ISDP International Society for Developmental Psychobiology

48TH ANNUAL MEETING
CONFERENCE PROGRAM

JULY 20-23, 2015

MIRAMAR PALACE
SAN SEBASTIAN, SPAIN

INTERNATIONAL SOCIETY FOR DEVELOPMENTAL PSYCHOBIOLOGY

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SAN SEBASTIAN, SPAIN • JULY 20 – 23, 2015

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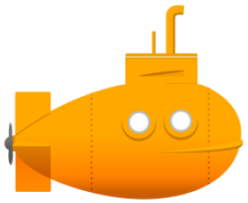

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Monday - 7/20		Tuesday - 7/21		Wednesday – 7/22		Thursday – 7/23	
8:30-10:20	**Board Meeting**	8:30-10:30	**Presidential Symposium: Continuities against Discontinuities - Mother-Infant 'Communication' Through Amniotic Fluid, Colostrum, and Milk** M.G. Chotro B. Patris J.R. Alberts J. Candau	8:30-10:30	**Oral Session 3: Attention, Learning, & Memory**	8:30-10:30	**Symposium: Epigenetic Consequences and Transgenerational Inheritance of Stress** T.L. Roth M. Szyf B. Dias K. Braun A. Weller
10:20-10:30	**Morning Break**	10:15-10:35	**Morning Break**	10:30-11:00	**Morning Break**	10:30-10:45	**Morning Break**
10:30-12:30	**Oral Session 1: Stress and HPA Function**	10:35-11:45	**Awards Symposium** Kurcharski Young Investigator Award FABBS Early Career Impact Award Sandra G. Wiener Award Dissertation Award	11:00-12:00	**Wiley Distinguished Speaker** A. David Edwards	10:45-11:45	**Business Meeting - All Invited**
		11:45-12:35	**Travel Awardees Presentations**	12:00-12:35	**Travel Awardees Presentations**	11:45	**End of ISDP Conference**
12:45-2:15	**General Lunch**	12.45-2:15	**General Lunch**	12:45-2:15	**General Lunch**		
12:45-2:15	**Meet the Professors Lunch**	12:45-2:15	**Lunch Workshop: the Future of Nonhuman Animal Research: Intersections of Science, Public Opinion, and Practice** A.J. Bennett J. Bailoo K. Leech G.F. Michel	12:45-2:15	**Wiley Editorial Board Meeting**		
2:15-4:15	**Sackler Symposium: New Research on Sensitive Periods in Development** J. Gervain F. Lee C.A. Nelson A.E. Takesian N.A. Fox	2:15-4:10	**Symposium: The Complexity of Imitation during Early Childhood: Biological Constraints and Individual Differences** C. Konrad E. Nordqvist E. Flynn R. Barr	2:15-3:25	**Mini-Symposium: How Exposure to Language Shapes the Human Infant Brain during the First 6 Months of Life** J. Gervain M. Molnar S. Rossi N. Altvater-Mackensen M. Carreiras		
				3:25-4:15	**Travel Awardee Presentations**		
4:15-4:30	**Afternoon Break**	4:10-4:30	**Afternoon Break**	4:15-4:35	**Afternoon Break**		
4:30-5:30	**Mini-Symposium: The Neurobiology of Mother-Infant Interaction: Typical vs. Atypical Development** R.C. Froemke R.E. Perry M.M. Sanchez	4:30-6:15	**Oral Session 2: Parental Influences**	4:35-6:35	**Oral Session 4: Motor and Social Development**		
5:30-6:15	**Travel Awardees Presentations**						
6:15-7:45	**Poster Session 1**	6:15-7:45	**Poster Session 2**				
8:00-10:00	**Welcome Cocktail Reception**	8:00-9:00	**Aquarium Tour**	9:00-12:00	**Gala Dinner Celebration**		
		9:00-12:00	**Student Social**				

Monday, July 20

8:00-5:00 **ISDP REGISTRATION** – *Hall Sur*

8:30-10:20 **ISDP BOARD MEETING** – *Salón Blanco*

10:20-10:30 **MORNING BREAK**

10:30-10:40 **OPENING REMARKS: April Ronca, President**

10:40-12:25 **ORAL SESSION 1: STRESS & HPA FUNCTION**
Chair: Nim Tottenham

10:40-10:55 SEX, STRESS, AND DOPAMINE: POTENTIAL MECHANISMS
K.G. Bath, & H. Goodwill

10:55-11:10 CORTISOL IN MOTHER'S MILK IN THE NEONATAL PERIOD INFLUENCES LATER INFANT SOCIAL BEHAVIOR AND COGNITION IN RHESUS MONKEYS – **Travel Awardee**
A.M. Dettmer, A.M. Murphy, D. Guitarra, E. Slonecker, M.A. Novak, J.S. Meyer, & S.J. Suomi

11:10-11:25 NEUROPSYCHOLOGICAL DEVELOPMENT AT 4 YEARS OLD: ASSOCIATION WITH SALIVARY CORTISOL, ALPHA-AMYLASE AND PSYCHOSOCIAL VARIABLES AT 14 MONTHS OF AGE
A. Andiarena, O. Vegas, N. Balluerka, & J. Ibarluzea

11:25-11:40 INDIVIDUAL DIFFERENCES IN STRESS REACTIVITY IN A HIGH RISK SAMPLE
R.D. Eiden & D. A. Granger

11:40-11:55 EARLY LIFE STRESS ALTERS GENE EXPRESSION AND ACTIVITY PATTERNS IN THE MESOLIMBIC DOPAMINE SYSTEM AND ENHANCES SUSCEPTIBILITY TO DEPRESSION – **Travel Awardee**
C.J. Peña, I. Purushothaman, A.K. Friedman, R.C. Bagot, M-H Han, L. Shen, & E.J. Nestler

11:55-12:10 THE BEHAVIORAL EFFECT OF POSTNATAL CORTICOSTERONE ADMINISTRATION IN DEVELOPING RATS DEPENDS ON ITS DURATION AND PATTERN OF ELEVATION
D.I. Claflin , S.J., Jensen, L.R. Greenfield, C.L. Wentworth-Eidsuane, M.Kraszpulski, K.D. Schmidt, K.D., & M.B. Hennessy

12:10-12:25 EFFECTS OF PERINATAL STRESS AND FLUOXETINE ON CIRCADIAN BEHAVIOUR OF ADULT MICE – **Travel Awardee**
V. Kiryanova, V.M. Smith, M.C. Antle & R.H. Dyck

12:45-2:15 **LUNCH & MEET THE PROFESSORS LUNCH** – *Tennis Ondarreta Restaurant*

2:15-4:15 **SACKLER SYMPOSIUM: NEW RESEARCH ON SENSITIVE PERIODS IN DEVELOPMENT**
Chair and Discussant: Nathan Fox

2:15-2:20 Introduction: N. Fox

2:20-2:45 THE PERCEPTION OF TIME-COMPRESSED SPEECH AT BIRTH
J. Gervain

2:45-3:10 SENSITIVE PERIODS IN AFFECTIVE DEVELOPMENT: NONLINEAR MATURATION OF FEAR LEARNING
F. Lee

3:10-3:35 THE EFFECTS OF EARLY, PROFOUND DEPRIVATION ON BRAIN AND BEHAVIORAL DEVELOPMENT: TIMING IS EVERYTHING
C.A. Nelson, N.A. Fox, & C.H. Zeanah

3:35-4:00 MECHANISMS OF CRITICAL PERIOD BRAIN DEVELOPMENT
A.E. Takesian & T.K. Hensch

