



Universidade do Minho
Escola de Psicologia



First joint Portuguese-Spanish Meeting on Comparative Psychology

XXVI Meeting of the Spanish Society for Comparative Psychology



Braga, Portugal

September 2014

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Marília Carvalho
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Financial support



Meeting venue

School of Psychology of the University of Minho

Braga, Portugal



Registration: Ground floor, south entrance

Keynote Addresses and Talks: EPsi Multimedia Center Amphitheater

Poster sessions and coffee breaks: Ground floor, south hallway

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Program overview

Wednesday, September 10

8:30 – 9:00	Registration	South entrance
9:00 – 9:30	Opening address	EPsi Multimedia Center Amphitheater
9:30 – 11:10	Latent inhibition	EPsi Multimedia Center Amphitheater
11:10 – 11:30	Coffee break	Ground floor hallway
11:30 – 11:40	Tribute to Nestor Schmajuk	EPsi Multimedia Center Amphitheater
11:40 – 12:40	APPE Keynote Address: Alex Kacelnik	EPsi Multimedia Center Amphitheater
12:40 – 14:20	Lunch break	<i>Panorâmico</i>
14:20 – 15:40	Polydipsia I	EPsi Multimedia Center Amphitheater
15:40 – 16:40	Evolution and optimization	EPsi Multimedia Center Amphitheater
16:40 – 17:40	Poster session I and coffee break	Ground floor hallway
17:40 – 19:00	Taste conditioning	EPsi Multimedia Center Amphitheater
21:00	Opening cocktail	<i>Hotel Meliã</i>

Thursday, September 11

8:30 – 9:50	Learning and health	EPsi Multimedia Center Amphitheater
9:50 – 11:10	Discrimination learning	EPsi Multimedia Center Amphitheater
11:10 – 11:30	Coffee break	Ground floor hallway
11:30 – 12:30	SEPEX Keynote Address: Cecilia Heyes	EPsi Multimedia Center Amphitheater
12:30 – 14:20	Lunch break	<i>Panorâmico</i>
14:20 – 15:40	Polydipsia II	EPsi Multimedia Center Amphitheater
15:40 – 16:20	Models of learning	EPsi Multimedia Center Amphitheater
16:20 – 17:20	Poster session II and coffee break	Ground floor hallway
17:20 – 19:00	Pavlovian conditioning	EPsi Multimedia Center Amphitheater
19:20 – 00:00	Guided walking tour and dinner in Guimarães	

Friday, September 12

8:30 – 9:30	Predictive learning	EPsi Multimedia Center Amphitheater
9:30 – 11:10	Timing	EPsi Multimedia Center Amphitheater
11:10 – 11:30	Coffee break	Ground floor hallway
11:30 – 12:30	Keynote Address: Peter Urcuioli	EPsi Multimedia Center Amphitheater
12:30 – 14:20	Lunch break	<i>Panorâmico</i>
14:20 – 16:00	Cue competition	EPsi Multimedia Center Amphitheater
16:00 – 16:40	Comparative cognition	EPsi Multimedia Center Amphitheater
16:40 – 17:40	Poster session III and coffee break	Ground floor hallway
17:40 – 18:40	Business Meeting of the SEPC	EPsi Multimedia Center Amphitheater
20:45	Closing dinner	<i>Mercado das Tapas</i>

Invited speakers

Alex Kacelnik



Alex Kacelnik is Professor of Behavioural Ecology at the University of Oxford, E.P. Abraham Fellow of Pembroke College and a Fellow of The Royal Society. He is a leader in the field of animal cognition and behaviour, blending theoretical and experimental approaches from biology, psychology and economics. He is distinguished for his work on risk perception in animals and tool use in crows. For his outstanding contributions, he has received the Cogito Prize Award and the Comparative Cognition Society Research Award.

Cecilia Heyes



Cecilia Heyes is Professor of Psychology at the University of Oxford, a Senior Research Fellow of All Souls College, and a Fellow of the British Academy. Her work in animal cognition, human experimental psychology, and cognitive neuroscience is distinguished by the clarity and acuity with which it challenges conventional wisdom and offers new perspectives on the evolution of cognition. An expert on social cognition, she has made seminal contributions to research on social learning, imitation, mirror neurons, and theory of mind.

Peter Urcuioli



Peter Urcuioli is Professor of Psychological Sciences at Purdue University. He has contributed to a wide variety of topics in animal learning and cognition, including pioneering work on the categorization of arbitrarily related stimuli and stimulus class formation in pigeons and other non-language-capable animals. He is currently an Associate Editor for the Journal of the Experimental Analysis of Behavior, and has been continuously supported in his research since 1983 by the National Institutes of Health and the National Science Foundation.

Full program

Wednesday, September 10

8:30 - 9:00 **Registration**

9:00 - 9:30 **Opening address**

Armando Machado, President of SEPC

9:30 - 11:10 **Latent inhibition**

Chair: Armando Machado, University of Minho

9:30 - 9:50 Latent inhibition of flavor-taste learning: Motivational state and nature of the reinforcer

Felisa González¹, David Garcia-Burgos², Geoffrey Hall³

¹ University of Granada, Spain; ² University of Fribourg, Switzerland; ³ University of York & University of Plymouth, UK; University of New South Wales, Australia

9:50 - 10:10 Effect of Deprivation Level on Latent Inhibition with Appetitive Conditioning Procedures

Luis E. Gómez-Sancho, Luis Gonzalo de la Casa

University of Sevilla, Spain

10:10 - 10:30 Effects of Positive and Negative Induced-Affect on Latent Inhibition with Humans

Luis Gonzalo De la Casa, Auxiliadora Mena, Andrea Puentes, Robert E. Lubow

University of Sevilla, Spain

10:30 - 10:50 Effects of Food or Water Deprivation on Flavor Preexposure and Conditioning

Auxiliadora Mena, Paola Revilla, Luis Gonzalo de la Casa

University of Sevilla, Spain

10:50 - 11:10 Dorsal lateral striatum involvement in processing of future CS in latent inhibition

F.J. Pérez, E. Quintero, A. Serrano, E. Diaz, J.C. López

University of Sevilla, Spain

11:10 - 11:30 **Coffee break**

11:30 - 11:40 Tribute to Nestor Schmajuk

A quest for the learning algorithm

Alex Kacelnik, Eduardo Alonso

University of Oxford, UK; City University London, UK

11:40 - 12:40 APPE Keynote Address

Chair: Marco Vasconcelos, University of Minho

Why and how form and function go hand in hand in behavioural research

Professor Alex Kacelnik

University of Oxford, UK

12:40 - 14:20 Lunch break

14:20 - 15:40 Polydipsia I

Chair: Luis Gonzalo de la Casa, University of Sevilla

14:20 - 14:40 Motivational and motor characteristics of schedule-induced Polydipsia by an engagement bout model

Javier Íbias¹, Ricardo Pellón¹, Federico Sanabria²

¹ National Distance Education University, Spain; ² Arizona State University, USA

14:40 - 15:00 Tryptophan depletion diet exacerbates compulsive drinking in rats selected by schedule-induced Polydipsia

Ana Merchán, Silvia Navarro, Sergio García-Martin, Olga Vilches, Margarita Moreno, Pilar Flores

University of Almería, Spain

15:00 - 15:20 Molecular analysis of the behavioural differences on schedule-induced Polydipsia

Sergio García-Martin, Olga Vilches, Roberto Alvarez, Margarita Moreno, Pilar Flores

University of Almería, Spain

15:20 - 15:40 Taste aversion to food or water on schedule-induced drinking in rats

Stefana Bura, Jorge A. Ruiz, Pedro Vidal, Matías López, Ricardo Pellón

National Distance Education University, Spain

15:40 - 16:40 Evolution and optimization

Chair: Ricardo Pellón, National Distance Education University

15:40 - 16:00 Back to optimality: A formal framework to express the dynamics of learning optimal behavior

Eduardo Alonso, Michael Fairbank, Esther Mondragon

City University London, UK; Centre for Computational and Animal Learning Research, UK

16:00 - 16:20 Learning as an Evolutionary Force: A Simulation of Natural Selection on Effective Learning of Complex Behavior

Sonia Ragir¹, Michael Kress²

¹ Hunter College, City University of New York, USA; ² College of Staten Island, City University of New York, USA

16:20 - 16:40 When does learning matter: the relationship between evolution and reinforcement learning

Jan Teichmann, Mark Broom, Eduardo Alonso

City University London, UK

16:40 - 17:40 Poster session I

Symmetry in rats

Sarah Beurms, Jan De Houwer, Tom Beckers

KU Leuven, Belgium

Eye tracking in a virtual water maze task

E.S Redhead, C Allison

University of Southampton, UK

Effect of postnatal stimulation on resistance to extinction of an instrumental behavior in rats

Rafael Alonso-Bardón, Alfredo Espinet

University of Málaga, Spain

The role of relationship response-outcome-intake in imitative learning: two assessments

Cristiano Valerio Dos Santos¹, Martha E. López², Abel J. Zamora², Rosalva Cabrera²

¹University of Guadalajara, Mexico; ² National Autonomous University of Mexico, Mexico

Effects of exposure on the salience of distinctive stimulus features

Gumersinda Alonso, Gabriel Rodríguez, Naiara Arriola, M^a Carmen Sanjuán

University of the Basque Country, Spain

Preference of juvenile angelfish (*Pterophyllum scalare*) for different environments differing in colour

Luis M. Gómez Laplaza, Emilio Hijes

University of Oviedo, Spain

Increased levels of drinking in baseline conditions under different contexts did not predict a higher drinking on Schedule-induced Polydipsia

Olga Vilches, Ana Sánchez-Kuhn, Roberto Alvarez, Pilar Flores, Margarita Moreno

University of Almería, Spain

Effects of changes on the availability of food (intra-session and inter-session) in social foraging of pigeons

Martha E. López, Abel J. Zamora, Rosalva Cabrera

National Autonomous University of Mexico, Mexico

Testing different accounts of the ambiguous-cue problem

Marco Vasconcelos¹, Tiago Monteiro²

¹ University of Minho, Portugal; ² Champalimaud Neuroscience Programme

Tactile working memory in rats

Juan P. Vargas, Carla A. Carvalho, Paula Balea, Paola Revilla, Manuel Portavella

University of Sevilla, Spain

Temporal inactivation of the prelimbic cortex disrupts spatial memory retrieval in the morris water maze

Marta Méndez-Couz, Nérida M. Conejo, Héctor González-Pardo, Jorge L. Arias

University of Oviedo, Spain

Spontaneous follow of human hand points by puppies of different ages

Isabela Zaine¹, Camila Domeniconi¹, Clive Wynne²

¹ Federal University of São Carlos, Brazil; ² Arizona State University, USA

17:40 - 19:00 Taste conditioning

Chair: Carlos Pinto, University of Minho

17:40 - 18:00 Palatability of flavors after illness- or internal pain-based taste avoidance

Stefana Bura, Dominic M. Dwyer, Matías López

University of Oviedo, Spain; Cardiff University, UK

18:00 - 18:20 Dissociable effects of the renewal of conditioned taste aversion on consumption and licking microstructure

Dominic M. Dwyer, Matías López

Cardiff University, UK; University of Oviedo, Spain

18:20 - 18:40 Taste-taste transfer of training between Pavlovian and consummatory tasks

Amanda C. Glueck, Mauricio R. Papini

Texas Christian University, USA

18:40 - 19:00 Sodium detection thresholds in an aversion paradigm
Susana Carnero, Félix Acebes, Beatriz Álvarez, Ignacio Loy
University of Oviedo, Spain

21:00 **Opening cocktail at *Hotel Meliá***

Thursday, September 11

8:30 - 9:50 Learning and health

Chair: Victoria Chamizo, University of Barcelona

8:30 - 8:50 The lack of side-effects increases the belief in the effectiveness of a bogus treatment
Fernando Blanco, Itxaso Barberia, Helena Matute
University of Deusto, Spain

8:50 - 9:10 The role of instruction and conditioning in the development of placebo nausea: an experimental manipulation of nausea in healthy participants
Veronica Quinn, Ben Colagiuri
The University of Sydney, Australia

9:10 - 9:30 Partial reinforcement and anti-anxiety self-medication
Mauricio R. Papini, Lidia Manzo, José E. Callejas-Aguilera, Alberto Fernández-Teruel, Carmen Torres
Texas Christian University, USA; University of Jaen, Spain; Autonomous University of Barcelona, Spain

9:30 - 9:50 Early variability in body temperature as a vulnerability marker in rats exposed to semistarvation induced hyperactivity
Angela Fraga, Olaia Carrera, Marcos Carreira, Felipe Casanueva, Emilio Gutierrez
University of Santiago de Compostela, Spain; Molecular Endocrinology Laboratory, Health Research Institute of Santiago (IDIS), Spain; USC University Hospital Complex (CHUS), Spain

9:50 - 11:10 Discrimination learning

Chair: Juan M. Rosas, University of Jaén

9:50 - 10:10 Generalization along an attended and unattended dimension following category learning in humans

Jessica C. Lee, Evan. J. Livesey

The University of Sydney, Australia

10:10 - 10:30 Manipulating the instructions on perceptual learning with complex visual stimuli

Sergio A. Recio, Adela F. Iliescu, Simón P. Mingorance, Isabel de Brugada

University of Granada, Spain

10:30 - 10:50 What makes a landmark effective in juvenile rats?

