases gaze fixations to the context

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Attentional Theory of Context Processing suggests that the ambiguity that extinction produces increases context attention so that all the information learned afterwards becomes context specific. Rosas and Callejas-Aguilera (2006) tested this hypothesis within a human predictive learning situation, finding that performance to a reinforced cue presented during extinction became context-specific. Two groups of human participants received training in which a cue was paired with the outcome in one context, and then tested in a different, but equally familiar context. Training of the target cue was conducted while an alternative cue was extinguished in the same context in Group E, while the same cue was trained in the absence of extinction in Group NE. Performance in the alternative context at testing was worse in group E than in group NE, suggesting that the context switch effect upon the target cue was potentiated by extinction. Concurrent recording of participants' point of gaze through an eye-tracking system found that relative frequency of gaze fixations to the test context was higher in group E than in group NE, confirming the idea that extinction increases participants' attention to the context.

Behavioral Responses of Orangutan (Pongo Pygmaeus) to Videos

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The current research studied the effect of behavioural enrichment conducted on a captive adult male of Borneo orang-utan (Pongo Pygmaeus). This study was a pilot program developed by the Barcelona Zoo carried out on the group of orang-utans during periods of confinement in quarantine (e.g., because of the construction of new facilities).

The behavioural enrichment consisted of showing different videos and audio programs on a TV screen (33 inches) located one meter outside the cage where the orang-utan could watch it without risk of accident.

The study recorded behavioural responses to the enrichment. Baseline data were compared with two experimental conditions: a) naturalistic videos of the Borneo forests and, b) Pocoyo cartoon (cartoons aimed at children).

We recorded three periods: baseline, naturalistic videos, and cartoon videos.

Each period consisted of 7 consecutive days separated by a dishabituation period of 10 days. The orang-utan was exposed to the videos for 10 minutes a day.

The results showed that although initially the orang-utan was interested in videos, he gradually lost interest in them and finally showed a similar behavior to that observed during the baseline.

Latent Inhibition disruption by 5-HT2A agonist administration at test stage.

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Latent Inhibition (LI) is a phenomenon that has been clearly established as suitable for assessing cognitive processes. The "retrieval failure" hypothesis of LI proposes that two independent associations are established at stimulus preexposure and conditioning stages, CS-nothing and CS-US, respectively. Both associations would compete at time of testing resulting in the reduced conditioned response that characterized LI. Previous research analyzing the involvement of the serotonin receptors 5-HT2A on LI indicates that when such receptors are hyperactivated by the agonist DOI, LI is disrupted. This result has been obtained when the agonist is injected before preexposure or before preexposure and conditioning. In two experiments we evaluated the effect of injecting DOI before the test phase that follows preexposure and conditioning in a 3-stage LI procedure. In the first experiment, using a conditioned taste aversion procedure, LI was disrupted by DOI administration compared to a saline group. In the second Experiment, using a fear conditioning procedure, LI was again disrupted by the agonist administration at test stage. The results are interpreted by considering the role of 5-HT2A receptors on information retrieval.

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Assessing learned changes in stimulus salience using a change blindness task

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In Phase 1, the preexposure phase, all the participants were instructed to conduct a task involving mental mathematical operations. For Group EXPOSED, the instructions for this task, and the operations to be performed, were introduced by the image of a robot. Group CONTROL was not exposed to the image of the robot during this phase. In Phase 2, the change blindness task, all the participants were instructed and allowed to observe the robot for 40 seconds. They were informed that several changes were to be included in that image and that their task was to detect the greatest number of possible changes. Twelve changes were included during the presentation of 8 screens of2 seconds duration with the image of the robot, and a blank screen of .5. sec was interspersed between the screens with the image of the robot. The changes most easily detected in Group CONTROL were detected less readily in Group EXPOSED, and the changes least easily detected in Group CONTROL were more readily detected in Group EXPOSED. We discuss these results in terms of a habituation mechanism by virtue of which the initially most salient features suffer a reduction of salience during exposure, thereby increasing the relative salience of the least salient features.

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Odor exposure effects on exploratory behavior as a tool for assessing perceptual learning

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In a one-trial object recognition task, subjects first receive an exposure trial with a pair of identical objects (A & A). On the subsequent test, one of these objects is replaced by a novel one (A & B) and animals show more, and longer, exploratory approaches to the novel (B) than to the familiar object (A). This preference for novelty has been interpreted as reflecting the previous formation and encoding of a cognitive representation of the familiar object. A recognition task was adapted in order to evaluate animal perceptual learning effects without using conditioning procedures. We used odor stimuli, and an exposure procedure in the home cages, similar to those used in previous experiments in the animal perceptual learning literature. We found the standard recognition effect: short preexposure to one odor (A) generated a preference to explore a novel stimulus (B) on test. Interestingly, when a variation is introduced in the familiar A, the animals show a preference for exploring the varied familiar stimulus A´ odor rather than the novel B odor. 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.