4:00-4:15 Discussion: N. Fox

4:15-4:30 **AFTERNOON BREAK**

4:30-5:30 **MINI-SYMPOSIUM: THE NEUROBIOLOGY OF MOTHER-INFANT INTERACTION: TYPICAL VS. ATYPICAL DEVELOPMENT**
Chairs: Rosemarie Perry & Elizabeth Rickenbacher

4:30-4:50 OXYTOCIN, MATERNAL BEHAVIOR, AND EXCITATORY-INHIBITORY BALANCE
R.C. Froemke, B.J. Marlin, M. Mitre, J.A. D'amour, & M.V. Chao

4:50-5:10 NEUROBEHAVIORAL CONSEQUENCES OF EARLY LIFE ABUSE: FEAR, AGGRESSION, AND MATERNAL PROTECTION OF PUPS – **Travel Awardee**
R.E. Perry & R.M. Sullivan

5:10-5:30 NEUROBEHAVIORAL CONSEQUENCES OF DISRUPTED MOTHER-INFANT RELATIONSHIP: NONHUMAN PRIMATES
M.M. Sanchez

5:30-6:15 **TRAVEL AWARD 5-MINUTE PRESENTATIONS**

Awardee	**Advisor**	**Institution**
M.J. Caruso	S. Cavigelli	Pennsylvania State University
W. Watanasriyakul	M. Hennessy	Wright State University
C.M. Ragan	J. Lonstein	Michigan State University
M. Ordonez-Retamar	W.P. Fifer	Columbia University
J.D. Nugent	W.P. Fifer	Columbia University
N.H. Brito	W.P. Fifer	Columbia University
J.A. Varholick	J. Bailoo	University of Bern
G. Manzano-Nieves	K. Bath	Brown University

6:15-7:45 POSTER SESSION 1 – *Salón de la Música*

1. NEUROMOTOR (POSTURAL) DEVELOPMENT AS A PREDICTOR OF DEVELOPMENTAL CHANGE IN INFANT HANDEDNESS – **Travel Awardee**
   A. Koucheki, J.M. Campbell, & G.F. Michel

2. HOW ESTABLISHED HAND PREFERENCE FOR ACQUISITION INFLUENCES THE CONSISTENCY OF HAND PREFERENCE FOR MANIPULATION – **Travel Awardee**
   J. Latta, J.M. Campbell, E.C. Marcinowski, & G.F. Michel

3. COMPARISON OF SENSORY, MOTOR AND COGNITIVE DEVELOPMENT IN 3XTG-AD AND 5XFAD MOUSE MODELS OF ALZHEIMER'S DISEASE
   S. Shin, A.K. Glenn, J.C. Whitehead, C.E. Blaney, K.R. Stover, & R.E. Brown

4. MATERNAL DIET INFLUENCES OFFSPRING FEEDING BEHAVIOR AND FEARFULNESS IN BIRDS
   A. Bertin, N. Aigueperse, & L. Calandreau

5. EMBRYONIC EXPOSURE TO COOL TEMPERATURE ENHANCES THE EXPRESSION OF FEAR-RELATED BEHAVIORS IN BIRDS
   A. Bertin, L. Calandreau, F. Cornilleau,M. Meurisse, P. Constantin, E.N. de Haas, J. Delaveau, C. Rat, A.S. Darmaillacq, L. Dickel, S. Lumineau, C. Houdelier, & C. Arnould

6. THE ROLE OF LANGUAGE CUES ON FLEXIBLE MEMORY RETRIEVAL AT 12-MONTHS OF AGE– **Travel Awardee**
   G. Taylor & J.S. Herbert

7. LIMITS ON THE BILINGUAL ADVANTAGE IN INFANT MEMORY GENERALIZATION ON A TRANSFER TASK – **Travel Awardee**
   L. Zimmermann, C. Nugent, N. Brito, & R. Barr

8. ASSOCIATIONS BETWEEN SOCIOECONOMIC STATUS, EEG POWER AT BIRTH, AND COGNITIVE SKILLS DURING INFANCY – **Travel Awardee**
   N.H. Brito, K.G. Noble, M.M. Myers, W.P. Fifer, & A.J. Elliott

9. ASSOCIATIONS BETWEEN MU RHYTHM REACTIVITY AND IMITATION IN INFANCY: A PILOT STUDY – **Travel Awardee**
   L.J. Bryant, K. Cuevas, K. Valerio, & J. Sahani

10. CREATING A PARADIGM FOR STUDYING CROSS-MODAL ASSOCIATIVE EPISODIC MEMORY IN PRESCHOOLERS
    A.E. Learmonth

11. ADOLESCENT ETHANOL CONSUMPTION ENHANCES ETHANOL REINFORCEMENT DURING ADULTHOOD IN ALCOHOL-PREFERRING (P) RATS
    Z.A. Rodd, J.E. Toalston, R.L. Bell, S.R. Hauser, G.A. Deehan Jr., & W.J. McBride

12. ADOLESCENT NICOTINE EXPOSURE FACILITATES RETRIEVAL OF TRAUMATIC FEAR MEMORY IN ABA RENEWAL
    R.C. Barnet, Luner, E., & J. Iannucci

13. MK-801 IMPAIRS THE ACQUISITION OF CONTEXTUAL FEAR IN THE CONTEXT PRE-EXPOSURE FACILITATION EFFECT (CPFE) PARADIGM IN ADOLESCENT RATS – **Travel Awardee**
    N.A. Heroux, P. A. Robinson-Drummer, J. B. Rosen, & M.E. Stanton

14. SEX AND GESTATIONAL AGE DIFFERENCES IN AUTONOMIC CONTROL OF HEALTHY NEWBORNS DURING SLEEP – **Travel Awardee**
    M. Ordonez-Retamar, N. Burtchen, J.S. Yang, J.D. Nugent, M.M. Myers, & W.P.Fifer

15. HIGH FREQUENCY ELECTROCORTICAL COHERENCE: EFFECTS OF SEX AND SLEEP POSITION – **Travel Awardee**
    J. D. Nugent, M. M. Myers, P. G. Grieve, & W.P. Fifer

16. SLEEP-MEDIATED CONSOLIDATION OF EPISODIC MEMORY IN CHILDREN AND ADULTS – **Travel Awardee**
    J.-Y. Wang, F.D. Weber, & J. Born

17. CHILD EXECUTIVE FUNCTIONING IS PREDICTED BY PARENT HYPOTHALAMIC PITUITARY ADRENAL (HPA) FUNCTION IN BOTH CANCER SURVIVORS AND HEALTHY CONTROL CHILDREN – **Travel Awardee**
    S.M. Dinces, S.N. Hile, L.N. Rowell, J.F.L. Pinner, R.E. Rieger, N.C. Moss, R.S. Allen, M.E. Thompson, A.C. Tang, & R.D. Annett

18. THE EXPERIENCE OF CANCER AFFECTS THE RELATIONSHIP BETWEEN PARENT AND CHILD HYPOTHALAMIC PITUITARY ADRENAL (HPA) FUNCTION– **Travel Awardee**
    S.M. Dinces, S.N. Hile, L.N. Rowell, J.F.L. Pinner, R.E. Rieger, N.C. Moss, R.S. Allen, M. Emery Thompson, A.C. Tang, & R.D. Annett

19. CORTICOSTEROID RECEPTOR EXPRESSION IS LINEARLY RELATED TO INDIVIDUAL DIFFERENCES IN NOVELTY EXPLORATION –**Travel Awardee**
    M.J. Caruso, R. A. Crouse, & S.A. Cavigelli