V.D. Chamizo, C.A. Rodríguez, N.J. Mackintosh

University of Barcelona, Spain; University of Cambridge, UK

10:50 - 11:10 Natural order, psychophysics and abstract concepts

Sheila Chase

Hunter College of the City University of New York, USA

11:10 - 11:30 Coffee break

11:30 - 12:30 SEPEX Keynote Address

Chair: Armando Machado, University of Minho

Mirror neurons from associative learning

Professor Cecilia Heyes

University of Oxford, UK

12:30 - 14:20 Lunch break

14:20 - 15:40 Polydipsia II

Chair: Mauricio R. Papini, Texas Christian University

14:20 - 14:40 Choice as a function of the opportunity for schedule-induced drinking among concurrent-chains alternatives

Jorge A. Ruiz, Ricardo Pellón

National Distance Education University, Spain

14:40 - 15:00 Contextual control of schedule-induced polydipsia within an ABA renewal design in rats

José A. Aristizabal¹, José E. Callejas-Aguilera¹, Pedro M. Ogallar¹, Ricardo Pellón², Juan M. Rosas¹

¹University of Jaén, Spain; ²National Distance Education University, Spain

15:00 - 15:20 Resistance to change of schedule-induced polydipsia and Behavioral Momentum Theory

Pedro Vidal García, Ricardo Pellón Suárez de Puga

National Distance Education University, Spain

15:20 - 15:40 Schedule-induced polydipsia in sign- versus goal-tracker rats is not related to impulsivity as measured by delay discounting

Valeria Edith Gutiérrez Ferre¹, Almudena Serrano², Juan Carlos López², Ricardo Pellón¹

¹ National Distance Education University, Spain; ² University of Sevilla, Spain

15:40 - 16:20 Models of learning

Chair: Marilia Carvalho, University of Minho

15:40 - 16:00 A double error correction model of classical conditioning

Niklas Kokkola, Esther Mondragón, Eduardo Alonso

City University London, UK; Centre for Computational and Animal Learning Research, UK

16:00 - 16:20 The SSCC TD model: a representational framework for temporal difference learning

Esther Mondragón, Jonathan Gray, Eduardo Alonso, Charlotte Bonardi, Dómhnaill J. Jennings

Centre for Computational and Animal Learning Research, UK; University of Southampton, UK; City University London, UK; University of Nottingham, UK; Newcastle University, UK

16:20 - 17:20 Poster session II

Revisiting the learning curve (once again)

Steven Glautier

Southampton University, UK

Environmental-induced deficit of memory in female gerbils

Katarzyna Zieba, Hans Wlazolek

University of Warsaw, Poland

The effect of a simultaneous manipulation of expectations and incentives on decision criterion in human responses to basic flavors

Teresa L. Martín-Guerrero, Concepción Paredes-Olay, Juan M. Rosas, Manuel M. Ramos-Álvarez

University of Jaén, Spain

Differences in early visual processing event-related potentials between predictive and non-predictive discriminative stimuli

David Luque, Joaquín Morís, Amanda Flores

University of Malaga, Spain; Institute for Biomedical Research of Málaga (IBIMA), Spain

Sumación de la entrada condicionada en el comedero pero no de la presión de palanca automoldeada en ratas

Luis E. Gómez-Sancho, María F. Arias Holgado, Francisco Fernández-Serra

University of Sevilla, Spain

Payoff-induced bias in temporal discrimination

Catarina Vila Pouca, Armando Machado, Marco Vasconcelos

University of Minho, Portugal

An instance of the labelling effect in the perception of chocolate

Gabriel Rodríguez, Naiara Arriola, María del Carmen Sanjuán, Gumersinda Alonso

University of the Basque Country, Spain

Novel procedure to increase the incentive salience of CS in latent inhibition

Marquez, I., Vargas, JP., López, JC., Esber, G., Diaz, E.

University of Sevilla, Spain

Spontaneous lateralization of mice in choosing arm of the T-shaped maze

Katarzyna Zieba, Maria Maciejewska

University of Warsaw, Poland

Base rate-induced bias in temporal discrimination

Catarina Vila Pouca, Marco Vasconcelos, Armando Machado

University of Minho, Portugal

17:20 - 19:00 Pavlovian conditioning

Chair: Geoffrey Hall, University of York, University of Plymouth, University of New South Wales

17:20 - 17:40 Evidence of facilitation and inhibition in human Pavlovian-to-instrumental transfer

Ben Colagiuri, Peter Lovibond

The University of Sydney, Australia; University of New South Wales, Australia

17:40 - 18:00 Contextual control of extinction but not excitation in a suppression task

James Byron Nelson, Jeffrey Lamoureux

University of the Basque Country, Spain; Boston College, USA

18:00 - 18:20 Simultaneous magazine training produces second order conditioning and inhibitory conditioning in rats

Ignacio Loy, Susana Carnero, Félix Acebes, Beatriz Álvarez, Joaquín Morís

University of Oviedo, Spain; University of Málaga, Spain

18:20 - 18:40 People's learning about stimulus co-occurrence is superior with simultaneous voice-picture presentations: Further support for contiguity models of associative learning

Jasper Robinson, Lam Chung Sze

The University of Nottingham, UK

18:40 - 19:00 Temporal discrimination in autoshaping: acquisition and extinction

María F. Arias, Francisco Fernández-Serra, Luis E. Gómez-Sancho, Manuel Mateos, Carmen Ortiz, José M. Sánchez-Marqueses

University of Sevilla, Spain

19:20 - 00:00 Visit to Guimarães

19:20 Meeting point at the School of Psychology and departure to Guimarães by bus

20:15 - 21:15 Guided walking tour of the historical center of Guimarães

21:30 - 23:45 Dinner at *Restaurante Histórico*

00:00 Departure to the School of Psychology (Braga) by bus

8:30 - 9:30 Predictive learning

Chair: Gumersinda Alonso, University of the Basque Country

8:30 - 8:50 Resistance to instructed reversal of the learned predictiveness effect

Hilary Don, Evan Livesey

The University of Sydney, Australia

8:50 - 9:10 Relative prediction error and protection from attentional blink in human associative learning

Steven Glautier, Shui-I Shih

Southampton University, UK

9:10 - 9:30 The effect of verbal instructions in contingency learning depends on the time available to process the cue: evidence in favor of associative models

Rafael Alonso-Bardón, David Luque, Francisco J. López

University of Málaga, Spain; Institute for Biomedical Research of Málaga (IBIMA), Spain

9:30 - 11:10 Timing

Chair: Esther Mondragon, Centre for Computational and Animal Learning Research

9:30 - 9:50 Application of Timing Drift-Diffusion Model to individual trials in the peak procedure

André Luzardo, François Rivest, Eduardo Alonso, Elliot Ludvig

City University London, UK

9:50 - 10:10 Shared stimulus control on a temporal discrimination task

Carlos Pinto, Inês Fortes, Armando Machado

University of Minho, Portugal

10:10 - 10:30 Different interdimensional discrimination tests on temporal generalization gradients: the effect of the temporal generalization test on the interdimensional temporal generalization gradient

Ana Catarina Vieira de Castro¹, Javier Íbias², Ricardo Pellón², Armando Machado³

¹Institute for Molecular and Cell Biology, Portugal; ²National Distance Education University, Spain; ³University of Minho, Portugal

10:30 - 10:50 Effects of dorsal hippocampal damage on timing: a pooled analysis

Shu K.E.Tam, Dómnall Jennings, Charlotte Bonardi

University of Nottingham, UK

10:50 - 11:10 Searching for relational responding in a temporal bisection task
Marilia Pinheiro de Carvalho, Armando Machado, François Tonneau
University of Minho, Portugal

11:10 - 11:30 Coffee break

11:30 - 12:30 Keynote Address

Chair: Marco Vasconcelos, University of Minho

Emergent relations and stimulus class formation

Professor Peter Urcuioli

Purdue University, USA

12:30 - 14:20 Lunch break

14:20 - 16:00 Cue competition

Chair: Ben Colagiuri, The University of Sydney

14:20 - 14:40 The elusive nature of the blocking effects: 17 failures to replicate
E. Maes, Y. Boddez, J. De Houwer, R. D'Hooge, T. Beckers
KU Leuven, Belgium

14:40 - 15:00 Perceptual learning transfer in an appetitive Pavlovian procedure
Antonio Alvarez Artigas¹, José Prados Guzmán²
¹University of Barcelona, Spain; ²University of Leicester, UK

15:00 - 15:20 Overshadowing and relative stimulus validity associability in a spatial search task
Javier Vila, Alberto Monrroy, Rodolfo Bernal
National Autonomous University of Mexico, Mexico

15:20 - 15:40 Stimulus processing and blocking in human learning
Evan Livesey, Marius Mather, Justin Harris
The University of Sydney, Australia

15:40 - 16:00 Pre-exposure reduces serial overshadowing in CTA
Dorothy W.S. Kwok, Robert A. Boakes
The University of Sydney, Australia

16:00 - 16:40 Comparative cognition

Chair: Javier Vila, National Autonomous University of Mexico

16:00 - 16:20 Perirhinal cortex involvement in taste and object recognition memory

Enrique Morillas, Beatriz Gómez-Chacón, Fernando Gámiz, Milagros Gallo

University of Granada, Spain

16:20 - 16:40 Temporal distance in temporal weighting rule with humans beings

Angélica Alvarado, Karina Segura, Zulema Cruz, Daniele Garcia, Lesly Hernández, Javier Vila

National Autonomous University of Mexico, Mexico

16:40 - 17:40 Poster session III

Palatability shifts in flavor preference learning as assessed by taste reactivity

Alberto Soto, Patricia Gasalla, Dominic M. Dwyer, Matías López

University of Oviedo, Spain; Cardiff University, UK

Noncontingency training nor extinction prevents the recovery of operant responses

Rodolfo Bernal-Gamboa, Alexis Martínez-Ramírez, Javier Nieto

National Autonomous University of Mexico, Mexico

Forward blocking can be detected using a lexical decision priming test in human contingency learning

Patricia Romero, Joaquín Morís

University of Málaga, Spain

Renewal of operant response is reduced by presenting an extinction cue

Jimena Hernández, Tere A. Mason, Rodolfo Bernal-Gamboa, Javier Nieto

National Autonomous University of Mexico, Mexico

Exploring the discounting function with pigeons: the effect of food amount

Inês Fortes, Marco Vasconcelos, Armando Machado

University of Minho, Portugal

Eye fixations to contexts decrease as training increases in a human predictive learning task

José A. Aristizabal, Juan M. Rosas, José E. Callejas-Aguilera, Pedro M. Ogallar, Manuel M. Ramos-Álvarez

University of Jaén, Spain

Effects of Schedule-Induced Polydipsia acquisition on emotional tests

Ana Sanchez-Kuhn, Ana Merchan, Sonia Montaña, Pilar Flores, Margarita Moreno

University of Almería, Spain

Filler associations on the expression of interfered information: associations retrieval or phase integration?

Javier Vila, Alberto Monrroy, Eneida Strempler

National Autonomous University of Mexico, Mexico

The effects of different types of pre-training on preschoolers' performance in number-to-position tasks

Eugénia Fernandes, Armando Machado, François Tonneau

University of Minho, Portugal

Updating information in the Episodic-Like Memory in preschoolers: time and outcome magnitude

Eneida Strempler, Angélica Alvarado, Javier Vila

National Autonomous University of Mexico, Mexico

17:40 - 18:40 Business Meeting of the SEPC

20:45 Closing dinner at *Mercado das Tapas*

20:45 Meeting point at the School of Psychology and departure to *Mercado das Tapas* by bus

9:30 - 11:10 Latent inhibition

Chair: Armando Machado, University of Minho

9:30 - 9:50 Latent inhibition of flavor-taste learning: Motivational state and nature of the reinforcer

Felisa González¹, David Garcia-Burgos², Geoffrey Hall³

¹ University of Granada, Spain; ² University of Fribourg, Switzerland; ³ University of York & University of Plymouth, UK; University of New South Wales, Australia

Previous work (Garcia-Burgos, González, & Hall, 2013) has established that motivational state at the time of testing is a critical factor in the expression of latent inhibition of flavor preference conditioning. Rats tested hungry and thirsty showed a lesser preference for a flavor paired with sucrose after flavor pre-exposure, while rats tested just thirsty showed no effect of previous pre-exposure on subsequent conditioning. In that study, rats were subjected to changes in motivational state between training and testing. In the present study we kept constant the motivational state of each group across experimental phases. In Experiment 1 rats were either thirsty and hungry (group Hunger) or just thirsty (No Hunger) throughout the experiment. Latent inhibition was evident in the former group but not in the latter. In Experiment 2 all animals were kept hungry and thirsty, but half of them were conditioned with sucrose, able to produce both flavor-taste and flavor-nutrient conditioning, and the rest with fructose as the reinforcer, thought to produce only flavor-taste conditioning. Results are discussed in terms of the distinction between flavor-nutrient and flavor-taste mechanisms in flavor preference learning. Research funding by project PSI2012-33552 (MINECO, Spain).

9:50 - 10:10 Effect of Deprivation Level on Latent Inhibition with Appetitive Conditioning Procedures
Luis E. Gómez-Sancho, Luis Gonzalo de la Casa
University of Sevilla, Spain

This work describes the results of two experiments with rats that employed different appetitive conditioning procedures that were intended to analyze the effect of food deprivation on preexposure and subsequent conditioning of a stimulus. In Experiment 1 the CS was the lever insertion and the CR were lever presses (sign tracking). In Experiment 2, maintaining the same experimental parameters used in Experiment 1, the CS was an auditory tone and the CR were magazine-entries (goal tracking). The Latent Inhibition (LI) effect was evident in both experiments, irrespective of the food deprivation level. The results reveal that it is possible to induce a LI effect using food as reinforcer, even in non-deprived animals. Finally, the results are discussed attending to a hypothesis that considers that motivational states can affect to the attention directed to the stimulus during preexposure, and, therefore, they can modulate the LI effect.

10:10 - 10:30 Effects of Positive and Negative Induced-Affect on Latent Inhibition with Humans

Luis Gonzalo De la Casa, Auxiliadora Mena, Andrea Puentes, Robert E. Lubow

University of Sevilla, Spain

Repeated presentations of an irrelevant stimulus produce, among other things, a reduction of a discriminative response when the same stimulus is subsequently associated with a relevant consequence. This phenomenon, commonly known as Latent Inhibition (LI), has focused the attention of many researchers that have considered LI as a key phenomenon to check the validity of associative learning theories, and have conducted extensive research on the role played by attentional, motivational, memory or psychobiological processes on such phenomenon. The present work is intended to evaluate the effect of emotional factors on LI with human participants, a process that has traditionally been ignored in the analysis of LI. For this purpose, we conducted two experiments to analyze the effects of the induction of positive or negative emotional states on LI intensity. Attending to previous results in the literature, we anticipate that the induction of a positive emotional state in the experimental subjects will result in the broadening of the attentional field that will favor the development of LI, while the induction of a negative affective state will have the opposite effect. The experimental results were in line with our hypotheses, but revealed a complex pattern of interaction between the induced-affect and preexposure duration.

10:30 - 10:50 Effects of Food or Water Deprivation on Flavor Preexposure and Conditioning

Auxiliadora Mena, Paola Revilla, Luis Gonzalo de la Casa

University of Sevilla, Spain

Latent Inhibition (LI), the reduced conditioned response observed after repeated exposures to the to-be-conditioned stimulus without consequences, has been traditionally considered as the result of attentional or associative processes. However, there are other aspects that modulate the intensity of the effect that have received less attention in literature, as some motivational factors derived from deprivation schedules that are common in LI experiments with animals. In this work we analyzed LI intensity with a new conditioned taste aversion procedure in water-deprived, food-deprived, or non-deprived rats by using as conditioned stimulus a saccharin (Experiment 1), or a sucrose solution (Experiment 2). The results indicated that LI was significantly reduced when the preexposed stimulus was related to the motivational state of the animals. The results are discussed considering that flavor exposure generates a safe taste memory trace that immunizes the flavor against the association with aversive consequences, and whose intensity depends, among other factors, of the motivational state of the organism.