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Labelling effect in the perception of a local product: an associative interpretation

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We investigated how the perception of the intrinsic features of two local honeys can be affected by the way in which they are presented (either in a crystal pot with the official label of quality for local products known as Eusko Label or in a plastic pot from a local brand without the label of quality). All the participants (students from the University of the Basque Country) received the same instructions regarding how to do a brief tasting of two honey samples produced in the Basque Country. For participants in Group NO-CHANGE, the honeys were presented in their original pots (i.e., the crystal pot contained the honey with the mention of quality Eusko Label, and the plastic pot contained the honey without that label). For participants in Group CHANGE, however, the presentation of the honeys was upside down. We found that the perception of the intrinsic features of each sample (and the willingness to pay for them) depended on the pot in which they were presented, but not on the actual type of honey. We discuss an associative interpretation of this sort of labeling effect.

A comparative study monitoring law students and professional development.

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A quasi-experimental field design was used to conduct a cross comparison of two groups of college students in different faculties of law, from ten municipalities of the State of Mexico with descriptive and inferential statistical analyses. The population consisted of 3,578 students from faculties of law state, with a random sample selection of 1,378.
Material: Test of values and invalues VALANTI and values Allport Test.
Results: There was a significant difference in values between students studying in different municipalities in: economic value, political value and nonviolence value, and also between different professional development in: theorist value, political value and nonviolence value.
This highlights the possibility that inside of the classroom, behavior is modeled for professional behavior based on ethical and moral values.
Inculcating values in universities through materials such as deontology and Juridical Axiology and other subjects will in future help the college student to show moral and ethical behavior in their daily actions.

Effects of prenatal exposure to ethanol flavor in the absence of acetaldehyde on neonatal and infantile acceptance of ethanol

Asier Angulo Alcalde

Ethanol exposure during gestational days 17-20 in the rat increases attractiveness, intake and palatability of ethanol when measured in neonates, infants, and adolescents. This effect has been found to be the result of prenatal appetitive learning after the association of ethanol's flavor (CS) and its reinforcing effects, in which central acetaldehyde plays a crucial role (US). In a recent study we have found that when eliminating the supposed reinforcer, by sequestering acetaldehyde (D-Penicillamine) after ethanol prenatal exposure, 1-day old neonates did not show any attraction to the flavor of ethanol. This result was unexpected, since mere prenatal exposure to vanilla in the absence of an explicit reinforcer induces neonatal attraction for this flavor (by familiarity). In this study we aim to increase the fetuses chances of sampling ethanol's chemosensory properties, increasing the intensity and duration of the ethanol flavor (CS) in the amniotic fluid, by interfering with the metabolism of ethanol (Fomepizole) in the absence of acetaldehyde (D-Penicillamine). This will result in increased attraction to the odor of ethanol on postnatal day 1 but will not increase consumption on day 14.

Assessing learned changes in stimulus salience using a recognition task with visual stimuli

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Rats were exposed in their home cages to a pair of complex shapes, AX and BX, each one consisting of a distinctive and a common shape (e.g., a pair of triangles, one with a circle inside and the other with a square inside). On a subsequent recognition task in a different experimental cage, subjects were also exposed to a pair of complex shapes. For all the rats, one of these test stimuli was familiar and identical to one of the preexposed shapes (e.g., AX), and the other stimulus was novel and consisted of a modified version of the familiar stimulus. For Group COMMON, the modification of the novel stimulus involved changing the feature that was common during preexposure (AZ; e.g., presenting the circle surrounded by a cross rather than by a triangle). For Group UNIQUE, the modification of the novel stimulus involved changing the feature that was unique during preexposure (XZ; e.g., presenting a triangle with a cross inside). We observed more and longer exploratory approaches to the novel than to the familiar stimulus in Group COMMON (testing AX vs. AZ) than in Group UNIQUE (testing AX vs. XZ). Implications for perceptual learning theories are discussed.

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The evaluation cost decreases as a function of extended exposure to a risky-choice procedure

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Several studies in pigeons and rats have reported a predictable relation between latencies during no-choice trials and the ulterior preference in choice trials. The Sequential Choice Model (SCM) was proposed in 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, and each session was composed of 10 blocks of trials (2 no-choice and 4 choice trials). We analyzed data taking latencies of response and testing the SCM's predictions. Our data support partially the SCM's predictions, but a monotonic decrease to a floor effect in all response latencies does not allow for confirmation of all predictions. The results are discussed in terms of a decrease in the valuation cost as a result of extended exposure, arguing that diminishing latencies in this particular procedure contributed to an increase in the whole rate of reinforcement.