20. STRESS BUFFERING OF CORTISOL RESPONSE IN GUINEA PIG PUPS: THE EFFECTS OF SOCIAL INTERACTIONS WITH UNFAMILIAR ADULT MALES – **Travel Awardee**
    W. Watanasriyakul, M.B. Hennessy, & P.A. Schiml

21. TRAIT ANXIETY PREDICTS MEDIAL PREFRONTAL CORTEX GABA SYSTEM PROTEIN EXPRESSION IN POSTPARTUM RATS – **Travel Awardee**
    C.M. Ragan & J.S. Lonstein

22. MANIPULATION OF THE PRE- AND POST-WEANING SOCIAL ENVIRONMENT AND ITS EFFECTS ON PREPULSE INHIBITION OF THE ACOUSTIC STARTLE RESPONSE IN C57BL/6 – **Travel Awardee**
    J.A. Varholick, X.J. Garza, R.L. Jordan, G.F. Michel, & J.D. Bailoo

23. THE EFFECT OF EARLY LIFE ADVERSITY ON EMOTIONAL MEMORIES DURING DEVELOPMENT – **Travel Awardee**
    G. Manzano-Nieves & K.G. Bath

8:00-10:00 WELCOME COCKTAIL RECEPTION – *Hotel Monte Igueldo*

Tuesday, July 21

8:30-10:30 **PRESIDENTIAL SYMPOSIUM: CONTINUITIES AGAINST DISCONTINUITIES – MOTHER-INFANT 'COMMUNICATION' THROUGH AMNIOTIC FLUID, COLOSTRUM, AND MILK**
Chairs: Benoist Schaal & M. Gabriela Chotro

8:30-8:35 Opening Remarks: A.E. Ronca

8:35-8:40 Introduction: B. Schaal

8:40-9:05 NEONATAL AND INFANTILE ATTRACTION TO ODORS FROM MATERNAL DIET DURING GESTATION: THE PARTICULAR CASE OF ALCOHOL
M.G. Chotro

9:05-9:30 SYNCHRONICITY IN MILK ODOR AND NEONATAL MILK ODOR ATTRACTION AND SUCKLING IN THE LABORATORY MOUSE
B. Patris, A. Al Ain, & B. Schaal

9:30-9:55 AMNIOTIC ODOR AS A CANALIZING EXPERIENCE
J.R. Alberts & A.E. Ronca

9:55-10:20 HUMAN NEONATAL CONSUMPTION OF THE COLOSTRUM AS A BIOCULTURAL EXPERIENCE
J. Candau

10:20-10:35 **MORNING BREAK**

10:35-11:45 **ISDP AWARDS SYMPOSIUM**
Chair: Pamela Hunt

10:35-10:40 **DAVID KUCHARSKI YOUNG INVESTIGATOR AWARD**
Kimberly Cuevas, University of Connecticut (talk Wed 10:15)
Presenter: Norman Spear

10:40-10:50 **FABBS EARLY CAREER IMPACT AWARD**
Tania Roth, University of Delaware
Presenter: Regina Sullivan

10:50-11:10 **SANDRA G. WIENER AWARD**
Steven Boomhower, Auburn University
Advisor: M. Christopher Newland
NEUROBEHAVIORAL TOXICITY OF ADOLESCENT METHYLMERCURY EXPOSURE IN MICE

11:10-11:40 **DISSERTATION AWARD**
Millie Rincón-Cortés, Sackler Institute - NYU School of Medicine
Advisor: Regina Sullivan
PATHWAY TO PATHOLOGY: EARLY LIFE TRAUMA AND AMYGDALA SEROTONIN

11:40-12:35 **TRAVEL AWARD 5-MINUTE PRESENTATIONS**

Awardee	Advisor	Institution
G. Taylor	J.S. Herbert	Lancaster University
L.J. Bryant	K. Cuevas	University of Connecticut
J.S. Yang	W.P. Fifer	Columbia University
J.-Y. Wang	J. Born	University of Tübingen
A.R. Gobinath	L. Galea	University of British Columbia
J. Blaze	T.L. Roth	University of Delaware
E.L. Moyer	A.E. Ronca	NASA Ames Research Center
S. Castelló	C. Arias	Instituto de Investigación Médica M. y M. Ferreyra

12:45-2:15 **LUNCH** – *Tennis Ondarreta Restaurant*

12:45-2:15 **LUNCH WORKSHOP: THE FUTURE OF NONHUMAN ANIMAL RESEARCH: INTERSECTIONS OF SCIENCE, PUBLIC OPINION, AND PRACTICE –** *Salón Blanco*
(this event requires advance reservation & ticket)
Chair: Alison Bennett

12:45-1:05 BROADER IMPACTS: GLOBAL INTERSECTIONS AND INTEGRATIVE ETHICAL CONSIDERATION OF ANIMAL RESEARCH AND POLICY
A.J. Bennett

1:05-1:25 AT THE INTERSECTION OF ANIMAL WELFARE, REPRODUCIBILITY, AND POLICY – **Travel Awardee**
J. Bailoo, T. S. Reichlin, J. A. Varholick, & H. Würbel

1:25-1:45 ANIMAL RESEARCH: TIME TO TALK!
K. Leech

1:45-2:15 Discussion: G.F. Michel

2:15-4:10 **SYMPOSIUM: THE COMPLEXITY OF IMITATION DURING EARLY CHILDHOOD: BIOLOGICAL CONSTRAINTS AND INDIVIDUAL DIFFERENCES**
Chair: Rachel Barr

2:15-2:20 Introduction: Rachel Barr

2:20-2:55 SLEEP AFTER LEARNING ENHANCES FLEXIBILITY OF MEMORY RETRIEVAL IN 12-MONTH-OLD INFANTS
C. Konrad, J.S. Herbert, S. Schneider, S. Lorek, S. Seehagen

2:55-3:20 DEFERRED IMITATION, ASSOCIATIVE MEMORY AND COMMUNICATION IN 14-MONTH-OLD CHILDREN
E. Nordqvist, M. Rudner, M. Lindgren, M. Johansson, & M. Heimann

3:20-3:45 INVESTIGATING THE FACTORS AFFECTING YOUNG CHILDREN'S SOCIAL AND ASOCIAL LEARNING PREFERENCES
E. Flynn, C.R. Turner, & L. Girardeau

3:45-4:10 IMITATION PRACTICE MAKES IMITATION PERFECT: IMITATION ENHANCES MOTOR-SPATIAL LEARNING BY PRESCHOOLERS IN A BRIEF TRAINING STUDY
R. Barr, F. Subiaul, & L. Zimmerman

4:10-4:30 **AFTERNOON BREAK**

4:30-6:15 **ORAL SESSION 2: PARENTAL INFLUENCES**
Chair: Bill Fifer

4:30-4:45 MATERNAL BUFFERING OF ADOLESCENT RISK TAKING: INSIGHTS FROM NEUROSCIENCE
E.H. Telzer

4:45-5:00 A POSITIVE TACER-3 ALCOHOL SCREEN IN PREGNANCY PREDICTS LATER ALCOHOL USE PROBLEMS IN CHILDREN
J.H. Hannigan, L.M. Chiodo, J. Janisse, R.J. Sokol, & V. Delaney-Black

5:00-5:15 EFFECTS OF MATERNAL CARE ETHANOL PREFERENCE AND SENSITIVITY TO ETHANOL INDUCED SEDATION HYPNOSIS – **Travel Awardee**
D.O. Popoola & N.M. Cameron