10:50 - 11:10 Dorsal lateral striatum involvement in processing of future CS in latent inhibition

F.J. Pérez, E. Quintero, A. Serrano, E. Díaz, J.C. López

University of Sevilla, Spain

Two different behavioral models have been related to the lateral and medial aspects of the dorsal striatum (dls and dms, respectively). While the lateral area (dls) is implicated in habitual actions, its medial part (dms) is linked to goal expectancy. Dls function has been typically analyzed with regard to the motor component of a specific task and there is no data indicating whether this region could be involved in encoding stimuli presented or stimulus- outcome associations. In previous experiments we report evidence in favor of the dls involvement in cognitive processes of learning and retrieval. In this experiment we analyze the role of the dorsolateral striatum in the processing of the pre-exposure learning. We analyzed the effects of dls lesion before the pre-exposure phase of a latent inhibition procedure using two conditions, long and short presentations of the future conditioned stimulus. Data showed a decreased LI in animals with dls lesion only when long exposure was used. In contrast, no different was found when a short presentation of future CS between sham and lesions animals. These results indicate that dls acquires the control of the learning pre-exposure only in advanced stages of processing, but not when the future CS has been exposed for short time. This research was supported by PSI2012-32445 grants.

14:20 - 15:40 Polydipsia I

Chair: Luis Gonzalo de la Casa, University of Sevilla

14:20 - 14:40 Motivational and motor characteristics of schedule-induced Polydipsia by an engagement bout model

Javier Íbias¹, Ricardo Pellón¹, Federico Sanabria²

¹ National Distance Education University, Spain; ² Arizona State University, USA

We used 8 Spontaneously Hypertensive rats (SHR), 8 Wistar Kyoto rats (WKY) and 8 Wistar rats, all males. They were exposed to 40 sessions of acquisition of schedule-induced polydipsia (SIP) using a multiple Fixed Time (FT) food schedule with components of 30 and 90 seconds. The last eight experimental sessions were analysed in order to investigate to what extent SIP could be described as a bout-based behaviour. The Bi-Exponential Refractory Model (BERM) was used to estimate the parameters. BERM estimations described SIP episodes better than single exponential models. Licks were not produced at a constant rate but organized into bouts through drinking episodes. FT 30 s produced similar results in all animals both in the rates of licks and in latency or duration of drinking episodes. SHRs made more and shorter bouts when compared to the other rat strains. In FT 90 s, SIP barely developed and was hardly maintained in Wistar and WKY rats compared to the FT 30 s schedule, whereas SIP was successfully maintained in SHRs despite a reduction.

14:40 - 15:00 Tryptophan depletion diet exacerbates compulsive drinking in rats selected by schedule-induced Polydipsia

Ana Merchán, Silvia Navarro, Sergio García-Martin, Olga Vilches, Margarita Moreno, Pilar Flores
University of Almería, Spain

Compulsive behaviour, present in different psychiatric disorders such as OCD, schizophrenia and drug abuse, is associated with altered levels of monoamines particularly serotonin (5-hydroxytryptamine) and its receptor system. The present study investigated whether 5-HT manipulation, through tryptophan depletion diet in Wistar and Lister Hooded rats, modulates compulsive behaviour assessed by Schedule-induced Polydipsia (SIP), food and water extinction tests on SIP, and by stereotyped behaviour. Wistar rats were selected as high (HD) or low (LD) drinkers according to their SIP behaviour, but Lister hooded rats did not show SIP acquisition. Both strains were fed for 14 days with either TRP-free diet (T-) or TRP-supplemented diet (T+). Depleted Wistar HD rats were more sensitive to 5-HT manipulation showing higher levels of licks on SIP and on water extinction test in comparison to non-depleted Wistar HD rats. TRP depletion diet increased stereotyped behaviour and horizontal activity in both rat strains, but no differences between HD and LD were found. These results suggest that alterations of the serotonin system may be a factor for increasing compulsive behaviour in vulnerable populations. This study was funded by a grant from the Ministerio Economía y Competitividad, Spanish Government (PSI2012-31660).

15:00 - 15:20 Molecular analysis of the behavioural differences on schedule-induced Polydipsia
Sergio García-Martin, Olga Vilches, Roberto Alvarez, Margarita Moreno, Pilar Flores
University of Almería, Spain

Schedule-induced polydipsia (SIP) can then be defined as the excessive drinking by food-deprived animals exposed to intermittent food-reinforcement schedules. Several experiments have shown individual differences on SIP. The aim of this study was to assess the possible multiple variables involved in individual differences on SIP. Roman High Avoidance (RHA) rats have shown an increased acquisition of SIP in comparison to Roman Low Avoidance (RLA). 21 RHA and 21 RLA were exposed to FT60 and FT 30 schedules. We developed a new recording program to analyze the precise moment of each lick on SIP, assessing the following variables: speed, latency, frequency and intensity of licks. Data analysis showed that there are two mutually independent variables lick intensity and frequency, which almost completely explains drinking on SIP. Furthermore, drinking differences on SIP between RHA and RLA rats were due to lick frequency, but not to lick intensity. The present results provide new insights into the nature of individual differences in SIP. This study was funded by a grant from the Ministerio de Economía y Competitividad, Spanish Government (PSI2012-31660).

15:20 - 15:40 Taste aversion to food or water on schedule-induced drinking in rats

Stefana Bura, Jorge A. Ruiz, Pedro Vidal, Matías López, Ricardo Pellón

National Distance Education University, Spain

It was studied the effect of conditioned taste aversion to water and to food on the resistance to change of schedule-induced drinking (SID). Twenty-four food-deprived rats were exposed to a multiple schedule of food delivery with two 20-min components (Fixed Time 30-s, Fixed Time 60-s) separated by a 5-min blackout. After 30 sessions of acquisition of drinking behavior the rats were randomly assigned into one of four groups, and in a context different from home-cage and experimental chamber received an intraperitoneal injection of either lithium chloride or sodium chloride after consumption of either food or water. Following a recovery day all rats were re-exposed to the SID procedure to test the effect of conditioned aversion. A second trial of conditioning, recovery day, and SID session was then repeated. Licking rates decreased in all rats after the first conditioning trial, especially in the FT 30-s component for rats that received lithium chloride injection paired with consumption of food. These results are discussed in the context of the debate about the relevance of water versus food as reinforcers in the schedule-induced drinking procedure.

15:40 - 16:40 Evolution and optimization

Chair: Ricardo Pellón, National Distance Education University

15:40 - 16:00 Back to optimality: A formal framework to express the dynamics of learning optimal behavior

Eduardo Alonso, Michael Fairbank, Esther Mondragon

City University London, UK; Centre for Computational and Animal Learning Research, UK

Consider the curves depicting the cumulative number of responses under different reinforcement schedules. They show a correlation between the rate of responding and the rate (and magnitude) of the reinforcement. Of all the possible curves, why do animals follow them? A mathematical meta-model of operant behavior inspired in adaptive optimal control theory is presented. Unlike standard reinforcement learning techniques, the accompanying algorithm, Value-Gradient Learning, minimizes a cost-to-go function using value gradients rather than mere values. The main insight is that if animals make progress in learning the value gradient all along a sequence of actions, while following a greedy policy, then, under certain conditions, the trajectory they follow is locally optimal. Our analysis is based on control and feedback principles and allows us to re-interpret bliss point theories as the optimal distribution of behaviours along a given gradient.

16:00 - 16:20 Learning as an Evolutionary Force: A Simulation of Natural Selection on Effective Learning of Complex Behavior

Sonia Ragir¹, Michael Kress²

¹ Hunter College, City University of New York, USA; ² College of Staten Island, City University of New York, USA

Theoretical models and simulations have linked learned adaptive performance to genetic predispositions on an evolutionary time scale. The concept of adaptive performance involves environmental and learning constraints on reproductive fitness and genetic variation. We modeled the selection on asocial learning in terms of its effect on innate and learned fitness as a function of learning complexity (number of interdependent learning tasks) and the cost of learning. Complex learning permitted the proliferation of possible solutions to an adaptive problem resulting in genotypes capable of effective learning—that is, large gains in learned fitness with low accumulations of learning costs. The simulations suggest that learned fitness for complex tasks became largely independent of innate fitness; complex learning promoted large fitness gains while maintaining levels of innate fitness and genetic diversity similar to that in unselected populations.

16:20 - 16:40 When does learning matter: the relationship between evolution and reinforcement learning
Jan Teichmann, Mark Broom, Eduardo Alonso
City University London, UK

Learning is assumed to be the adaptation to environmental change but the relationship between environmental factors, learning, and evolution is complex and not fully understood. We present a computational model, which analyses and compares fitness distributions of individuals in a changing environment, which either use a learning strategy or a mutation strategy. We gain general insights into the effects of the cost of learning and the role of environmental factors in the relationship between evolution and learning. We show that reinforcement learning offers a starting point for the initial evolution of learning irrespective of technical parameters. In particular, our simulations show that the only environmental factor which impacts the general success of learning is regularity. If selection cannot discard the uncertain option from the action space of the mutation strategy, learning is always beneficial as it has lower fitness variability even in extremely irregular environments when compared to the mutation strategy. In other words, our model predicts that once an environment has stabilized species develop learning strategies that, to some extent, preclude evolution.

Symmetry in rats

Sarah Beurms, Jan De Houwer, Tom Beckers

KU Leuven, Belgium

Stimulus equivalence is the ability to form classes of stimuli that are functionally interchangeable on the basis of earlier experiences. The crucial characteristic of stimulus equivalence is that individuals not only learn about specific relationships, but also generalize these learned relations to other, so called, derived relations. One aspect of stimulus equivalence is symmetry, which is the capacity to form bi-directional associations. Because of several failures to observe symmetry in nonhuman animals, some authors argued that formal language is necessary to acquire stimulus equivalence. An alternative, however, is that confounding factors, such as the encoding of stimulus-specific associations, might have prevented the acquisition of symmetry. Based on the Pavlovian-to-Instrumental procedure, we used a new approach to tackle this question. In our experiment, we trained rats on the unidirectional association between two responses and two auditory stimuli. Subsequently, we tested whether they could generalize this trained (R-S) association to the symmetrical (S-R) association. Because we hypothesized that symmetry is a capacity that needs to be trained, we used multiple exemplars. The results of our study will shed light on the relation between human language and stimulus equivalence.

Eye tracking in a virtual water maze task

E.S Redhead, C Allison

University of Southampton, UK

Two experiments using human participants completing a virtual watermaze task analysed the time spent looking at distal cues in blocking and overshadowing designs. Participants were required to approach a visible platform in a circular pool in the presence of distal cues. During a probe trial where the platform was removed, the overshadow group were found to spend less time in the correct quadrant and less time viewing the distal cues compared to a control group where the position of the platform had not been marked during training. This was not true for the blocking group. Eyetracking suggested the insertion of the distal cues midway through blocking training lead the participants to view the distal cues. In Experiment 2 two blocking groups were run, group 1 received the same training as experiment 1 group 2 received the distal cues throughout training but during the first 8 trials the position of the distal cues were changed on each trial. On the probe trial Group 2 spent less time in the correct quadrant and less time viewing the distal cues than a control group. The results suggest the overshadowing and blocking can be explained by a reduction in attention to the distal cues.

Effect of postnatal stimulation on resistance to extinction of an instrumental behavior in rats

Rafael Alonso-Bardón, Alfredo Espinet

University of Málaga, Spain

The speed of extinction of lever pressing was compared between two groups of rats one of which had received postnatal stimulation (handling). Extinction was conducted in two phases during which the animals were fed ad libitum. The first phase was conducted in two extinction sessions in which lever pressing responses were not reinforced. The results showed greater resistance to extinction in handled rats than in control rats. In the second phase, no food was delivered but the noise produced by the food dispenser ("click") was presented automatically every 30 seconds, or whenever an animal pressed the lever. This treatment resulted in a recovery of the lever pressing response in handled rats but not in the control rats.

The role of relationship response-outcome-intake in imitative learning: two assessments

Cristiano Valerio Dos Santos¹, Martha E. López², Abel J. Zamora², Rosalva Cabrera²

¹University of Guadalajara, Mexico; ² National Autonomous University of Mexico, Mexico

Experiment 1 was designed to evaluate, in observers exposed collectively to trained demonstrator, the effect of different Response-Outcome-Intake relationships on acquisition of novel response (piercing seal of food containers). In Modelling, Group 1 was exposed to Response-Reinforcer-Intake via demonstrator; Group 2 was exposed only to the apparatus with sealed containers; Group 3 was exposed to the apparatus with broken seals and food, which could be intake; Group 4 was exposed to the apparatus in which a mechanism broke the seals of food containers and the food was available. In Testing, the observers were exposed collectively to the apparatus in absence of demonstrator. Only observers of Group 1 acquired the novel response. Experiment 2 was designed to evaluate, in observers exposed individually to trained demonstrator, the effect of different Response-Outcome-Intake relationships on acquisition of novel response (opening test tube). In Modelling, in Group 1 observers watched Response-Reinforcer-Intake via demonstrator; in Group 2 observers watched Response-Reinforcer-Non Intake via demonstrator; in Group 3 observers watched Response, but only listened to demonstrator's intake the food. In Testing, the observers were exposed to test tube in absence of demonstrator. Observers exposed to complete relationship Response-Outcome-Intake acquired the novel response to higher level that another groups.

Effects of exposure on the salience of distinctive stimulus features

Gumersinda Alonso, Gabriel Rodríguez, Naiara Arriola, M^a Carmen Sanjuán

University of the Basque Country, Spain

We will present an experimental series in which changes in the salience of exposed stimuli were measured through a subsequent conditioned taste aversion. Conditioning of the compound AB was assessed after intermixed or blocked preexposures to the compounds AX and BX, or after either long or short preexposure to the AB compound. The results will be discussed in terms of changes in the salience of the distinctive features as a function of the preexposure schedule and length.

Preference of juvenile angelfish (*Pterophyllum scalare*) for different environments differing in colour

Luis M. Gómez Laplaza, Emilio Hijes

University of Oviedo, Spain

Fish are becoming one of the most useful vertebrate models for behavioural and biomedical investigation, including studies in learning, perception and higher-order processes. However, knowledge about many aspects of their behavior is still limited. We are trying to develop novel colour-based learning and memory paradigms for this species, and we need to establish a natural preference and/or aversion, or any pre-existing biases towards specific colours. The aim of this study was to determine the preference of angelfish (*Pterophyllum scalare*) for different colour environments. A two-chamber aquarium was used for the preference tests, and the time spent in each coloured chamber was considered as an index of preference. Two parallel, transparent partitions delimited a 10-cm central passage area (start compartment) between the two compartments. Each partition contained three 'windows' through which the fish had access to both compartments. Adopting this procedure we made the task more difficult for the fish as compared with our previous approach, when no partitions were used. Results show a strong preference towards blue colour relative to all other colours (red, green and black). Nevertheless, blue-green discrimination was more difficult than the other colour contrasts, whereas a tendency towards red colour aversion was also found. These results should have implications for future colour-based learning and memory assays in angelfish, as well as for their application to fish welfare.