Pigeons riddle again the ambiguous-cue problem: Moving forward from Vasconcelos & Monteiro (2014)

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Pigeons (Columba livia) were trained to perform the ambiguous-cue task, which is composed of a two-choice simultaneous discrimination involving three stimuli: positive (P), ambiguous (A) and negative (N). The trial types were PA or NA. The ambiguous cue (A) served as an S- in PA trials, but as an S+ in NA trials. Two groups of pigeons were formed: Continuous Group (CG) and Partial Group (PG). The S+ is reinforced with a probability equal to 1 in the CG, but equal to 0.5 in the PG. The S- is never reinforced. The experiment was conducted to test the hypothesis proposed in Vasconcelos and Monteiro (2014): the ambiguous-cue effect was due to experimental manipulation of the panel in which the alternatives were presented (a 120˚angle). No ambiguous-cue effect was found on NA trials for both groups, as is typically reported in literature. We also found signals of this trend on PA-GP trials, in which performance was relatively high, but our panel manipulation was "flat" as typically used. Our data suggest that the alleged variations cannot be explained in terms of the ambiguous-cue effect by the simultaneous vision offered by the angled panel, and more tests have to be conducted.

An extended open-field experimental preparation to study foraging behaviour in groups of rats

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In social foraging situations, the way in which a particular subject explores the habitat or experimental preparation and exploits patches (each type of food source) depends on the interaction with other subjects in the same habitat and the habitat's particular properties. The Producer-Scrounger Game assumes that a subject can only play one of two different strategies: a producer finds or delivers food sources (i.e., patches), while a scrounger joins a previously discovered patch. Nowadays, all the evidence demonstrates that a subject plays both strategies in a foraging episode; sometimes it plays the producer, and sometimes the scrounger. But why and when do the changes in strategies happen? This is the question that arose and motivated the construction of an extended new open-field experimental preparation to study individual foraging behaviour from a Behavioural Analysis perspective in a social situation. We present the main characteristics and possibilities of this preparation and results regarding some variables that control changes in the individual foraging strategy.

The effects of an absence of gonads on males' performance to solve a spatial task

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When solving a spatial task in the presence of multiple cues males tend to use geometrical information while females tend to use landmarks. These differences may depend on gonadal hormones. In a recent study where castrated and control females were used (Rodríguez et al., 2013) it was found that castrated adult females solved a spatial task similarly to male rats, and clearly differed from control sham females. Would a similar manipulation also alter males' performance? The present experiment evaluated how castrated and control male rats would solve the previous spatial protocol. Rats were trained in a triangular-shaped pool to find a hidden platform, whose location was defined in terms of two cues, a landmark outside the pool and a particular corner of the pool. Subsequent test trials without the platform pitted these two cues against one another. This test revealed that all rats spent more time next to the geometry cue than next to the landmark. Two further tests conducted with the two cues presented individually showed that only castrated males learned about the landmark cue significantly, while both groups learned the same about the geometry cue. A third group of male rats addressed the importance of the landmark's salience.

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Environmental enrichment does not depend on physical activity

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Recently, the effects of early environmental enrichment (EE) and voluntary wheel running on the preference for using a landmark or pool geometry when solving a simple spatial task in adult male and female rats have been assessed (Chamizo, Rodríguez, Sánchez, & Mármol, in press). After weaning, rats were housed in enriched or standard cages for two and a half months. Then the rats were trained in a 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. Enriched rats reached the platform faster than control animals, and males and females did not differ. Enriched rats also performed better on subsequent test trials without the platform with the cues individually presented.

The aim of the present experiment, involving only male rats, was to rule out an alternative explanation for the previous results, namely that they were due to physical activity (i.e. wheel-running) rather than environmental enrichment. Specifically, the running wheels were present exactly as in Chamizo et al. (in press) but were rendered useless, so that it was impossible to run in them. The results clearly suggest that the beneficial effects of the previous study were due to environmental enrichment.

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The importance of selective attention in rats after geometry learning when solving a navigation task

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In Experiment 1, female rats (Group Experience-G) were trained in one or two unusually-shaped watermazes to find a hidden platform that always maintained a constant relationship with a distinctive corner of the pools. After each training session a test trial was conducted, without the platform. On tests, the amount of time the rat spent in two different areas, one in front of the correct corner and one in front of the opposite incorrect corner was recorded. (Females in Group Control remained in their home cages until compound training). All the animals then received compound training. The platform was defined by two cues simultaneously present, a landmark, and a particular corner of the pool (as in Rodríguez et al., 2010, Experiment 2). Three subsequent test trials were conducted, counterbalanced. In two of them the two cues were presented individually, while the remaining test pitted these two cues against one another. In Experiment 2, with males and females, the same procedure employed in Group Experience-G of Experiment 1 was followed to provide a direct comparison between the groups, which did not differ. The results of both experiments favour an explanation based on selective attention, corners being the relevant dimension. Selective attention was particularly beneficial for females.