5:15-5:30 PERCEIVED MALTREATMENT AND DEVELOPMENT OF RISKY PERSONALITY FACTORS AND FUTURE ORIENTATION: RISK FOR ALCOHOL USE DURING ADOLESCENCE – **Travel Awardee**
H. Edalati & M.D. Krank

5:30-5:45 MATERNAL BEHAVIOR IS MODULATED BY PRENATAL STRESS IN YOUNG BIRDS
N. Aigueperse, O. Le Bot, F. Pittet, E. de Margerie, C. Houdelier, & S. Lumineau

5:45-6:00 PRENATAL MATERNAL EFFECTS ARE MODULATED BY A PRECOCIAL BIRDS' POSTNATAL MATERNAL CARE
C. Houdelier, O. Le Bot, N. Aigueperse, E. de Margerie, A.S. Darmaillacq, L. Dickel, C. Arnould, L. Calandreau, A. Bertin, & S. Lumineau

6:00-6:15 EARLY FACE-TO-FACE INTERACTIONS IMPROVE SOCIAL DEVELOPMENT IN NURSERY-REARED INFANT RHESUS MACAQUES (MACACA MULATTA) – **Travel Awardee**
S.S.K. Kaburu, E.A. Simpson, A. Paukner, S.J. Suomi, & P.F. Ferrari

6:15-7:45 **POSTER SESSION 2 –** *Salón de la Música*

1. THE BENEFICIAL EFFECTS OF A POSITIVE ATTENTION BIAS AMONGST CHILDREN WITH A HISTORY OF PSYCHOSOCIAL DEPRIVATION: REDUCING ANXIETY AND STRESS REACTIVITY – **Travel Awardee**
   S. Troller-Renfree, K. McLaughlin, M. Sheridan, C.A. Nelson, C.H. Zeanah, & N.A. Fox
2. ELECTROPHYSIOLOGICAL RESPONSES DURING ERROR MONITORING AS A POTENTIAL BIOMARKER FOR ANXIETY **– Travel Awardee**
   M.L. Ramos, A. Casas, M. Bechor, J. Pettit, & B.C. Reeb-Sutherland
3. THE ROLE OF ACETALDEHYDE IN THE PRENATAL ETHANOL EXPOSURE EFFECT ON THE NEONATE RATS.
   A. Angulo-Alcalde, M. Gaztañaga, & M.G. Chotro
4. PERSISTENCE OF ETHANOL-INDUCED SENSITIZATION DURING THE PREWEANLING PERIOD OF THE RAT **– Travel Awardee**
   S. Castelló, G. D'Aloisio, J. C. Molina, & C. Arias
5. INTRA-DORSAL HIPPOCAMPAL ANTAGONISM OF MUSCARINIC ACETYLCHOLINE RECEPTORS DISRUPTS THE CONTEXT PREEXPOSURE FACILITATION EFFECT **– Travel Awardee**
   P.A. Robinson-Drummer, N.A. Heroux, & M.E. Stanton
6. BEHAVIORAL LATERALIZATION SCALE: A NEW METHOD FOR CHARACTERIZING MULTIPLE LATERALIZED PREFERENCES IN BOBWHITE QUAIL CHICKS (COLINUS VIRGINIANUS) **– Travel Awardee**
   S.C. Belnap & R. Lickliter
7. INDIVIDUAL DIFFERENCES IN SPONTANEOUS EYE BLINKING ARE LINKED TO FRONTAL ASYMMETRY IN HUMAN INFANTS
   L.F. Bacher, S. Retz, C. Lindon, & M.A. Bell
8. MODERATELY-PREMATURE AND FULL-TERM INFANTS PERFORM DIFFERENTLY ON A COGNITIVE/EYE-HAND “TOUCHPAD TASK” AT 4-MONTHS OF AGE
   E. Hanrion-Monnier, C. Granier-Deferre, & A.J.DeCasper
9. FRONTAL HIGH FREQUENCY EEG SPECTRAL POWER IS INCREASED DURING ACTIVE SLEEP IN NEWBORNS WITH CONGENITAL HEART DISEASE COMPARED TO HEALTHY CONTROLS – **Travel Awardee**
   J.S. Yang, C.L. Weiss, P. Grieve, I.A. Williams, M.M. Myers, & W.P. Fifer
10. AN EARLY LIFE TREATMENT THAT INCREASES MATERNAL BEHAVIOR DECREASES INCENTIVE SALIENCE IN A SEX-DEPENDENT MANNER IN RATS
    R. Nadal, S. Fuentes, J. Carrasco, A. Hatto, J. Navarro, M. Monsonet, J. Ortiz & A. Armario
11. COMPARING THE EFFICACY OF MATERNAL FLUOXETINE AND EXERCISE IN A RODENT MODEL OF POSTPARTUM DEPRESSION: OUTCOME OF BOTH MOTHER AND MALE AND FEMALE OFFSPRING **– Travel Awardee**
    A.R. Gobinath, R.J. Richardson, C. Chow, J.L. Workman, S.E. Lieblich, A.M. Barr, & L.A.M. Galea
12. EFFECT OF SPATIAL MANIPULATIONS AND NMDA-RECEPTOR ANTAGONISM ON THE ONTOGENY OF OBJECT-IN-CONTEXT RECOGNITION IN THE RAT **– Travel Awardee**
    A.I. Ramsaran & M.E. Stanton
13. THE INFLUENCE OF MATERNAL ANTENATAL STRESS AND CORTISOL ON BIRTH OUTCOMES – **Travel Awardee**
    S. Nazzari, F. Ciceri, N. Dottori, M. Molteni, F. Rice, P. Fearon, A. Frigerio
14. EARLY DEPRIVATION ALTERS THE DEVELOPMENT OF AFFECTIVE AND SOCIAL BEHAVIOR IN RATS SELECTIVELY BRED FOR AN INFANTILE TRAIT
    B. Zimmerberg, & C. Bope

15. THE INCIDENCE OF DEPRESSION IN PREGNANT WOMEN IS HIGH IN AN URUGUAYAN POPULATION AND PREDICTED BY EMOTIONAL AND PHYSICAL ABUSE IN MOTHERS' FAMILY OF ORIGIN: A PILOT STUDY
    D.E. Olazábal, A.S. Fleming, G. Grandi, D. Musetti, G.Rey, L. Fernández, G. Laporte, F. Medici, & E. Nicolaisen

16. INTERVENING EARLY TO AFFECT TELOMERE LENGTH – **Travel Awardee**
    J.R. Hoye, A. Asok, K. Bernard, T.L. Roth, & M. Dozier

17. STRESS IMPAIRS COGNITIVE FLEXIBILITY IN 15-MONTH-OLD INFANTS**– Travel Awardee**
    S. Seehagen, S. Schneider, & N. Zmyj

18. EFFECTS OF UNPREDICTABLE VARIABLE PRENATAL STRESS (UVPS) ON BDNF DNA METHYLATION AND TELOMERE LENGTH IN THE ADULT RAT BRAIN – **Travel Awardee**
    J. Blaze, A. Asok, C.D. Tulbert, A.E. Ronca, &T.L. Roth

19. DOES UNPREDICTABLE VARIABLE PRENATAL STRESS (UVPS) ALTER MATERNAL CARE AND MODULATE TELOMERE LENGTH IN ADULT RAT BRAIN?– **Travel Awardee**
    E.L. Moyer, A. Asok, J. Blaze, T.L. Roth, & A.E. Ronca