Increased levels of drinking in baseline conditions under different contexts did not predict a higher drinking on Schedule-induced Polydipsia

Olga Vilches, Ana Sánchez-Kuhn, Roberto Alvarez, Pilar Flores, Margarita Moreno

University of Almería, Spain

Schedule-induced Polydipsia (SIP) has been suggested as a model of compulsive behavior. Previous studies have shown individual differences on SIP, inbred Roman high avoidance female rats (RHA) has shown compulsive drinking compared to low-avoidance (RLA) rats. We evaluated water intake in different baseline conditions and water intake, licks and nose-pokes responses at different schedules of food pellet presentation fixed-time 60s (FT60) and fixed-time 30s (FT30) during 60-min sessions on SIP. In baseline conditions, RLA rats exhibited an increased water intake in the home-cages. Furthermore, this effect was exacerbated in baseline conditions in the Skinner boxes context. However on SIP, RHA rats augmented licks but no water intake in FT60, but significant differences in licks and water intake were revealed under the FT30 condition. Then, the main conclusion of the present study is that increased levels of drinking in baseline conditions under different contexts did not predict a higher drinking behaviour on FT schedules. This study was funded by a grant from the Ministerio de Economía y Competitividad, Spanish Government (PSI2012-31660).

Effects of changes on the availability of food (intra-session and inter-session) in social foraging of pigeons

Martha E. López, Abel J. Zamora, Rosalva Cabrera

National Autonomous University of Mexico, Mexico

In natural situations, when the subjects search, choice and intake food (foraging), they are frequently deal with limited resources, which can be depleted; in following foraging encounters, the resources can be available in new sites. The purpose of this experiment was to evaluate the distribution of encounters with useful food sources in pigeons exposed to social foraging situation in which useful food sources were varying through of trials into session; besides, the position of useful food sources were varying through five experimental sessions. Two groups of pigeons (n=5) were exposed to wooden table with 12 containers each sealed with opaque paper, which only 4 hold food. Experimental session was configured by three trials in which the subjects could piercing the seals, finding the food and eating it. The distribution of useful containers was varied through sessions. In the Near Group, the useful containers were spatially contiguous. In the Away Group, the useful containers were getting away. The data shows that as trials as were passaging subjects were improving their finding of useful containers; this improvement also was observed with the passage of sessions. These data allow us to suggest that learning process is present in social foraging. Key words: pigeons, social foraging, spatial, trials, sessions

Testing different accounts of the ambiguous-cue problem

Marco Vasconcelos¹, Tiago Monteiro²

¹ University of Minho, Portugal; ² Champalimaud Neuroscience Programme

The ambiguous-cue problem is deceptively simple. It involves two concurrently trained simultaneous discriminations (known as PA and NA trials), but only three stimuli. Stimulus A is common to both discriminations, but serves as non-reinforced stimulus (S-) on PA trials and as reinforced stimulus (S+) on NA trials. Typically, animals' accuracy is lower on PA trials—the ambiguous-cue effect. We conducted two experiments with European starlings (*Sturnus vulgaris*) using Uruioli and Michalek's [2007, *Psychon B Rev* 14, 658-662] experimental manipulations as a springboard to test the predictions of two of the most important theoretical accounts of the effect: the interfering cue hypothesis and value transfer theory. Both experiments included two groups of birds, one trained with a regular ambiguous-cue problem (Group Continuous) and another trained with partial reinforcement on PA trials (Group PA-Partial). The experiments differed only in the number of sessions (18 vs. 36) and daily trials (360 vs. 60). As previously observed, we found faster acquisition on NA trials than on PA trials in both experiments, but by the end of training PA performance was surprisingly high, such that no ambiguous-cue effect was present in Group Continuous of either experiment. The effect was still present in both PA-Partial groups, but to a smaller degree than expected. These findings are inconsistent with the literature, in particular with the results of Uruioli and Michalek with pigeons, and question the aforementioned theoretical accounts as complete explanations of the ambiguous-cue effect. In our view, to achieve such high levels of accuracy on PA trials, starlings must have attended to configural (i.e., contextual) cues, thus differentiating stimulus A when presented on PA trials from stimulus A when presented on NA trials. A post hoc simulation of a reinforcement-based configural model supported our assertion.

Tactile working memory in rats

Juan P. Vargas, Carla A. Carvalho, Paula Balea, Paola Revilla, Manuel Portavella
University of Sevilla, Spain

Rats have texture discrimination capacities rivaling those of humans. Primates can store textures parameters in working memory for subsequent manipulation, but until now, there has been no demonstration of this capacity in rodents. Here we report tactile working memory in rats. Rats were trained to navigate in a three-arm maze using tactile cues to locate a food reward. Using a given arm as a starting point the rat used its whiskers to contact a texture (sample). At the entrance of the two other arms there are different textures, one of them is the same as the sample and indicated the availability of the reward at the end of this arm. Results show that rats can store texture information for subsequent comparison with another texture. In humans and other primates, working memory has been associated with a network of prefrontal and parietal cortical regions. In rodents the analogous networks have yet to be systematically explored and the design of the apparatus used in the present experiment allows the use of a neuronal recording system. This research was supported by PSI2012-32445 grants.

Temporal inactivation of the prelimbic cortex disrupts spatial memory retrieval in the morris water maze

Marta Méndez-Couz, Nélica M. Conejo, Héctor González-Pardo, Jorge L. Arias

University of Oviedo, Spain

The prefrontal cortex has been repeatedly associated with reference spatial memory acquisition and retrieval. Specifically, the hippocampal-prefrontal cortex circuit has been reported to be activated throughout the spatial memory process, thereby highlighting the contribution of the prefrontal cortex during the final stage of the memory acquisition process. However, the specific role of the prelimbic cortex during the memory retrieval stage has not been addressed. Therefore, the aim of our study was to determine the contribution of the prelimbic region of the prefrontal cortex to the retrieval of a previously acquired hidden platform task in the Morris Water Maze. For this purpose, male Wistar rats underwent temporal bilateral inactivation of the prelimbic cortex using the GABA-A agonist muscimol infused before the retrieval test. A saline-infused group was used as a control group. Results showed that both groups of animals successfully learned the task, but when the experimental group was under the muscimol effect, the retrieval task was significantly impaired. Our findings show that the prelimbic cortex is required for spatial memory retrieval. This work was supported by grant PSI2010-19348 (Spanish MICINN) and the Regional Government fund PCTI, Spain (PCTI; BP11066).

Spontaneous follow of human hand points by puppies of different ages

Isabela Zaine¹, Camila Domeniconi¹, Clive Wynne²

¹ Federal University of São Carlos, Brazil; ² Arizona State University, USA

The present study investigated the performance of 40 shelter puppies of two age groups (2 to 3 and 5 to 6 months-old) in spontaneously following hand points of different difficulty levels: dynamic proximal points (easy), momentary proximal points (intermediate) and momentary distal points (difficult). Subjects' performance significantly differed across point types despite age (Friedman test, $p < .001$), being their performance more accurate in the easiest cues (Wilcoxon tests, $p < 0.001$). Both groups were successful in following the easy ($p < 0.001$) and intermediate hand-points ($p < 0.043$), but not the difficult ones ($p < .160$). There was no age difference in following the easy point (Mann-Whitney tests, $p < .983$), but the younger group surprisingly outperformed the older pups in following the intermediate ($p < .054$) and difficult cues ($p < .03$). An analysis of subjects' files showed that the number of puppies of the younger group that had been previously owned or lived in temporary foster families was significantly higher when compared to the older group (Fischer's test, $p < .0001$). The results suggest that age itself was not a good predictor of subjects' performance of following social cues, being ontogenetic learning more accountable to this difference in performance.

17:40 - 19:00 Taste conditioning

Chair: Carlos Pinto, University of Minho

17:40 - 18:00 Palatability of flavors after illness- or internal pain-based taste avoidance

Stefana Bura, Dominic M. Dwyer, Matías López

University of Oviedo, Spain; Cardiff University, UK

These experiments examined taste reactivity behaviors in rats after conditioning of a saccharin solution with either lithium (LiCl) or sodium chloride (NaCl). Experiment 1 compared the efficacy of two different doses (1.5 or 3.0 mEq/kg) of LiCl and NaCl, administered in the form of an isotonic solution (10 ml/kg of 0.15 M) or a hypertonic solution (2.5 ml/kg of 0.6 M). The LiCl groups, whether administered the isotonic or the hypertonic solution, showed an aversion to the saccharin as reflected by both suppressed consumption and disgust reactions (i.e., gaping, chin rubbing) in the taste reactivity test. By contrast, the injection of NaCl had no effect on the consumption or the flavor palatability. Experiment 2 tested the effect of a larger dose of NaCl (15 mEq/kg) administered in the form of a hypertonic solution (10 ml/kg of 1.5 M). This solution caused a decrease in consumption but it did not result in disgust reactions. It reduced, however, the rate of appetitive responses (i.e., tongue protrusions, mouth movements) elicited by the saccharin. The results are discussed in terms of the distinction between the aversion to flavors based on conditioned nausea and the avoidance of flavors due to a change in physiological state.

18:00 - 18:20 Dissociable effects of the renewal of conditioned taste aversion on consumption and licking microstructure

Dominic M. Dwyer, Matías López

Cardiff University, UK; University of Oviedo, Spain

Pairing a taste with LiCl-induced nausea will reduce consumption of that taste, and also allow the taste to elicit behavioural responses indicative of disgust (e.g. reduced lick cluster sizes). When conditioned aversions are established in one context, and extinguished in another, the reduction in consumption is typically reinvigorated by testing in the initial training context (an ABA renewal effect). Whether conditioned disgust reactions are subject to renewal is unknown. Here, rats received aversion training where a salt solution was paired with LiCl injection in Context A, half were extinguished in Context A and half in Context B, before all were tested with salt in Context A. Consumption of salt at test was higher in rats extinguished in Context A than those extinguished in Context B (i.e., a typical ABA renewal effect). However, there was no renewal effect on lick cluster size despite the fact that conditioning had produced a reduction in lick cluster size that recovered over extinction. These data are consistent with partially separate contributions of consummatory and preparatory conditioning to acquired disgust and learnt changes in consumption. As only consumption changes are subject to renewal, perhaps preparatory and consummatory conditioning also make separate contributions to renewal.

18:20 - 18:40 Taste-taste transfer of training between Pavlovian and consummatory tasks

Amanda C. Glueck, Mauricio R. Papini

Texas Christian University, USA

Last year we reported that training in the consummatory successive negative contrast (cSNC) situation (induction task) reduced one-way avoidance contrast and retarded appetitive extinction (transfer tasks), whereas the opposite sequence did not affect cSNC. Subsequent experiments varying the induction task (appetitive partial reinforcement) found no evidence of transfer to cSNC. To test the hypothesis that asymmetric transfer is due to taste stimuli having a dedicated frustration circuitry not readily accessible by the audiovisual stimuli used in the induction tasks, rats receive induction training in a Pavlovian taste conditioning paradigm before cSNC training (Phase 1). KoolAid was simultaneously paired with 2% ethanol under either continuous or partial reinforcement (CR, PR). In Phase 2 (transfer), animals within each group were randomly assigned to a 32-to-4% sucrose downshift (CR/32, PR/32) or to 4-to-4% sucrose unshifted controls (CR/4, PR/4). We predicted that cSNC would be attenuated in PR groups, compared to CR groups. Instead, cSNC was eliminated in both CR and PR groups. Performance during Phase 1 and posttraining preference tests suggest that animals overcame a mildly aversive taste compound (KoolAid+Ethanol). The ensuing counterconditioning may have been sufficient to abolish cSNC. These results suggest that taste transfer works better than audiovisual taste transfer.

18:40 - 19:00 Sodium detection thresholds in an aversion paradigm

Susana Carnero, Félix Acebes, Beatriz Álvarez, Ignacio Loy

University of Oviedo, Spain

Available literature shows, with different procedures, a wide range of values of the sodium chloride (NaCl) absolute threshold in rats, this is, the lowest concentration (molarity) in which a sodium chloride solution was detected (from 0.001M to 0.005M). The aim of the present study was to establish reliable mechanisms of sodium discrimination by exploring the different values reported in the literature with a new procedure in which a classic psychophysics' method (limits method) was combined with procedures from contemporary studies of associative learning (taste aversion learning via oral ingestion). Results seem to show a higher sensibility with this method, as lower thresholds have been obtained than those reported in the literature. This minimum sensory threshold of sodium flavor allows developing further research in psychophysics and associative learning which could be use to unravel some particularities of both preference and aversive mechanisms.

8:30 - 9:50 Learning and health

Chair: Victoria Chamizo, University of Barcelona

8:30 - 8:50 The lack of side-effects increases the belief in the effectiveness of a bogus treatment

Fernando Blanco, Itxaso Barberia, Helena Matute

University of Deusto, Spain

Many alternative medicines have failed to prove effective in clinical trials, yet sometimes people prefer to use them instead of conventional, scientifically validated treatments. We propose that perceiving a medicine as "free from side-effects" explains part of this preference. In our experiment, two groups of participants were allowed to use a medicine to heal a series of fictitious patients. The rate of spontaneous recovery was high, but this was noncontingent with the administration of the medicine. Thus, the medicine was completely useless. In one group it was described as producing side-effects. We found that perceiving the medicine as free from side-effects made participants use the medicine with high probability. Additionally, the more often they used the medicine, the more likely they were to develop an illusory belief in its effectiveness, despite the fact that it was actually useless. This behavior parallels actual pseudomedicine usage: when a treatment is thought to be harmless, it is used with high frequency, hence the overestimation of its effectiveness in treating diseases with a high rate of spontaneous relief. These results shed light on the motivations spurring the preference of pseudomedicines over scientific medicines, and can be readily explained by current theories of associative learning.

8:50 - 9:10 The role of instruction and conditioning in the development of placebo nausea: an experimental manipulation of nausea in healthy participants

Veronica Quinn, Ben Colagiuri

The University of Sydney, Australia

The experience of nausea in humans has been found to be affected by an individual's expectancies. The experiments reported aimed to use a new paradigm to explore independently the effects of instruction and conditioning on the development of this placebo nausea. Nausea was elicited using a galvanic vestibular stimulator which possesses a placebo setting and a high level of control over stimulus intensities. Experiment one saw twenty participants allocated to receive either placebo or high intensity stimulation in training. On test, participants who had been exposed to high intensity stimulation in training experienced more nausea to the placebo stimulation than those who had not, suggestive of placebo nausea in the experimental group. The second experiment aimed to determine the independent contributions of instruction and conditioning to this effect through the introduction of a placebo vapour to reduce nausea, and also included a physiological measure of nausea through electrogastrogram. Both the information provided about this vapour, and its pairing with a surreptitious reduction in stimulation, was varied between groups. A general placebo effect was observed, but the reduction differed across groups dependent on their experience of either instructions, conditioning or both. These findings will be discussed in reference to clinical settings.