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Repeated administration of ketamine in rats causes deficits in prepulse inhibition but no effects on executive function

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Administration of a noncompetitive glutamate N-methyl-D-aspartate (NMDA) receptor antagonist, i.e. ketamine, results in increased releases of dopamine, serotonin, and glutamate in the Prefrontal Cortex (PFC). Ketamine has been shown to mimic some of the schizophrenic symptoms related to PFC functions, and is currently used to treat major depressive disorder. In the present study, we assessed the effects of repeated ketamine administration in rats on two behavioural paradigms–a probabilistic reversal learning task (RL) and Prepulse Inhibition (PPI). RL requires adapting a behavior when the reward-related contingencies previously learned are reversed. PPI refers to a reduction in the startle reflex produced by an auditory noise (pulse) when preceded by a weaker noise (prepulse). Both phenomena are modulated by PFC and are affected in schizophrenia. The results showed that the ketamine group did not show a deficiency in the RL task although it exhibited deficits in PPI and in the startle reflex in comparison with the saline group. These findings indicate that repeated ketamine administration does not produce cognitive deficits, at least during reversal learning. They suggest that ketamine can be used in depressed patients more than once to improve its sustained antidepressant-like effects.

Generating expectations: Evaluative Conditioning and P300 component

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Evaluative conditioning (EC) is a type of learning through which a neutral stimulus acquires an affective value after it has been paired with an unconditioned stimulus that has hedonic value. The most studied feature of EC is its notable resistance to extinction, which has raised the need to distinguish between two associative learning systems: referential and expectation learning. In this research we study whether the expectation system is an underlying mechanism of EC and its extinction. For this reason, we not only use affective judgments, but also electroencephalographic records for assessing the amplitude of P3 component, a late component of the CNV that correlates with the production of expectation. The affective judgments show an EC and extinction effect at both behavioral and electrophysiological levels. During the conditioning phase, the amplitude of P3 is only increased significantly for the stimulus paired with affective words (not for the neutral stimulus). After the extinction phase, this component decreased significantly. Therefore, these results support the idea that one of the underlying mechanisms of EC is expectation learning.

Associability of unique and common elements after long and short pre-exposure

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Using an appetitive conditioning procedure, rats experienced short or long pre-exposure to two acoustic compounds sharing a common element (AX and BX) according to an Intermixed or a Blocked schedule. Following pre-exposure the animals were given conditioning with the unique element A (or B) or the common element X showing a lower associability of both (either the unique or common elements) after long and intermixed pre-exposure, an effect which vanishes after short pre-exposure conditions. We will discuss our results in terms of Artigas and Prados (2014) suggestion that stimuli are differentially represented during intermixed and blocked pre-exposure to AX and BX. Intermixed exposure would lead to the establishment of elemental representations of each element A, B and X, whereas the blocked condition would result in the establishment of configural representations of the compound stimuli AX and BX. Elemental representations of unique and common elements would be more affected by a loss of salience and associability than configural representations.

Artigas, A. A. & Prados, J. (2014). Perceptual learning transfer: Salience of the common element as a factor contributing to the intermixed/blocked effect. Journal of Experimental Psychology: Animal Learning and Cognition, 40, 419-424.

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Implicit extinction prevents spontaneous recovery of fear potentiated startle responses

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Fear memory recovery after successful extinction training is a core feature of anxiety disorders. According to the dual-process account, fear learning relies on two different learning systems: an affective learning system, supported by a subcortical defence circuit; and an expectancy learning system dependent of the hippocampal complex. It has been shown that fear extinction training taps into the latter system, leaving the affective memory intact. In this study we sought out to extinguish fear learning at the lower level using implicit presentations of the fear conditioned stimulus. As a read out of expectancy and affective driven fearful responses we measured skin conductance and startle reflex respectively. We found impaired spontaneous recovery 24h after implicit extinction only in startle responses but found normal fearful recovery for skin conductance responses. Our results showed, for the first time, that the affective component of fearful memories can be effectively reduced when extinction learning is engage under implicit conditions. Overall, current findings suggest that inducing fear extinction at both affective and declarative levels could lead to permanent extinction and ultimately become a successful treatment strategy for patients with phobias or PTSD.