20. UNPREDICTABLE VARIABLE PRENATAL STRESS PROGRAMS ENDURING EFFECTS ON THE STRESS AXIS IN MALE AND FEMALE RATS
    A.E. Ronca, E.L. Moyer, J. Varholick, J.L., Bollinger, C.D. Tulbert, & L.A. Baer

21. ADOLESCENT FEAR MEMORIES AND DNA METHYLATION FOLLOWING EXPOSURE TO CAREGIVER MALTREATMENT – **Travel Awardee**
    T.S. Doherty & T.L. Roth

22. LOOKING FOR POTENTiATION OF LATENT INHIBITION IN PREWEANLING RATS
    U. Liberal, M. Gaztañaga, A. Angulo, & G. Rodríguez

23. ROLE OF CONTEXT IN THE EXTINCTION PARADIGM IN PREWEANLING RATS **– Travel Awardee**
    D.A. Revillo, G. Trebucq, G. Paglini, & C. Arias

8:00-9:00 **AQUARIUM TOUR**

9:00-12:00 **STUDENT SOCIAL** – *Sirimiri*

Wednesday, July 22

8:30-10:30 **ORAL SESSION 3: ATTENTION, LEARNING, AND MEMORY**
Chair: Mark Stanton

8:30-8:45 NEW LEARNING VS UNLEARNING: EXAMINATION OF THE INFRALIMBIC CORTEX-AMYGDALA-HIPPOCAMPUS CIRCUITRY IN EXTINCTION OF CONDITIONED FEAR
J.H. Kim, C.H.J. Park, A.G. Paolini, D.E. Ganella

8:45-9:00 NEONATAL MERCURY EXPOSURE ALTERS HIPPOCAMPUS-DEPENDENT MEMORY AND ANXIETY IN RATS
P.S. Hunt

9:00-9:15 EXTINCTION OF CONDITIONED CUES REDUCES INCUBATION OF COCAINE CRAVING IN ADOLESCENT AND ADULT RATS – **Travel Awardee**
H.B. Madsen, I.C. Zbukvic, S. Luikinga, A.J. Lawrence, & J.H. Kim

9:15-9:30 METHAMPHETAMINE ABUSE IN ADOLESCENCE: EXAMINATION OF DRUG INTAKE, EXTINCTION AND REINSTATEMENT USING THE INTRAVENOUS SELF-ADMINISTRATION PARADIGM – **Travel Awardee**
S.J. Luikinga, H.B. Madsen, I.C. Zbukvic, A.J. Lawrence, J.H. Kim

9:30-9:45 THE EFFECT OF D-PENICILLAMINE ADMINISTRATION DURING PRENATAL ETHANOL EXPOSURE IN 5 AND 14 DAY-OLD RATS
M. Gaztañaga , A.Angulo-Alcalde , N.E. Spear and M.G. Chotro

9:45-10:00 AGE-RELATED CHANGES AND SEX DIFFERENCES IN VISUOSPATIAL WORKING MEMORY IN 2- TO 4-YEAR-OLDS – **Travel Awardee**
L. Zimmermann, R. Speidel, and R. Barr

10:00-10:15 REAL-TIME ANALYSIS OF COVERT ATTENTION USING STEADY-STATE VISUAL EVOKED POTENTIALS REVEALS ROBUST INHIBITION OF RETURN DURING FREE-LOOKING BY YOUNG INFANTS
S.S. Robertson

10:15-10:30 SEX DIFFERENCES IN EEG ACTIVITY DURING EXEUCTIVE PROCESSING: A COMPARISON OF INFANTS AND YOUNG CHILDREN – **David Kucharski Young Investigator Awardee**
K. Cuevas, S.D. Calkins, and M.A. Bell

10:30-11:00 **MORNING BREAK**

11:00-12:00 **JOHN WILEY DISTINGUISHED SPEAKER**
A. David Edwards, King's College London
Chair: April Ronca
THE DEVELOPING HUMAN CONNECTOME PROJECT

12:00-12:35 **TRAVEL AWARD 5-MINUTE PRESENTATIONS**

Awardee	Advisor	Institution
A. Koucheki	G.F. Michel	UNC-Greensboro
J. Latta	G.F. Michel	UNC-Greensboro
N.A. Heroux	M.E. Stanton	University of Delaware
P.A. Robinson-Drummer	M.E. Stanton	University of Delaware
A.I. Ramsaran	M.E. Stanton	University of Delaware
S. Nazzari	P. Fearon	University College London

12:45-2:15 **LUNCH** – *Tennis Ondarreta Restaurant*

2:15-3:25 **MINI-SYMPOSIUM: HOW EXPOSURE TO LANGUAGE SHAPES THE HUMAN INFANT BRAIN DURING THE FIRST 6 MONTHS OF LIFE**
Chairs: Monika Molnar & Manuel Carreiras

2:15-2:30 PRENATAL EXPERIENCE SHAPES PERCEPTION OF PROSODY AT BIRTH
J. Gervain

2:30-2:45 BILINGUAL EXPOSURE SHAPES RESTING STATE BRAIN NETWORKS BY 4 MONTHS OF AGE
M. Molnar, B. Blanco, M. Carreiras, & C. Caballero

2:45-3:00 DOES BILINGUALISM DELAY LANGUAGE ACQUISITION OR SPEED IT UP? EVIDENCE FROM A SIMULTANEOUS EEG-FNIRS STUDY
S. Rossi & M.F. Gugler

3:00-3:15 INFANTS' PREFERENCE TO LOOK AT A SPEAKER'S MOUTH MODULATES ACTIVATION OF FRONTAL BRAIN AREAS DURING SPEECH PERCEPTION
N. Altvater-Mackensen & T. Grossman

3:15-3:25 Discussion: M. Carreiras

3:25-4:15 **NIH FUNDING: RESEARCH NEEDS AND FUNDING IN DEVELOPMENTAL PSYCHOBIOLOGY**
K. Mann Koepke

4:15-4:35 **AFTERNOON BREAK**

4:35-6:35 **ORAL SESSION 4: MOTOR AND SOCIAL DEVELOPMENT**
Chair: Jane Herbert

4:35-4:50 CHILDREN IMITATE ACTIONS WITH OBJECTS AFTER A DELAY WITHOUT OBVIOUS USE OF RATIONAL INFERENTIAL PROCESSES
M. Heimann, A. Edorsson, A. Sundqvist, & F. Koch

4:50-5:05 ONTOGENY OF ULTRASONIC VOCALIZATION AND RESPIRATORY RESPONSES TO AN AVERSIVE EVENT IN RATS – **Travel Awardee**
J. Boulanger Bertolus, M. Rincon-Cortes, R. M. Sullivan, & A.-M. Mouly

5:05-5:20 SOME LIKE IT HOT: TEMPERATURE PREFERENCE AND REPRODUCTION IN HARTLEY AND HAIRLESS GUINEA PIGS
G.A. Kleven, P. Joshi, & S.A. Bellinger

5:20-5:35 DOES INFANT HANDEDNESS TRAJECTORY AFFECT STACKING ABILITY? – **Travel Awardee**
E. C. Marcinowski, J. M. Campbell, & G. F. Michel

5:35-5:50 THE DEVELOPMENTAL CASCADE OF A HAND PREFERENCE FOR ACQUIRING OBJECTS INTO A HAND PREFERENCE FOR THEIR UNIMANUAL MANIPULATION – **Travel Awardee**
J. M. Campbell, E. C. Marcinowski, & G. F. Michel

5:50-6:05 PREMATURITY AND UNDERWEIGHT: PREDICTORS FOR PSYCHOMOTOR DEVELOPMENT?
A. Sistiaga, M. Estevez, M. Gaztañaga, J. Aliri, G. Labayru, J. Acha, & M.D. Elorza