9:10 - 9:30

Partial reinforcement and anti-anxiety self-medication

Mauricio R. Papini, Lidia Manzo, José E. Callejas-Aguilera, Alberto Fernández-Teruel, Carmen Torres

Texas Christian University, USA; University of Jaen, Spain; Autonomous University of Barcelona, Spain

Inbred rats from the Roman low-avoidance strain (RLA-I), but not from the Roman high-avoidance strain (RHA-I), increased preference for ethanol after exposure to appetitive extinction (Manzo et al. *Physiol Behav* 2014 123:86-92). RLA-I rats have shown greater sensitivity than RHA-I rats to anxiogenic situations, including those involving reward loss. Such increased fluid preference did not occur after acquisition (reinforced) sessions or in groups with postsession access to water, rather than ethanol. Because ethanol has anxiolytic properties in reward loss tasks, oral consumption after extinction sessions was interpreted as anti-anxiety self-medication. The disrupting effects of appetitive extinction are known to be attenuated by partial reinforcement training, which, therefore, can be conceptualized as treatment for developing resilience to loss-induced anxiety. The present research was an attempt to eliminate the self-medication effect in rats genetically prone to anxiety (RLA-I) by giving them 50% partial reinforcement training. Whereas RLA-I rats showed faster extinction in the runway than RHA-I rats, the two strains did not differ in terms of their postsession preference for ethanol at any point during training. Exposure to the uncertainty typical of partial reinforcement training can eliminate the anti-anxiety self-medication effect even in rats genetically selected for high levels of anxiety.

9:30 - 9:50 Early variability in body temperature as a vulnerability marker in rats exposed to semistarvation induced hyperactivity

Angela Fraga, Olaia Carrera, Marcos Carreira, Felipe Casanueva, Emilio Gutierrez

University of Santiago de Compostela, Spain; Molecular Endocrinology Laboratory, Health Research Institute of Santiago (IDIS), Spain; USC University Hospital Complex (CHUS), Spain

Introduction. Research has shown that hyperactivity in anorexia nervosa is related both to hypoleptinemia associated to weight loss and ambient temperature. The objective of the study was to compare the efficacy of leptin in the reversion of hyperactivity in food restricted rats in the SIH procedure. Methods. Animals were ranked according to the variability in body temperature during the first three hours after exposure to the activity wheel cage. After two weeks of baseline maintained at 21°C, animals with inserted minipumps were continuously infused with leptin (1.29 mg/ml) during the third week while receiving a daily ration of 60% of the food intake of the second week. Results. Animals showing higher variability in body temperature during the early first three hours displayed higher activity and less weight gain during the two baseline weeks. Moreover, during the third week of food restriction leptin treatment did not prevent either weight loss or excessive activity in the animals with early variability in body temperature. Conclusion. Early variability in body temperature is a vulnerability marker in SIH rats and leptin treatment does not preclude increased activity and weight loss characteristic of animals exposed to SIH.

9:50 - 11:10 **Discrimination learning**

Chair: Juan M. Rosas, University of Jaén

9:50 - 10:10 Generalization along an attended and unattended dimension following category learning in humans

Jessica C. Lee, Evan. J. Livesey

The University of Sydney, Australia

After discrimination training with stimuli that lie close together on a continuous dimension, animals tend to generalize along the dimension in a manner suggesting stimulus control via surface features of the stimuli, often displaying a peak shift effect. In contrast, humans performing a similar categorization task typically show a pattern of generalization suggestive of stimulus control via a relational rule, especially if participants are able to verbalize a difference between the categories. The current study examined rule- and feature-based generalization following category learning using two concurrent test measures: category judgements and typicality ratings. We additionally investigated whether these measures of category learning were dependent on attention, by directing attention to one of two diagnostic category dimensions. The results suggest that patterns of generalization based on rule- and feature-learning are sensitive to voluntary selective attention.

10:10 - 10:30 Manipulating the instructions on perceptual learning with complex visual stimuli

Sergio A. Recio, Adela F. Iliescu, Simón P. Mingorance, Isabel de Brugada

University of Granada, Spain

From an associative learning perspective, experiments of perceptual learning in humans usually guide participants through instructions to look for differences between the to-be-discriminated stimuli. This raises concerns about whether this kind of task is actually reflecting perceptual learning or other kind of process, like discrimination learning via self-supervision. To ascertain this, we conducted a series of experiments manipulating instructions with three different conditions. In the first one, participants were asked to look for differences. In the second one, instructions only required to look at the stimuli, but did not explicitly ask to look for differences. In the last one, participants were given bogus instructions about a non-related task that requires them to look at the stimuli. We found that the intermixed/blocked effect was only evident with explicit instructions. This may indicate that the interpretation of prior perceptual learning experiments using visual stimuli like checkerboards is compromised, and that mere exposure is not enough to produce perceptual learning.

10:30 - 10:50 What makes a landmark effective in juvenile rats?

V.D. Chamizo, C.A. Rodríguez, N.J. Mackintosh

University of Barcelona, Spain; University of Cambridge, UK

In Experiment 1, juvenile male and female rats were trained in a circular pool to find a hidden platform defined by a single-pattern landmark. Following training the two main components of the landmark, its shape and pattern, were tested individually. Unlike adult males that perform equally well when tested on both components (Chamizo et al., submitted, Experiment 5), juvenile males performed much more accurately when tested with the shape of the landmark alone than with the pattern. Age differences were also found in females. Unlike adult females that perform much less accurately when tested with the shape of the landmark alone than with the pattern, juvenile females performed equally well when tested on both components. As with adult rats, when testing the shape component, juvenile males outperformed juvenile females, and when testing the pattern component juvenile males and females did not differ. Likewise as with adult rats, juvenile males and females learn rather different things about a landmark that signals the location of the platform. Moreover, Experiment 1 shows that age has an important effect on their behavior, suggesting a clear effect of sexual maturation. Experiment 2 directly compares the performance of adult and juvenile male and female rats. Reference Chamizo, V.D., Rodríguez, C.A., Torres, I., Torres, M.N., & Mackintosh, N.J. (submitted). What makes a landmark effective?

10:50 - 11:10 Natural order, psychophysics and abstract concepts

Sheila Chase

Hunter College of the City University of New York, USA

With the onset of the cognitive revolution researchers in animal learning using techniques from stimulus-response psychology have clearly demonstrated that non-humans trained to respond differentially to two points on a continua, e.g., categorizing images as same or different, demonstrate abstract conceptualization -- appropriate responding independent of the training stimuli. Such behavior appears to reflect the orderly relationship between stimulus and response continua ubiquitous in nature and most clearly revealed when animal subjects are treated as psychophysical observers.

14:20 - 15:40 Polydipsia II

Chair: Mauricio R. Papini, Texas Christian University

14:20 - 14:40 Choice as a function of the opportunity for schedule-induced drinking among concurrent-chains alternatives

Jorge A. Ruiz, Ricardo Pellón

National Distance Education University, Spain

It was explored the reinforcing value of water in a schedule-induced drinking situation using concurrent-chain schedules of food delivery. Four rats were trained on a concurrent-chain schedule with two terminal-links that provided food pellets on identical fixed-time schedules (FT 20-s). Through several phases, one terminal-link provided the opportunity to drink in 100, 50 or 0 % of the entries to this terminal-link, whereas the other terminal-link provided constant opportunity to drink. Initial-link response rates showed proportional changes according to percentage of terminal-links with opportunity to drink. A different set of eight rats were trained on a concurrent-chain schedule with terminal-links that provided food pellets with different frequency (FT 10-s and FT 20-s). In a first phase four rats had opportunity to drink during both terminal-links, but not the other four rats. In a second phase, FT 20-s terminal-link provided opportunity to drink for all rats. Next, the first phase's conditions were re-established and then, in a fourth phase, FT 10-s terminal-link provided opportunity to drink for all rats. Initial-link response rates showed preference for FT 10-s terminal-link except when the opportunity to drink was provided only during FT 20-s terminal-link. These findings suggest that water acquires reinforcing properties in the schedule-induced drinking procedure.

14:40 - 15:00 Contextual control of schedule-induced polydipsia within an ABA renewal design in rats

José A. Aristizabal¹, José E. Callejas-Aguilera¹, Pedro M. Ogallar¹, Ricardo Pellón², Juan M. Rosas¹

¹University of Jaén, Spain; ²National Distance Education University, Spain

The main goal of this study was to explore whether ABA renewal may be found in an adjunctive behavior, such as schedule-induced polydipsia. Polydipsia was induced by a FT30 sec reinforcement schedule. Experiment 1 used a 2 x 2 factorial design being one of the factors the reinforcement schedule (either FT30, or administration of all the reinforcers at the start of the session), and the other the presence or the absence of a 10 sec tone at the end of each 30 sec period within a session. Acquisition and extinction were conducted in different contexts, returning to the acquisition context at the time of testing. Renewal was observed as an increase in both, the magazine entries and the water intake during the test, regardless of the presence of the tone. Experiment 2 replicated these results in a factorial design in which one of the factors was the schedule of reinforcement and the other factor was the context where the test was conducted (the acquisition context ABA, or the extinction context ABB). Obtained results suggest that scheduled induced polydipsia shows renewal from extinction with the context change. The implications for the understanding of polydipsia as a conditioned response are discussed.

15:00 - 15:20 Resistance to change of schedule-induced polydipsia and Behavioral Momentum Theory
Pedro Vidal García, Ricardo Pellón Suárez de Puga
National Distance Education University, Spain

Behavioral momentum theory (BMT) is an important framework to evaluate the strength of a response as behavioral persistence. The behavior strength can be inferred by its resistance to change (RTC) when a context disturbance condition occurs. Response rate and RTC are separable aspects of operant behaviors. According to BMT, response rate would be governed by the response-reinforcer contingency while RTC would be determined by a molar Pavlovian stimulus-reinforcer relation. Schedule-induced polydipsia (SIP) is characterized by a pattern of excessive water intake that develops when animals are exposed to intermittent food reinforcement schedules. The main controversy is whether adjunctive behaviors satisfy the same learning laws as other operant behaviors. Three experiments were designed to test if RTC and the resistance to extinction (RTE) of SIP conforms to the predictions of BMT for operant behaviors. In the experiments we used a multiple schedule with 2 components varying reinforcement magnitude, relative reinforcement ratio and total reinforcement ratio. The data suggest that RTC and RTE are related to total reinforcement ratio and reinforcement magnitude, but not to relative reinforcement ratio, as others operants do.

15:20 - 15:40 Schedule-induced polydipsia in sign- versus goal-tracker rats is not related to impulsivity as measured by delay discounting

Valeria Edith Gutiérrez Ferre¹, Almudena Serrano², Juan Carlos López², Ricardo Pellón¹

¹ National Distance Education University, Spain; ² University of Sevilla, Spain

Male Wistar rats, previously divided into goal- and sign-trackers, were exposed to intermittent food schedules to measure the development of schedule-induced polydipsia (SIP) using fixed time (FT) schedules of 15, 30, 60 and 120 seconds counterbalanced across animals according to a Latin square design. Subsequently impulsivity levels of both groups were measured by a delay discounting procedure with values of 10, 20 and 40 seconds for the larger delayed reinforcer. Adjunctive drinking was obtained in all FT schedules with a gradation as a function of inter-food interval length, being goal-trackers the ones showing the highest levels of drinking compared with sign-trackers, mainly in FT 30 and 60 seconds. However, differences were not found between goal- and sign-trackers in delay discounting. These results point to SIP not as a good animal model of impulsivity, and they might be related to the differential dopaminergic activity of goal- versus sign-trackers. Related to other studies, goal-trackers present the same behavioral pattern (higher rate of drinking) and receptor level (greater number of D2 receptors but fewer D1 receptors in the ventral tegmental area and the nucleus accumbens) that rats classified as high-drinkers, in comparison with the sing-trackers and low-drinkers respectively.

15:40 - 16:20 Models of learning

Chair: Marilia Carvalho, University of Minho

15:40 - 16:00 A double error correction model of classical conditioning

Niklas Kokkola, Esther Mondragón, Eduardo Alonso

City University London, UK; Centre for Computational and Animal Learning Research, UK

A computational real-time error correction model of classical conditioning will be introduced. The model builds upon the temporal difference learning algorithm, and integrates stimuli memory traces and probabilistic element sampling akin to SOP. The model postulates a double prediction error embedded in a real-time framework, which implies that both the predictability of the outcome and the predictability of the predictor of said outcome influence the type of learning observed. By allowing for the prediction of a predictor, the model accounts for neutral stimuli associations. In addition, the architecture also incorporates in its representational structure stimulus activation levels, which renders the model capable of explaining learning about associatively activated stimuli. The model's dynamic representational conceptualisation entails an interaction between predicted and current stimulus occurrences, thus allowing the simulation of a range of critical phenomena such as latent inhibition and mediated effects. Conflicting experimental results in mediated conditioning and extinction are solved by the model through the modulating influence of temporal factors on inhibitory and excitatory associations. Results from a set of simulations will be presented and discussed within the framework of different theoretical approaches.

16:00 - 16:20 The SSCC TD model: a representational framework for temporal difference learning

Esther Mondragón, Jonathan Gray, Eduardo Alonso, Charlotte Bonardi, Dómnall J. Jennings

Centre for Computational and Animal Learning Research, UK; University of Southampton, UK; City University London, UK; University of Nottingham, UK; Newcastle University, UK

A novel representational framework for the Temporal Difference (TD) model of learning will be presented. TD is a real-time extension of the Rescorla & Wagner's model which conceptualizes a stimulus as a temporally distributed set of components. Each component is effectively treated as a distinctive stimulus and acquires associative strength independently through the modulation of an eligibility trace that progressively decays with distance from the US. The representational structure proposed here incorporates stimulus compounds within the exclusively elemental architecture of TD. The model computes both simultaneous and serial compound stimuli by incorporating unique configural cues and context within their representation. This modification significantly broadens the range of phenomena which the TD paradigm can account for, and allows it to predict phenomena which traditional TD solutions cannot, particularly effects that depend on compound stimuli functioning as a whole. Simulations of critical experiments such as patterning learning and serial structural discriminations will be presented and compared against real data.