6:05-6:20 FLEXOR AND EXTENSOR MUSCLE RECRUITMENT DURING LEG MOVEMENTS IN CHICK EMBRYOS – **Travel Awardee**
S. Sun & N.S. Bradley

6:20-6:35 ASSESSING NEWBORN CRAWLING IN RESPONSE TO TERRESTRIAL OPTIC FLOW **– Travel Awardee**
V. Forma, D. Anderson, & M. Barbu-Roth

6:35-7:20 **TRAVEL AWARD 5-MINUTE PRESENTATIONS**

Awardee	Advisor	Institution
S. Troller-Renfree	N.A. Fox	University of Maryland
M.L. Ramos	B.C. Reeb-Sutherland	Florida International University
S.C. Belnap	R. Lickliter	Florida International University
J.R. Hoye	M. Dozier	University of Delaware
S. Seehagen	S. Schneider	Ruhr-Universität Bochum
T.S. Doherty	T.L. Roth	University of Delaware
S.M. Dinces	A.C. Tang	University of New Mexico
D.A. Revillo	C. Arias	Instituto de Investigación Médica M. y M. Ferreyra

9:00-12:00 **GALA DINNER CELEBRATION** – *Mirador de Ulía*
(this event requires advance reservation & ticket)

Thursday, July 23

8:30-10:30 **SYMPOSIUM: EPIGENETIC CONSEQUENCES AND TRANSGENERATIONAL INHERITANCE OF STRESS**
Chairs: Tania Roth & Aron Weller

8:30-8:55 EPIGENETIC CONSEQUENCES AND TRANSGENERATIONAL INHERITANCE OF STRESS
T.L. Roth

8:55-9:20 DNA METHYLATION MEDIATING THE IMPACT OF MATERNAL SOCIAL STATE ON OFFSPRING PHENOTYPE
M. Szyf

9:20-9:45 INFLUENCE OF OLFACTORY FEAR CONDITIONING ON OLFACTORY NEUROANATOMY AND SENSITIVITY IN SUBSEQUENTLY CONCEIVED GENERATIONS – **Travel Awardee**
B. Dias and K.J. Ressler

9:45-10:10 EPIGENETIC MECHANISMS MEDIATING PERINATAL STRESS - INDUCED TRANSGENERATIONAL NEURONAL AND SYNAPTIC CHANGES IN PREFRONTO-LIMBIC-HYPOTHALAMIC (PLH) CIRCUITS
K. Braun, N. Groeger, K. Rether, A. Lesse, & J. Bock

10:10-10:30 TRANSGENERATIONAL EPIGENETIC PROGRAMMING OF HYPOTHALAMIC MECHANISMS THAT REGULATE FEEDING AND OBESITY BY HIGH FAT DIET
A. Weller, A. Marco, T. Kisliouk, T. Tabachnik, & N. Meiri

10:30-10:45 **MORNING BREAK**

10:45-11:45 **ISDP BUSINESS MEETING – ALL INVITED**

END OF ISDP CONFERENCE

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FOR THE 49TH ANNUAL MEETING OF THE

INTERNATIONAL SOCIETY FOR DEVELOPMENTAL PSYCHOBIOLOGY

November 9 – 12, 2016
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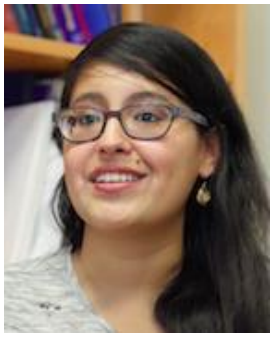
ISDP 2015 AWARDS



ISDP Dissertation Award

Millie Rincón-Cortés. This award honors outstanding scientists early in their careers and to help defray costs of attending the meeting. Winner of this award will do a special presentation of her dissertation at the annual meeting.

Sandra G. Wiener Award

Steven Boomhower. This award was established in memory of Sandra Wiener to help defray costs of graduate students attending the annual meeting of ISDP. This award was established to honor Sandy for her interest and concern for students and her dedication and affection for ISDP.

Kucharski Young Investigator Award

Kimberly Cuevas. This Kucharski Young Investigator award is given to honor the memory of David Kucharski, a promising young investigator in the field of Developmental Psychobiology.

ISDP 2015 Travel Awards

Funding for these awards was generously provided by Wiley, Sackler Institute for Developmental Psychobiology at Columbia University, Eunice Kennedy Shriver National Institute of Child Health & Human Development, Mead Johnson Nutrition, Columbia University Nurture Science Program, and the Members of the International Society for Developmental Psychobiology.

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Vincent Forma	Marianne Barbu-Roth	Université Paris Descartes
Aarthi Gobinath	Liisa Galea	University of British Columbia
Nicholas Heroux	Mark Stanton	University of Delaware
Julie Hoye	Mary Dozier	University of Delaware
Stefano Kaburu	Pier Ferrari	National Institutes of Health
Veronika Kiryanova	Richard Dyck	University of Calgary
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Heather Madsen	Jee Hyun Kim	Florey Institute of Neuroscience and Mental Health
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Daniel Popoola	Nicole Cameron	Binghamton University
Christina Ragan	Joseph Lonstein	Michigan State University
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Justin Varholick	Jeremy Bailoo	University of Bern
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Joel Yang	William Fifer	Columbia University
Laura Zimmermann	Rachel Barr	Georgetown University

INTERNATIONAL SOCIETY FOR DEVELOPMENTAL PSYCHOBIOLOGY

2015 ABSTRACTS

MATERNAL BEHAVIOUR IS MODULATED BY PRENATAL STRESS IN YOUNG BIRD. N. Aigueperse, O. Le Bot, F. Pittet, E. de Margerie, C. Houdelier, and S. Lumineau. Animal and Human Ethology, CNRS-Université de Rennes 1, 35042 Rennes, France. nadege.aigueperse@univ-rennes1.fr

Maternal behavior has a significant individual variability, as mothers take care differently to their young based on their own breeding experience or age. In this parent-youth system, we investigated whether the young played a role as modulator of maternal behavior. For this, we evaluated how adoptive quail (unstressed) raised chicks coming from stressed female (PS) or not (NPS) thank a social stress procedure during laying, known to modify the behavior of chicks. During breeding period, mothers showed no difference in the time spent warming. However, mothers of PS remained closer to their chicks than NPS mothers. These latter were more aggressive towards chicks throughout mothering. On the other hand, PS chicks had a different behavior during breeding period with more requests from their mother at the end. Finally, after mothering, PS and NPS chicks showed different profiles of emotivity and sociality. Results show that mothers respond to behavioral changes in chicks caused by prenatal stress, adapting their own maternal behavior. Behavioral development of these chicks is in turn influenced by maternal behavior. The mother-young relationship is a dynamic interactive system where the young plays a significant role.

NEUROPSYCHOLOGICAL DEVELOPMENT AT 4 YEARS OLD: ASSOCIATION WITH SALIVARY CORTISOL, ALPHA-AMYLASE AND PSYCHOSOCIAL VARIABLES AT 14 MONTHS OF AGE. A. Andiarena[1,2], O. Vegas[1,2], N. Balluerka[1,2], and J. Ibarluzea[1,2]. [1]Psychology Faculty, University of the Basque Country (UPV/EHU), San Sebastian, Spain. [2]BioDonostia Health Research Institute, San Sebastian, Spain. ainara.andiarena@ehu.eus

Background and aims: Early life stress can have long-lasting effects on neurodevelopment. The aim of this study was to assess the association between stress system activity at 14 months of age and long-term neuropsychological development at 4 years old, adjusting for the sociodemographic and the psychosocial variables that best predicted neuropsychological development.
Method: The sample was part of a population-based birth cohort derived from the INMA (INfancia y Medio Ambiente [Environment and Childhood]) project in Gipuzkoa, Spain. The main analysis were based on 186 parent-child pairs with complete information on evening salivary cortisol and alpha-amylase levels at 14 months of age and child neuropsychological development at 4 years old. Multivariate regression analyses were used for the associations between both salivary cortisol and alpha-amylase and neuropsychological development. Results: Both stress markers at 14 months of age showed an association with neuropsychological development at 4 years old. Salivary cortisol, showed a sex-specific pattern of association. In girls, cortisol levels at 14 months were negatively associated with long-term cognitive development (Long-Term Memory: β = -3.86 [-6.7-(1)]; p=.010; Executive function: β = -7.64 [-15.3-.03]; p=.05), whereas in boys cortisol levels were negatively associated with socio-emotional development (CAST scale: IRR = 1.35 [1.02-1.78]; p=.03). Salivary alpha-amylase was positively associated with socio-emotional development both in boys (CPSCS: β = 1.25 [.12-2.5]; p=.04; Hyperactivity score: IRR = .83 [.70-.99]; p=.045) and girls (Hyperactivity: IRR = .80 [.67-.97]; p=.02). Conclusion: Stress system's postnatal activity is associated with long-term neuropsychological development showing a sex-specific effect.
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AMNIOTIC ODOR AS A CANALIZING EXPERIENCE. J.R. Alberts[1] and A.E. Ronca[2,3]. [1]Department of Psychological and Brain Sciences, Indiana University, Bloomington, IN, 47405, USA. [2]NASA Ames Research Center, Moffett Field, CA, 94035 USA. [3]Wake Forest School of Medicine, Winston-Salem, NC, 27157 USA. alberts@indiana.edu

Amniotic fluid contains chemical cues that serve as olfactory stimuli to activate the nipple attachment behavior of newborn rats. We added a novel olfactant to the amniotic fluid of rat fetuses and then paired the fluid with specific elements of labor and parturition (*viz*., artificial labor contraction and birth canal compression, simulated maternal licking of the newborn, and postnatal thermal flux). Caesarian-delivered pups that experienced such pairings attached to the nipples sedated dams bearing the amniotic scent. Catecholamine titers also changed dramatically with these procedures. Thus, specific components of vaginal birth provide sufficient conditions for odor learning that canalizes the newborn's suckling behavior. In contrast, the absence of in utero compressions was associated with poor sucking onset. We will discuss how birth stimuli contribute to the first nipple attachment via release of catecholamines that co-act to constitute a context for learning to suckle. We will propose this learning as an *exaptation* based on processes that are primary adaptations to the critical transformation from uterine environment to postnatal life. Our perspective helps illuminate the challenges of suckling by babies born prematurely and thus do not experience the typical contingencies mediating onset of oral ingestion.
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INFANTS' PREFERENCE TO LOOK AT A SPEAKER'S MOUTH MODULATES ACTIVATION OF FRONTAL BRAIN AREAS DURING SPEECH PERCEPTION. N. Altvater-Mackensen[1] and T. Grossmann[1,2]. [1]Research Group Early Social Development, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany. [2]Department of Psychology, University of Virginia, Charlottesville, VA, 22904 USA. altvater@cbs.mpg.de

Infants' preference to look at a speaker's mouth has been related to their sensitivity for (mis)matches between auditory and visual speech cues. We extend these findings by investigating whether infants' recruitment of visual speech information modulates the neural processing of audiovisual speech. We presented 6-month-olds with matching and mismatching audiovisual speech and assessed (a) their preference to look at a speaker's mouth compared to her eyes, and (b) the activation of frontal brain areas. Results show stronger activation for matching than mismatching speech.

Furthermore, activation in left frontal areas is modulated by infants' preference to look at the speaker's mouth.

THE ROLE OF ACETALDEHYDE IN THE PRENATAL ETHANOL EXPOSURE EFFECT ON THE NEONATE RAT. A. Angulo-Alcalde, M. Gaztañaga, and M.G. Chotro. Faculty of Psychology, University of the Basque Country UPV/EHU, Donostia-San Sebastian, Spain.
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It has been demonstrated that ethanol exposure on the last gestational days increases ethanol acceptance in neonate, infant and in adolescent rats. In previous experiments we have found that after prenatal exposure to ethanol, 1-day-old neonates recognize and crawl longer distances towards ethanol odor than neonates from water treated dams. We also found that manipulating the opioid receptor system decreases the prenatal ethanol exposure effect, reducing the attractiveness of ethanol odor. In addition to the relevance of the opioid system, acetaldehyde, the first metabolite of ethanol, has been recently implicated in the reinforcing properties of ethanol. The aim of this study was to determine the participation of acetaldehyde in the enhanced attractiveness of ethanol, induced by prenatal ethanol exposure, by evaluating newborn rats on postnatal day 1. Therefore, pregnant rats were administered with water, ethanol or ethanol + D-Penicillamine (DP) during gestational days 17, 18, 19 and 20. Twenty-four hours after birth the offspring of these dams was evaluated using the odor crawling locomotion technique, in which the distance travelled towards the odors of ethanol, water and vanilla was registered and used as an index of odor attractiveness.

INDIVIDUAL DIFFERENCES IN SPONTANEOUS EYE BLINKING ARE LINKED TO FRONTAL ASYMMETRY IN HUMAN INFANTS. L.F. Bacher[1], S. Retz[1], C. Lindon[1], and M.A. Bell[2]. [1]Psychology Department, SUNY Oswego, Oswego, NY, 13126 USA. [2]Psychology Department, Virginia Tech, Blacksburg, VA, 24061 USA. leigh.bacher@oswego.edu

The rate of spontaneous eye blinking (SEB), a putative index of dopamine function (DA), is altered by some kinds of cognitive activities and under some pathological conditions. The present work is a continuation of a study investigating relationships between SEB and cognitive function in human infants. A unique contribution is our examination of the relationship between SEB and frontal asymmetry (FA). Relationships between DA-related genes and FA in infants and other studies of adults suggests that DA system function relates to some aspects of FA. Whereas our previous analyses revealed task-related temporal variation in FA, the present work explores potential contributions of attention and emotion to this effect. Forty, healthy, term, 10-mo-olds completed a looking version of the A-not-B task. SEB was coded blind to task phase (Show, Hide, Reveal toy). EEG data were collected from three frontal regions (frontal pole Fp1, Fp2; medial frontal F3, F4; lateral frontal, F7,F8) at 512Hz. Previous analyses demonstrated that infants of high SEB exhibited greater left-FA activation during one phase of the task. In the present analysis, decreased HR (resulting from increased attention) was expected to correspond to the SEB rate changes. Although HR did change across the task, it did not correspond to the fluctuations observed in SEB. Analyses of the potential contribution of the experimenter's emotional tone are underway. Results of these analyses have implications for identifying neurophysiological mechanisms involved in cognitive processing during infants' first year and provide new information on the temporal features of FA during infancy.