Revisiting the learning curve (once again)

Steven Glautier

Southampton University, UK

Work in the field of associative learning seeks to test the adequacy of theoretical accounts using average data. However, averaging hides important information with departures from the average designated "error". To some extent this error can be reasonably understood in terms of parametric variations of the underlying model. Unfortunately, in many cases, the data cannot be accommodated in this way and the applicability of the underlying model can be questioned. Indeed several authors have proposed alternatives to associative models because of the poor fits between data and associative model. Here, a novel associative approach to the analysis of individual learning curves is presented. The Memory Environment Cue Array Model (MECAM) is described and applied to two human predictive learning datasets. The MECAM assumes that participants do not parse the trial sequences to which they are exposed into independent episodes as is often assumed when learning curves are modelled. Instead, the MECAM assumes that learning and responding on a trial may also be influenced by the events of the previous trial. Incorporating non-local information the MECAM produced better approximations to individual learning curves than did the Rescorla-Wagner Model (RWM) suggesting that further exploration of the approach is warranted.

Environmental-induced deficit of memory in female gerbils

Katarzyna Zieba, Hans Wlazole

University of Warsaw, Poland

Many researchers minimize description of conditions of keeping the animals as much as they can. Dimensions of the cage are given rarely, let alone the number of animals inside. How frequent were the contacts between a researcher and an animal; was there anything except sawdust in the cage? In this study we will present how often skipping the procedure affect their memory. Presented research consisted of 40 gerbils both sexes which were kept in 5 different groups and next, after a month the animals underwent of the behavioural test measured memory Barnes Maze. There was a statistically significant interaction effect of both factors: sex and group, $F(4,30)=4,55$; $p<0,001$; $\eta^2=0,38$. Bonferroni correction shows that inside handling and food deprivation groups were statistically relevant differences, respectively: $F(1,30)=4,68$; $p<0,05$ and $F(1,30)=7,86$; $p<0,01$. In both groups females received the worst results than males. Females in enrichment group had significantly better results than in food deprived group $F(4,30)=3,26$; $p<0,05$. There were no statistically relevant differences in male group. Research financed by National Financed Centre DEC-201101NHS600673

The effect of a simultaneous manipulation of expectations and incentives on decision criterion in human responses to basic flavors

Teresa L. Martín-Guerrero, Concepción Paredes-Olay, Juan M. Rosas, Manuel M. Ramos-Álvarez

University of Jaén, Spain

In signal-detection experiments, observers seek to maximize correct responding by actively adjusting their decision criterion in response to experimental manipulations. Signal Detection Theory (SDT) suggests that response criterion reflect two main processes: Base rate expectations and incentives. The optimal criterion may be calculated by a simple equation that includes the interaction of the variables that correspond to these cognitive factors. Changing the a priori probability of Signal versus Noise, and the Payoffs matrix would yield a different optimal value. The present study extends the logic of SDT to a tasting situation involving salty over acid flavors, in which probability of signal and payoffs are simultaneously manipulated. Decision criterion estimates were close to optimal values predicted by detection model. When payoffs and probabilities both favored one type of response (yes or no), participants polarized their responses adopting either a Lenient or a Conservative pattern, respectively. However, when factors were manipulated in opposite directions, participants adopted a neutral criterion. Obtained results were also in agreement with the dissociative proposal of SDT providing support for the independence assumption: selective influences on response bias were found without affecting sensitivity. Keywords: Signal Detection Theory, salty and acid flavors, decision criterion, sensitivity, optimal criterion, base-rate expectations, incentives.

Differences in early visual processing event-related potentials between predictive and non-predictive discriminative stimuli

David Luque, Joaquín Morís, Amanda Flores

University of Malaga, Spain; Institute for Biomedical Research of Málaga (IBIMA), Spain

We used a Stimulus-Response-Outcome reinforcement learning task to train human participants while Event-Related Potentials (ERPs) were recorded. Participants had to learn which of the two response options was correct for each stimulus. Incorrect trials were never rewarded and correct trials were rewarded in a high rate after predictive stimuli and at chance level after non-predictive stimuli. Analysis of learning curves and subjective rates about predictive values indicated that participants learned to discriminate between predictive and non-predictive stimuli. Interestingly, differences among predictive and non-predictive stimuli in early ERP signal were found. These results suggest that the early stimuli visual processing might have a relevant function in detecting their predictive value. Such early visual processing modulations could reflect attentional allocation modulations.

Sumación de la entrada condicionada en el comedero pero no de la presión de palanca automoldeada en ratas

Luis E. Gómez-Sancho, María F. Arias Holgado, Francisco Fernández-Serra

University of Sevilla, Spain

El efecto de sumación posee una amplia generalidad. Sin embargo en el automoldeamiento con palomas con frecuencia no se obtiene. Ello ha alimentado la controversia clásica entre los puntos de vista elemental y configurativo del aprendizaje asociativo. Por su parte, no hay apenas estudios sobre sumación en automoldeamiento utilizando ratas como sujetos experimentales. En este trabajo se pretende evaluar el efecto de sumación utilizando ratas y diferentes combinaciones de estímulos, auditivos y visuales, y midiendo las respuestas del sujeto en la palanca pero también en el comedero. Se entrenaron tres grupos de sujetos: Intermodal 1 (Tono+/Luz+/Palanca-); Intermodal 2 (Tono+/Palanca+/Luz-); e Intramodal (Palanca+/Luz+/Tono-). Se observó sumación de la RC de entrada en el comedero en Intermodal 1. No se observó sumación de la RC de presión de palanca en los grupos Intermodal 2 e Intramodal. Los resultados se discuten en relación con la investigación que muestra que la actividad condicionada de los sujetos puede cambiar de forma, pivotando entre el seguimiento de meta y el seguimiento de la señal, dependiendo de diferentes características de los estímulos usados. Se plantea que la tensión entre seguir la señal y seguir la meta puede hacer inapropiada a la actividad centrada en la señal para valorar la sumación.

Payoff-induced bias in temporal discrimination

Catarina Vila Pouca, Armando Machado, Marco Vasconcelos

University of Minho, Portugal

To compare the predictions of three theoretical models of timing, the Scalar Expectancy Theory (SET), the Learning-to-Time (LeT) model and the Behavioral Economic Model (BEM), we investigated the effects of differential reinforcement of two sample durations on a temporal discrimination task. Six pigeons learned to choose a Red key following a 3-s signal and a Green key following a 9-s signal. The reinforcement probabilities for the two correct responses were then systematically varied. We examined how payoff probability affected the proportion of correct responses, the psychometric function relating signal duration to choice probability and the PSE. The results will be discussed in the light of the three models.

An instance of the labelling effect in the perception of chocolate

Gabriel Rodríguez, Naiara Arriola, María del Carmen Sanjuán, Gumersinda Alonso

University of the Basque Country, Spain

We investigated how label information about the origin and quality of cacao affects consumer perception of chocolate and the willingness to pay for it. All participants (UPV/EHU students) received the same instructions regarding how to do a brief tasting of a chocolate sample. Participants in Group Supreme were informed that the sample was made from a (fictitious) cacao variety called Supreme that originated in Venezuela. Participants in Group Control did not receive this information. After tasting the chocolate participants rated various features of the chocolate on a scale of 0 to 10. Group Supreme reported liking the chocolate, perceiving it as sweeter, and being more willing to pay for it than Group Control.

Novel procedure to increase the incentive salience of CS in latent inhibition

Marquez, I., Vargas, J.P., López, J.C., Esber, G., Diaz, E.

University of Sevilla, Spain

Latent inhibition (LI) defined as the reduced conditioned response to a stimulus that has been preexposed before conditioning. LI could be the interaction of different processes that includes attentional factors. According to Pearce and Hall model (1980) the gradual decrease in attentional processing of the conditioned stimulus (CS) that occurs during the preexposure phase, restricts the conditioning learning. In this experiment, we present a new behavioral protocol for restore the conditioning of preexposed stimulus by increasing its salience. In the first phase, all animals were exposed to a serial conditioning: Light (L) / Tone (T)/ Food. In a second phase, we increased the salience of the stimulus L to shifting its predictive validity. This manipulation produced an increase of aversive conditioning to L relative to the control group that maintained the consistent training in the second phase. This research was supported by PSI2012-32445 grants.

Spontaneous lateralization of mice in choosing arm of the T-shaped maze

Katarzyna Zieba, Maria Maciejewska

University of Warsaw, Poland

Nowadays it is known that functional lateralization of human brain is a fact. More and more researches shows us, that also other species have lateralized mind. It is important for our knowledge of evolution to study animals behavior to find out more about this phenomenon. This is one of the main topic research in comparative and evolutionary psychology. A T-Shaped Maze verifies whether an animal learned how to choose the appropriate arm, but we noticed that animals shows particular preference for torsion right in the first turn in T-maze. Research we would like to present shows spontaneous lateralization of mice in choosing arm of the T-maze. In this research was analyzed behavior of 40 CD-1 mice: 20 female and 20 male. Each mouse was put into the maze. Under observation was first reaction – first turn into one of arms. The statistically relevant intra-group differences in the amount of right entrances into arms displayed in bidominal test ($p=0,038$) mice more often used right sleeves – 67,5% of mice chose to turn right on the end of the maze but no differences were observed in side of first turn reactions between male and female. Research financed by National Financed Centre DEC-201101NHS600673

Base rate-induced bias in temporal discrimination

Catarina Vila Pouca, Marco Vasconcelos, Armando Machado

University of Minho, Portugal

To contrast the predictions of three models of timing, the Scalar Expectancy Theory (SET), the Learning-to-Time (LeT) and the Behavioral Economic Model (BEM), we investigated how signal frequency affects temporal discrimination. Seven pigeons learned to discriminate two stimuli, one short (3s) and one long (9s). We then varied the frequency of presentation of each stimulus and assessed its effects on the proportion of correct responses, the psychometric function relating signal duration to choice probability and the PSE. We will discuss the results in the light of the three models of timing.

17:20 - 19:00 Pavlovian conditioning

Chair: Geoffrey Hall, University of York, University of Plymouth, University of New South Wales

17:20 - 17:40 Evidence of facilitation and inhibition in human Pavlovian-to-instrumental transfer

Ben Colagiuri, Peter Lovibond

The University of Sydney, Australia; University of New South Wales, Australia

Pavlovian-to-instrumental transfer (PIT) occurs when reward-cues influence instrumental responding for that reward. In two experiments we explored PIT in humans when tested under instrumental reinforcement, with previous human studies exclusively testing PIT under instrumental extinction. Participants first underwent Pavlovian discrimination training with an auditory cue paired with a chocolate reward (CS+) and another auditory cue not reinforced (CS-). Instrumental training followed. Here participants learnt to press a button to receive the chocolate reward on a VR10 schedule. In the test phase, each CS was presented while participants maintained the opportunity to make the instrumental response to receive chocolate. In Experiment 1, 25min of instrumental training led to high satiety and low responding during test, yet the CS+ still elicited an increase in instrumental responding, indicating an facilitatory PIT effect. In Experiment 2, 4mins of instrumental training produced less satiation and higher baseline responding during test and, in these circumstances, the CS+ had no effect, but the CS- produced markedly decreased responding, indicating an inhibitory PIT effect. In line with some animal research, these findings suggest that, in humans, both excitatory and inhibitory associations are learnt during PIT training and that the expression of these depends on baseline response rate.

17:40 - 18:00 Contextual control of extinction but not excitation in a suppression task

James Byron Nelson, Jeffrey Lamoureux

University of the Basque Country, Spain; Boston College, USA

Four experiments with humans assessed whether ambiguity enhances contextual control of excitatory conditioning as predicted by the Attentional Theory of Context Processing (ATCP) in a behavioral suppression task (Nelson & Sanjuan, 2006). In Experiment 1 X underwent partial extinction or not, followed by conditioning of T. There was no effect of X-extinction when T was tested in a different context yet “AAB Renewal” with X occurred both before and after conditioning with T. In Experiment 2 T was conditioned while X was undergoing complete extinction, or not. T was tested in the same or different context as training. There were no effects of context or extinction. Experiment 3 replicated the complete extinction of Experiment 2 and tested both X and T. AAB Renewal occurred with X and a small effect of context appeared with T. In Experiment 4 T was conditioned while X underwent extinction, re-conditioning, and re-extinction, or not. Tests of T in the same or different context revealed a main effect of context and no effect of the extinction manipulation. Bayesian analyses provide positive to very strong support for the lack of context and extinction effects on T that could support ATCP.

18:00 - 18:20 Simultaneous magazine training produces second order conditioning and inhibitory conditioning in rats

Ignacio Loy, Susana Carnero, Félix Acebes, Beatriz Álvarez, Joaquín Morís

University of Oviedo, Spain; University of Málaga, Spain

Second order conditioning and conditioned inhibition are formally equivalent (A+ / AB-). A critical operational variable to determine the occurrence of one or the other is the number of trials with the compound CS, AB- trials (Yin, Barnett & Miller, 1994). The experiments reported here showed that the temporal relation between training phases (concurrent or subsequent training) is also relevant in dissociating these phenomena. Experiment 1 showed no evidence of second order conditioning nor conditioned inhibition with subsequent training of the phases, regardless of whether subjects experienced few or many trials. However, in Experiment 2, employing a concurrent training of the phases showed that at the beginning of training stimulus B became an excitatory conditioned stimulus and that later, as training progressed, it acquired inhibitory properties (summation and retardation test). The fact that both phenomena were observed when employing simultaneous training could be accounted for by arguing that stimuli can have both excitatory and inhibitory properties instead of them being mutually exclusive. Experiment 3 rejected this hypothesis. The implications for associative phenomena with formally equivalent designs (contrary effects) are discussed.

18:20 - 18:40 People's learning about stimulus co-occurrence is superior with simultaneous voice-picture presentations: Further support for contiguity models of associative learning
Jasper Robinson . Lam Chung Sze
The University of Nottingham, UK

Dickinson (1980) and Brandon, Vogel & Wagner (2003) differ in the predictions that they make about the optimal, temporal arrangements for association formation. To Dickinson, learning is about the detection of predictive relationships (i.e., the signal should precede its outcome); to Brandon et al., learning is about maximising signal-outcome contiguity (i.e., the signal and outcome should onset and terminate simultaneously). I report findings that support Brandon et al.'s view: People were presented with a synthetic voice stimulus (e.g., 'ore') that preceded a picture of an object (e.g., a hammer). They also received simultaneous pairings of 'ore' and a second object picture (e.g., a telephone). Additional stimuli allowed the creation of eight serial and eight simultaneous trial types. After training, subjects were tested for their knowledge of the voice-picture pairings: On each test trial, two pictures were presented with one voice stimulus and subjects were asked to select the picture that had been presented with the voice. Choices were more frequent for simultaneously paired than serially paired voice-object pairs.

18:40 - 19:00 Temporal discrimination in autoshaping: acquisition and extinction

María F. Arias, Francisco Fernández-Serra, Luis E. Gómez-Sancho, Manuel Mateos, Carmen Ortiz, José M. Sánchez-Marqueses

University of Sevilla, Spain

The general goal of the present study was to explore the dynamic of acquisition, steady state and extinction of temporal control in autoshaping with pigeons. The experiment reported was divided into two phases, the first dealing with conditioning, the second with extinction. During the first phase, pigeons were trained simultaneously with two durations, short and long (8 s. and 32 s., respectively), of a flashing white key as CS with continuous reinforcement. During the second phase, each of the 7 sessions started with 8 reinforced trials (4 with short and 4 with long duration) like those used during the first phase, and after changed to extinction in which the response key was on until the end of the session. The pattern of key pecking during the course of training shows in all subjects a slow acquisition of temporal control. In the steady state the rate of responses peaked around 4 s. and decreased to a low level near to 16 s. and next increased until reached the steady state at 24 s. to the terminal value of the interval (32 s). In the extinction phase, when the US was removed, the pattern of pecking showed peak-pause oscillations mainly the first sessions of extinction. The results are discussed comparing them with those from other studies with FI and peak procedures of timing. Key-words: acquisition, extinction, temporal control, autoshaping, pigeons.

8:30 - 9:30 **Predictive learning**

Chair: Gumersinda Alonso, University of the Basque Country

8:30 - 8:50 Resistance to instructed reversal of the learned predictiveness effect

Hilary Don, Evan Livesey

The University of Sydney, Australia

The learned predictiveness effect is a widely observed bias towards previously predictive cues in novel situations. Although the effect is generally attributed to an automatic attentional shift, it has recently been explained as the product of controlled inferences about the predictive value of cues. This view is supported by evidence that the learned predictiveness effect can be completely reversed through explicit instructions about the predictive value of cues. However, subsequent research has shown conflicting results. In order to investigate the parameters of the instructed reversal effect, three experiments manipulated length of initial training, causal scenarios and instruction difficulty, respectively. While causal scenarios and instruction difficulty had some influence on learning about instructed cues, substantial resistance to reversal as a result of prior experience was still observed in every experiment. Taken together, the results are inconsistent with a purely controlled account of learned predictiveness, and provide support for dual-process theories of learning and attention.

8:50 - 9:10

Relative prediction error and protection from attentional blink in human associative learning

Steven Glautier, Shui-I Shih

Southampton University, UK

The relationship between predictive learning and attentional processing was investigated in two experiments. During a learning procedure participants viewed rapid serial visual presentation (RSVP) of stimuli in the context of a choice-reaction-time (CRT) task. Salient stimuli in the RSVP streams were either predictive or non-predictive for the outcome of the CRT task. Following this procedure we measured attentional blink (AB) to the predictive and non-predictive stimuli. In Experiment 1, despite the use of a large sample and checks demonstrating the validity of the learning procedure and the AB measure, we did not observe reduced AB for predictive stimuli. In contrast, in Experiment 2, where the predictive stimuli occurred alongside salient non-predictive comparison stimuli, we did find less AB for predictive than for non-predictive stimuli. Our results support an attentional model of learning in which relative prediction error is used to increase learning rates for good predictors and reduce learning rates for poor predictors (Mackintosh, 1975) and provide confirmation of the AB learning effect originally reported by Livesey, Harris, and Harris (2009).

9:10 - 9:30

The effect of verbal instructions in contingency learning depends on the time available to process the cue: evidence in favor of associative models

Rafael Alonso-Bardón, David Luque, Francisco J. López

University of Málaga, Spain; Institute for Biomedical Research of Málaga (IBIMA), Spain

Much of the research in human contingency learning has tried to dissociate associative and inferential processes. One feature that has been regarded as relevant for these dissociations is the time available to process the cue. A brief presentation of the cue may facilitate the activation of associative processes whereas a long one may favor the activation of inferential processes. The two experiments reported here used a two-phase task. In Phase 1, four different cue-outcome relationships were programmed. In Phase 2, two of these relationships were changed. Participants knew about some of these changes through verbal instructions. The effect of these instructions was measured during Phase 2 in two groups that differed in the time available to process the cue, either 250 or 1500 ms. The results showed that the control of performance produced by verbal instructions differed depending on the time available to process the cue. Only in the 1500 ms group, the verbal instructions were able to affect what it had been learnt during Phase 1. Thus, the results are consistent with the hypothesis that a brief presentation of the cue during Phase 2 facilitates the activation of associative processes.

9:30 - 11:10 **Timing**

Chair: Esther Mondragon, Centre for Computational and Animal Learning Research

9:30 - 9:50 **Application of Timing Drift-Diffusion Model to individual trials in the peak procedure**

André Luzardo, François Rivest, Eduardo Alonso, Elliot Ludvig

City University London, UK

Drift-diffusion models (DDMs) are a popular framework for explaining response times in decision-making tasks. Recently, this DDM architecture has been used to build an interval timing model. This Timing DDM (TDDM) is physiologically plausible and can adapt to different time intervals whilst also preserving timescale invariance. Previous studies have successfully applied the TDDM to a variety of timing tasks, including fixed-interval schedules and the bisection procedure. In addition, the TDDM accurately reproduced the behaviour observed in tasks where the durations of intervals are randomly or periodically changing as in cyclic schedules of reinforcement. One key limitation, however, is that, due to its learning rules, the TDDM does not readily apply to the peak procedure—a benchmark in the timing literature. Here, we further develop the TDDM to apply to the peak procedure. We show how the TDDM both reproduces the global pattern of responses averaged over trials, but also provides a close quantitative fit to the statistics derived from single-trial analyses. We adduce some novel, testable predictions about timing on the peak procedure.

9:50 - 10:10 Shared stimulus control on a temporal discrimination task

Carlos Pinto, Inês Fortes, Armando Machado

University of Minho, Portugal

Pigeons were trained on a temporal discrimination task: On each trial, in a dark box a white key light (sample) was presented and pigeons were trained to choose a red key after a 2-s light and a green key after an 18-s light. Between trials, there was an intertrial interval (ITI) illuminated with a houselight. Although the pigeons only needed to attend to the sample (white key light) duration to learn the task, the ITI (houselight) could have also been used to distinguish between trials: on 2-s sample trials the houselight was more recent than on 18-s trials. In a first test, when the ITI was changed from illuminated to darkened, correct responses to the 2-s sample decreased. On a second test, when the whole trial was illuminated, correct responses decreased the most to the 18-s sample. These results suggest that the pigeon's responses were partially under control of the ITI.

10:10 - 10:30 Different interdimensional discrimination tests on temporal generalization gradients: the effect of the temporal generalization test on the interdimensional temporal generalization gradient

Ana Catarina Vieira de Castro¹, Javier Íbias², Ricardo Pellón², Armando Machado³

¹Institute for Molecular and Cell Biology, Portugal; ²National Distance Education University, Spain; ³University of Minho, Portugal

We investigated the effects of interdimensional discrimination training and different temporal generalization tests in the temporal generalization gradient. Firstly, 24 naïve Wistar rats learned to choose lever A after Short/Dark (S/D) trials and to choose lever B after Long/Light (L/L) trials. The S/D trials consisted of a period of 20 seconds spent in the darkness and the L/L trials consisted of a period of 20 seconds in the darkness plus 20 seconds of houselight illumination. Afterwards the animals were divided in three groups and the test phase began. During testing, the duration of the dark period was varied for the S/D- group, the duration of the light period was varied for the L/L- group and the S/D-L/L- group was tested using combinations of different durations of both dark and light periods. The test durations used were 1.5, 6, 10, 14, 28, 40, 57 and 80 seconds. The results showed a flat generalization gradient for durations longer than 20 seconds both for the S/D- and L/L- groups, but L/L- group displayed a sharper generalization gradient for shorter durations. S/D-L/L- group showed different gradients depending on the light and dark period values. The scalar property of timing was evaluated in each group. Keywords: Discrimination, Generalization Gradients, Scalar property of timing

10:30 - 10:50 Effects of dorsal hippocampal damage on timing: a pooled analysis

Shu K.E.Tam, Dómnall Jennings, Charlotte Bonardi

University of Nottingham, UK

The dorsal hippocampus (DHPC) is crucial for spatial cognition: for example, there is a positive relationship between the extent of DHPC damage and spatial navigation deficit. HPC has also been implicated in temporal cognition, and we have shown that damage to the DHPC is sufficient to produce timing deficits (Tam & Bonardi, 2012a, 2012b; Tam et al., 2013). We explored the relationship between the extent of DHPC damage and timing ability in these data, using ANOVA and a generalised linear mixed modelling (GLMM) approach. Our results showed that DHPC-lesioned animals had lower peak times than sham controls, consistent with previous reports on effect of HPC damage; but they also displayed larger coefficients of variation - suggesting an additional nonscalar source of timing error. Consistent with this interpretation, within the DHPC-lesioned animals the GLMM model that best predicted the extent of DHPC damage comprised timing error and peak rate: both increased with degree of DHPC damage. In terms of scalar expectancy theory (SET) this suggests DHPC damage has two effects: (i) lower peak times stemming from a reduction in K (the constant by which the number of pacemaker pulses in the accumulator are multiplied before transfer to long-term memory) (ii) a nonscalar increase in timing variability, possibly stemming from adoption of a less conservative criterion when comparing accumulated and stored pulses to determine the onset of the conditioned response.

10:50 - 11:10 Searching for relational responding in a temporal bisection task

Marilia Pinheiro de Carvalho¹, Armando Machado¹, François Tonneau²

¹University of Minho, Portugal, ²Federal University of Pará, Brazil

We compared performance under a relational and an absolute stimulus-response mapping in a bisection task. Pigeons learned to choose 'red' following 2s ('short') and 'green' following 6s ('long') samples, and were tested for generalization with other durations. Next, subjects learned a new discrimination between 6s ('short') and 18s ('long'). 'Relational' subjects still had to choose 'red' following 'short', and 'green' following 'long'. 'Absolute' subjects still had to choose 'green' following 6s. At issue was whether relational and absolute mappings would enhance/impair acquisition of the new discrimination. We were not only interested in comparing performances between groups, but also on predicting performances for both groups. Although claims in favor of relational responding have been made in the last forty years, no formal relational-timing model has ever since been advanced that allowed for predictions. Hence, we predicted group performances by assuming exclusively absolute-discrimination processes and resorted to both the generalization-gradients data and to simulations with the Learning-to-Time model (LeT). Results showed that both the generalization gradients and the LeT model predicted fairly well the whole pattern of acquisition of the new discrimination. We conclude that, so far, absolute-discrimination processes can account for results obtained under both a relational and an absolute stimulus-response mapping.

14:20 - 16:00 Cue competition

Chair: Ben Colagiuri, The University of Sydney

14:20 - 14:40 The elusive nature of the blocking effects: 17 failures to replicate

E. Maes, Y. Boddez, J. De Houwer, R. D'Hooge, T. Beckers

KU Leuven, Belgium

In 1969, Kamin described the blocking effect, which would become one of the most influential discoveries in the history of the psychology of learning. In a typical blocking design, pairings of a stimulus A with an unconditioned stimulus (US) are followed by pairings of a compound comprising A and a novel stimulus X with the US. Following such training, responding to X alone is found to be weaker than in control conditions in which training with A is omitted or replaced by pairings of another stimulus B with the US. The discovery of the blocking effect spurred the development of numerous theories of learning, including the highly influential Rescorla-Wagner model. The capacity to explain blocking became nothing short of a touchstone for the validity of a theory of conditioning. The influence of the blocking effect is illustrated by the fact that it is covered in virtually every Psychology of Learning textbook. Considering this impact, one would expect blocking to be a highly robust phenomenon. We report a series of seventeen experiments in which we failed to obtain a solid blocking effect. A variety of species, strains, parameters, paradigms and set-ups were used in those experiments. We argue that our failure is a cause for concern; it raises the question whether blocking is indeed the robust phenomenon around which we should build our theories of conditioning.

14:40 - 15:00 Perceptual learning transfer in an appetitive Pavlovian procedure

Antonio Alvarez Artigas¹. José Prados Guzmán²

¹University of Barcelona, Spain; ²University of Leicester, UK

Experiments 1 and 2 replicated the perceptual learning effect originally reported by Mondragon and Murphy (2010) using a standard Pavlovian task in conditioning chambers. In these experiments, two groups of rats were given intermixed or blocked pre-exposure to two acoustic compounds sharing a common element, AX and BX. Following pre-exposure, the compound AX was conditioned by pairing it with the presentation of food. In the final generalization test trials the animals were exposed to the compound BX. The animals that were given intermixed pre-exposure showed lower generalization from AX to BX than animals given blocked pre-exposure, a perceptual learning effect. In Experiment 3, after pre-exposure to AX and BX, a novel compound NX was paired with food, and the animals were finally presented with yet a novel compound, ZX. As in previous experiments, animals that were given intermixed pre-exposure showed lower generalization than those given blocked pre-exposure, this time with two novel compound stimuli (NX and ZX), a perceptual learning transfer effect. Following Mondragon and Murphy (2010), perceptual learning transfer to novel stimuli would be explained as a consequence of a higher reduction in the salience of the common element, X, during intermixed than blocked pre-exposure. Reference: Mondragon, E. & Murphy, R. A. (2010). Perceptual learning in an appetitive Pavlovian procedure: Analysis of the effectiveness of the common element. *Behavioural Processes*, 83, 247-256.

15:00 - 15:20 Overshadowing and relative stimulus validity associability in a spatial search task

Javier Vila, Alberto Monrroy, Rodolfo Bernal

National Autonomous University of Mexico, Mexico

In Overshadowing when a CS X is presented in compound with a salient CS A this results in less CR. Acquisition-failure theories and expression-failure theories of conditioning provide divergent explanations of cue competition effects. The present research examined the underlying basis of overshadowing through a relative stimulus validity procedure that revealed latent associations of less salient CS X. In Experiment 1 human participants learned a search task where a land mark cue (L) was overshadowed by a more salient geometric cue (G). Experiment 2 using the same task showed that participants always responded to G cue, but additional trials with reinforced L+ eliminated overshadowing (LG+; L+), and trials with no reinforced L- (LG+; L-) increased overshadowing. Results are according with theories that considered changes in the associability of the CS due to its correlation with the US (Mackintosh, 1975). These data supports the idea that overshadowing depends on ambiguity and attention change to less salient CS, in a similar way to the context dependency (Rosas et al., 2006).

15:20 - 15:40 Stimulus processing and blocking in human learning

Evan Livesey, Marius Mather, Justin Harris

The University of Sydney, Australia

Blocking is one of the most widely replicated cue competition effects. Nevertheless, in human learning, there are several conditions under which researchers routinely fail to observe blocking. These results tentatively suggest that blocking may be determined in part by the time to process the stimuli on each trial as well as overall stimulus complexity. However, to date, there are very few systematic investigations of these parameters and their effect on blocking and other cue competition phenomena. In this study, we investigated the effects of processing time and stimulus complexity on blocking using a deadline task, which allowed us to precisely manipulate the time available to process the stimuli before each response was made. As we will discuss, the results support some previous suggestions about the time course of stimulus processing and its effect on cue competition.

15:40 - 16:00 Pre-exposure reduces serial overshadowing in CTA

Dorothy W.S. Kwok, Robert A. Boakes

The University of Sydney, Australia

This set of experiments examined the question of whether the effect of a delay between pre-exposure and conditioning affects the ability of an interfering taste to overshadow conditioning to a second taste. Four groups of rats were pre-exposed to an interfering taste (HCl), with one group receiving this pre-exposure a week before conditioning (Group Distal), while a second group experienced pre-exposure in the day preceding conditioning (Group Proximal). A third group experienced no pre-exposure (Group Interference), while a Control group received no interfering taste. On the single conditioning trial, rats were given a target taste (sucrose) followed by HCl 50 min later, then 10 min later injected with lithium. We found that proximal pre-exposure to HCl reduced the degree to which this taste overshadowed sucrose aversion learning more than did distal pre-exposure. This indicates that increasing the time between pre-exposure and conditioning reduces the latent inhibition effect of pre-exposure. A second experiment examined whether this LI effect is mediated via a change in context.

16:00 - 16:40 Comparative cognition

Chair: Javier Vila, National Autonomous University of Mexico

16:00 - 16:20 Perirhinal cortex involvement in taste and object recognition memory

Enrique Morillas, Beatriz Gómez-Chacón, Fernando Gámiz, Milagros Gallo

University of Granada, Spain

Previous studies have shown the relevance of the perirhinal cortex (PRh) integrity either in safe taste recognition memory (De la Cruz et al., 2008) and object recognition memory (Gutiérrez et al., 2004; Brown et al., 2010; Commins, 2011). In this study we assessed the effect of excitotoxic lesions in two subregions of the PRh during a taste neophobia attenuation task and a spontaneous object recognition task (SOR). Forty-one male Wistar rats were assigned to one of three surgical groups receiving i.c. bilateral infusions of NMDA in anterior and posterior PRh or vehicle. They were subjected to a taste neophobia attenuation task, receiving six consecutive exposures to a 3% cider vinegar solution followed by a SOR task with a 24-hour retention interval. Taste recognition memory consolidation was not impaired by any of the PRh lesions. Lesions of the posterior PRh impaired object recognition memory, but anterior lesions did not. These results corroborate the selective involvement of PRh in object recognition memory and the functional specialization of the posterior region of PRh. Funded by PSIC2011-23702 (MICINN, Spain) supported by FEDER funding.

16:20 - 16:40 Temporal distance in temporal weighting rule with humans beings
Angélica Alvarado, Karina Segura, Zulema Cruz, Daniele Garcia, Lesly Hernández, Javier Vila
National Autonomous University of Mexico, Mexico

Recently the Temporal Weighting Rule (TWR) has been proposed as a possible explanation for spontaneous recovery. The TWR predicts integration considering relative distance and subjective value of learning experiences (Devenport, 1998). Some predictions of TWR were demonstrated using an instrumental task with humans participants when the experiences had positive value (López, Alvarado, Cabrera, Luna & Vila, 2013) and when temporal distance of experiences was varied (López, Alvarado & Vila 2010). This study was conducted to replicate some predictions of TWR in an instrumental task using experiences with negative value. This task had different negative relative value (loss of reinforcement) ($A > B$, $A = B$) and different recency values (IR 0, 0.5, 1 and 24h) when both experiences had different relative value ($A > B$). The results replicated the predictions of TWR with positive value consequences, demonstrating that participants consider relative distance and subjective value of each experience at test moment. This integration of time and value occurs gradual when temporal distance increases from recency. Participants choose the most recent experience during an immediate test (recency), but in a distant test, they choose the first experience (primacy). When both experiences had the same relative value they were chosen in the same way.

Palatability shifts in flavor preference learning as assessed by taste reactivity

Alberto Soto, Patricia Gasalla, Dominic M. Dwyer, Matías López

University of Oviedo, Spain; Cardiff University, UK

This study examines with the taste reactivity procedure whether the acquisition of a conditioned flavor preference is also accompanied by an increase in the palatability of the flavor. In Experiment 1, rats received exposures to a lemon solution in combination with either a nutrient (sucrose), a palatable taste (saccharin), or an unflavored nutritive solution (maltodextrin). In a subsequent choice-test between water and the lemon solution, the rats showed a preference for the lemon independently of the solution provided in compound with the lemon during conditioning. When examined the taste reactivity responses to the lemon, it was found an increase in palatability in rats trained with the nutritive flavor (sucrose or maltodextrin) relative to rats receiving saccharin. In Experiment 2, the nutritive component or the nonnutritive component of a sucrose solution previously paired with lemon was devaluated with LiCl. All rats developed a conditioned preference for the lemon as shown in the choice-test, which was abolished by the devaluation treatment. However, a decrease in lemon palatability was observed only after the devaluation of the nutritive component of the sucrose (sucrose or maltodextrin). The results are discussed in relation with the different associations (flavor-nutrient or flavor-flavor) than can influence flavor preference learning.

Noncontingency training nor extinction prevents the recovery of operant responses

Rodolfo Bernal-Gamboa, Alexis Martínez-Ramírez, Javier Nieto

National Autonomous University of Mexico, Mexico

One experiment used a free operant procedure with rats to compare renewal of a response previously eliminated by noncontingent reinforcement training or extinction of previously reinforced lever pressing. All rats were trained to perform one instrumental response (R1) for food in context A, and a different instrumental response (R2) in context B. Then R1 was extinguished in context A and a noncontingent reinforcement procedure was used to eliminate R2 in context B. Each response was then tested in both contexts (A and B) using a within-subject design. R1 was tested in extinction and R2 was tested using the delivery of food irrespective of responding use in the previous phase. The results demonstrated that all rats showed higher levels of responding of both responses when testing was conducted in a second context (i. e., AAB renewal) regardless of the procedure used during the elimination phase. Key words: Context, Extinction, Noncontingent reinforcement, Rats, Renewal.

Forward blocking can be detected using a lexical decision priming test in human contingency learning

Patricia Romero, Joaquín Morís

University of Málaga, Spain

Several propositional models and associative theories have been suggested to explain human contingency learning. Most studies have used verbal judgements to measure the cue-outcome relationships learnt, allowing the engagement of high-order processes. In a recent study, Morís, Cobos, Luque & López (2014), using an associative repetition priming task, showed that forward and backward blocking can be detected engaging automatic associative retrieval processes alone. In the experiment reported here, we extended previous results by showing forward blocking with a lexical decision priming test, minimising the relation between the explicit demands of the test and the learning task. The results provided additional evidence for the implication of automatic associative retrieval processes in human contingency learning, convergent with previous priming results.

Renewal of operant response is reduced by presenting an extinction cue

Jimena Hernández, Tere A. Mason, Rodolfo Bernal-Gamboa, Javier Nieto

National Autonomous University of Mexico, Mexico

The renewal effect, that is, a partial recovery of the extinguished conditioned response that occurs when testing takes place outside the extinction context has been proposed as an animal model for the treatment and relapse of unwanted behaviors such as phobias or addictions. The main goal of the present experiment was to test whether presentation of an extinction-cue (EC) during testing attenuates the renewal effect. A free operant procedure with rats was used. During acquisition, rats were trained to perform one operant response (R1) in context A, and a different operant response (R2) in context B. The extinction phase was conducted in context B for R1 and in context A for R2. During extinction sessions performing the operant responses no longer produced the delivery of pellets, also in these sessions rats received presentations of a tone (i. e., extinction-cue). All subjects were testing in both contexts with both responses. R1 was tested with the EC present in both contexts, while R2 received testing with the presence of the EC only in the extinction context. The data showed that the recovery of R1 was reduced when rats were tested in the presence of the EC. Key words: Rats, Extinction, Renewal.

Exploring the discounting function with pigeons: the effect of food amount

Inês Fortes, Marco Vasconcelos, Armando Machado

University of Minho, Portugal

The hyperbolic discounting function usually describes well how the value of a reward decreases as the cost to obtain it increases. It is, thus, important to understand the parameters of this discounting function. In this experiment we manipulated food amounts to test specific predictions derived from the hyperbolic discounting function. Pigeons chose between two options: 1 reward after a small number of pecks and 2 rewards after a larger number of pecks. The larger number of pecks was increased and decreased until the pigeons were indifferent between the two options. This procedure was repeated for different peck requirements to obtain a function relating the number of pecks on the larger reward with the number of pecks on the smaller reward. Afterwards, we manipulated the number of rewards while keeping the ratio between them, either 1:2 or 1:4. We found that the higher the ratio between reward amounts, the higher the slope of the indifference functions. Moreover, the slopes were equal for conditions with the same ratio but with different absolute food amounts. These results are important for a better understanding of the hyperbolic discounting function.

Eye fixations to contexts decrease as training increases in a human predictive learning task
José A. Aristizabal, Juan M. Rosas, José E. Callejas-Aguilera, Pedro M. Ogallar, Manuel M. Ramos-Álvarez
University of Jaén, Spain

Participants received simple acquisition in a human predictive learning task in which ingestion of a food (cue) was followed by gastric malaise (outcome) in a specific restaurant (context), while other foods were not followed by the outcome in the same, or in a different restaurant (A:X+, F1- and B:Y-, F2-). Upon the presentation of a given cue, participants had to predict whether the cue was going to be followed by the outcome for a given customer. Predictive responses and eye-fixations were recorded throughout the 48 training trials with each cue involved in the task. Attentional theory of context processing predicts that, as training increases and participants discard irrelevant contexts as predictors of the outcome, attention to contexts should decrease, as attention to the cues either increases or is kept constant through training. The results of this study are in agreement with these predictions, supporting the idea that contexts are actively processed at the beginning of acquisition, and that this processing quickly decreases as training increases. The implications for the role of attention in context-switch effects in human predictive learning are discussed.

Effects of Schedule-Induced Polydipsia acquisition on emotional tests

Ana Sanchez-Kuhn, Ana Merchan, Sonia Montaña, Pilar Flores, Margarita Moreno

University of Almería, Spain

Investigating Compulsive Behaviors is a continuing concern within the study of schizophrenia, OCD and addiction disorders. Schedule-Induced Polydipsia is characterized by the development of excessive drinking under intermittent food-reinforcement schedules, and it has been proposed as a successful model to study compulsive behavior. Besides, in literature, it has been hypothesized that the exposition to SIP, may produce an effect on anxiety levels. Therefore, the aim of this study was to determine if SIP acquisition could have an effect over different emotional behaviours; anxiety in the Plus-Maze and compulsivity, locomotor activity and novelty reactivity in the activity cage. We used a population of 30 male Roman rats characterized by individual differences on SIP: Low Avoidance (RLA) and High Avoidance (RHA) Rats. RHA showed higher levels of SIP acquisition, anxiety, novelty reactivity and locomotor activity compared to RLA rats. SIP acquisition decreased locomotor activity and novelty reactivity, in contrast did not affect anxiety measures on plus-maze and on the activity cages in both RHA and RLA rats. One of the more significant findings to emerge from this study is that anxiety levels are not significantly altered after SIP acquisition.

Filler associations on the expression of interfered information: associations retrieval or phase integration?

Javier Vila, Alberto Monrroy, Eneida Strempler

National Autonomous University of Mexico, Mexico

In an interference between outcomes paradigm (e.g., X-01 | X-02) literature has shown that this first information remains stored and that some manipulations, such as context switches, or filler associations may cause its expression. Matute et al. (2011) have suggested that filler associations can be used to retrieve a past temporal context and the information associated with other cues that were trained at this time. Two experiments with human participants where they learned an instrumental response were conducted to study the conditions under which a filler association can retrieve other associations that occurring together. Experiment 1 replicated the original effect showing that a filler association can retrieve other associations that occurring together. Experiment 2 using control groups with a new association before testing found similar intermediate responses for both phases and for distant association X-01 in a filler association group during the test. These data suggest that the retrieval of the first association can be explained more properly as an integration of both phases (X-01; X-02) where the most recent association is more relevant at test moment.

The effects of different types of pre-training on preschoolers' performance in number-to-position tasks

Eugénia Fernandes, Armando Machado, François Tonneau

University of Minho, Portugal

In a Number-to-Position (NTP) task, participants are initially presented a spatial medium, such as a line segment. They are instructed and/or trained to select the line's leftmost position when they see a minimum number of dots (e.g., 10) and to select the line's rightmost position when they see a maximum number of dots (e.g., 90). Next, they are tested with these and also intermediate numerosities and asked to estimate their location along the 10-to-90 line. We tested adults and preschool children and found that both groups' average response location curves increased as a function of numerosity. However, inspection of individual's single-trial scatterplots revealed that, contrary to adults, preschoolers' smooth and increasing curves were an averaging artifact. Rather than responding along the line's extent, most preschoolers restricted their responses to the endpoints (bi-categorical pattern) or to the middle and the endpoints (tri-categorical). Consequently, we implemented three pre-training histories and assessed whether they enhanced continuous NTP performance. We found that transfer to the NTP has highest when preschoolers were pre-trained to select increasing positions along the line as sample circles became darker. Arguably, this is because in both the Brightness and NTP tasks, the stimuli and the responses are ordered along a continuum of increasing magnitude.

Updating information in the Episodic-Like Memory in preschoolers: time and outcome magnitude

Eneida Strempler, Angélica Alvarado, Javier Vila

National Autonomous University of Mexico, Mexico

Episodic-Like Memory (ELM) is the ability to remember an integrated information about the What, Where and When (WWW) of a personal event, and it is attributable to animals and humans. The ELM allows organism update their knowledge to new situations (Clayton, Bussey, and Dickinson, 2003). An experiment with preschool children, sought to prove if the Temporal Weighting Rule (Devenport, 1998) could explain update information about WWW memories. One experiment compared the information retrieval of two conditions: $A=B$ vs. $A>B$, the magnitude of the outcome during the first experience was varied in one group ($A>B$). Participants acquired two experiences at different times (first experience A and experience B later), followed by an extinction phase for both experiences. What: were two types of coins, Where: were the coins containers and When: the two moments of each acquired experience. A test was performed after a 24h interval, asking by the container with more coins. Obtained data showed update information, where participants considered time recency and outcome magnitude for each experience. These results are according with the Temporal Weighting Rule predictions.