[NICHD HD049878 to MAB]

AT THE INTERSECTION OF ANIMAL WELFARE, REPRODUCIBILITY, AND POLICY. J. D. Bailoo, T. S. Reichlin, J. A. Varholick, and H. Würbel. Division of Animal Welfare, The University of Bern, Switzerland, 3012. jeremy.bailoo@vetsuisse.unibe.ch

Every year, 50-100 million vertebrates are used in experimental procedures, of which greater than 80% are mice and rats. Increasingly researchers are pressured to justify such use also in the face of poor reproducibility of experimental results and evidence of abnormal behaviour and other signs of distress in rodents housed under standard laboratory housing conditions. Here, we will explore 1) whether impaired welfare induced by inadequate housing conditions may contribute to poor reproducibility of experimental results and 2) how environmental enrichment to improve animal welfare affects outcome variability and reproducibility.
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ADOLESCENT NICOTINE EXPOSURE FACILITATES RETRIEVAL OF TRAUMATIC FEAR MEMORY IN ABA RENEWAL. R.C. Barnet, E. Luner, and J. Iannucci. Department of Psychology, The College of William & Mary, Williamsburg, VA 23185 USA. rcbarn@wm.edu

Adolescent nicotine decreases the number of cells in the midbrain, hippocampus, and cortex (Trauth et al., 2000) and hippocampus-dependent context conditioning in rats is impaired following adolescent nicotine exposure (Spaeth et al., 2010). Here we examined whether adolescent nicotine would impair a more complex form of context learning known as "renewal". In renewal, an animal learns a task in one context (A) then receives extinction treatment in a different context (B). If returned to the original training context (A) the previously extinguished behavior recovers, or "renews". Renewal implies that one form of context learning involves the ability of contextual cues to modulate memory retrieval (Bouton, 2002). If adolescent nicotine impairs complex aspects of context learning (renewal) in the same way as simpler forms of context learning (context conditioning) - presumably by disrupting hippocampus function - then adolescent nicotine should impair renewal. Adolescent rats received 2x/day intraperitoneal injections of nicotine (saline, 0.15 mg/kg, 0.40 mg/kg) from PD28-PD54 followed by a 20-day abstinence interval. Beginning on PD75 all animals were exposed to pairings of a light with footshock (Light-shock) then subsequent light extinction, presentation of the Light with no shock (L-). Extinction occurred either in the same or different context as original Light-shock training. Animals were tested for fear of the light in the original training context using fear-potentiated startle (FPS). Adolescent nicotine did not impair but actually facilitated context-dependent memory retrieval (renewal). Findings suggest adolescent nicotine may facilitate encoding or retrieval of traumatic fear memory long after the nicotine exposure period.

IMITATION PRACTICE MAKES IMITATION PERFECT: IMITATION ENHANCES MOTOR-SPATIAL LEARNING BY PRESCHOOLERS IN A BRIEF TRAINING STUDY. R. Barr[1], F. Subiaul[2], and L. Zimmermann[1]. [1]Department of Psychology, Georgetown University, 3700 O St., NW Washington DC 20057, USA. [2]The George Washington University, Department of Speech & Hearing Science, Department of Anthropology: Center for the Advanced Study of Hominid Paleobiology, GW Institute for Neuroscience and Mind-Brain Institute [2] Smithsonian Institute's National Museum of Natural History. rfb5@georgetown.edu

The ability to vicariously learn information from others' in order to replicate their responses (i.e. imitation), is essential to cognitive development and predicts later academic success in children (e.g., Riggins, Cheatham, Stark, & Bauer, 2013). Here we explored whether training individual learning in general improved imitation performance specifically. To that end, we tested whether task-general learning and memory training or task-specific imitation training improved motor-spatial imitation performance on a touchscreen task with 3- and 4-year-olds. When compared to the No Practice and Trial and Error groups, only domain- (motor-spatial) and task- (imitation) specific practice significantly improved motor-spatial imitation performance from pre- to post-testing.
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SEX, STRESS, AND DOPAMINE: POTENTIAL MECHANISMS UNDERLYING SEX DIFFERENCES IN EARLY-LIFE STRESS ASSOCIATED PATHOLOGY. K.G. Bath[1], and H. Goodwill[2]. [1]Department of CLPS, Brown University, Providence, RI, 02912 USA. [2]Department of Neuroscience, Brown University, Providence, RI 02912 USA. kevin_bath@brown.edu

Early life stress (ELS) has profound effects on neural and behavioral development, and is associated with a significant increase in the risk of developing affective pathology. Affective disorders peak during the adolescent period, with females being nearly twice as likely as males to develop stress-associated pathology. However, the mechanisms underlying sex differences in risk for pathology are not well understood. Recently, multiple groups have proposed that negative symptoms associated with depression are consequence of disturbance in reward processing. Here, we used a mouse model of ELS, maternal bedding restriction, to test for ELS associated changes in affective behavior as well as expression of dopamine receptor and dopamine-related genes in neural structures associated with reward processing. We found that ELS led to significant sex differences in the development of negative symptoms of depressive-like behaviors, including lethargy, anhedonia, enhanced risk assessment, and sleep disturbance in females but not males. We collected tissue and measured gene expression in striatum, frontal cortex, ventral tegmental area, and substantia nigra of male and female mice and used realtime qPCR to measure changes in gene expression. We observed significant and selective effects of ELS on DRD4 expression (elevated in female frontal cortex), with no effects on gene expression in male mice. Studies are currently underway to test a potential direct relationship between these observed effects.

BEHAVIORAL LATERALIZATION SCALE: A NEW METHOD FOR CHARACTERIZING MULTIPLE LATERALIZED PREFERENCES IN BOBWHITE QUAIL CHICKS (Colinus virginianus). S.C. Belnap and R. Lickliter. Department of Psychology, Florida International University, Miami, FL, 33199 USA. sbelnap@fiu.edu

Hemispheric lateralization is observed across a wide range of vertebrates. This specialized brain organization enables separate and parallel processing, thus maximizing efficiency and improving fitness. In precocial birds, prenatal light experience affects the expression of several lateralized behavioral responses including hatch degree, turn preferences, and footedness. A lack of lateralized behaviors may indicate a reduction in sensory integration. The aim of this study was to assess the magnitude of the relationship between several behavioral lateralization preferences and various prenatal light conditions, and to create an overall behavioral lateralization index of these preferences. We experimentally modified the amount of prenatal light experience available during late embryogenesis. The experimental light conditions included no light exposure, 2 hours of light exposure, 6 hours of light exposure, and normal low-light incubation. Post-hatch egg shells were examined for hatch degree and all birds were tested for laterality preferences during a T-maze task and during stair-climbing at three developmental age points, 12 hours, 24 hours, and 48 hours following hatch. Individual lateralized behaviors were scored on a scale ranging from 0-2 with 0 representing no behavioral lateralization and 2 representing normal species typical lateralization at each age point. Scores for each lateralized behavior were summed, creating a Behavioral Lateralization Scale (BLS) for each subject. Pending results indicate a gradual decline in the BLS in relationship to the amount of in prenatal light experience. This scale should be helpful in characterizing the magnitude of hemispheric specialization and its plasticity for future experimentation.

BROADER IMPACTS: GLOBAL INTERSECTIONS AND INTEGRATIVE ETHICAL CONSIDERATION OF ANIMAL RESEARCH AND POLICY. A.J. Bennett. Department of Psychology, University of Wisconsin-Madison, Madison, WI 53715 USA. Ajbennett2@wisc.edu.

Significant escalating challenges to animal research highlight an urgent need for partnership between the scientific community and broader public to better inform policy and practices that affect research. Science plays a core role to provide knowledge, but also to inform decisions that affect individual, species, societal, and environmental health. Decisions made in absence of full consideration of the science can jeopardize both public interests and animal welfare. Thus, scientists' active engagement is essential to develop integrated approaches and a more expansive framework for ethical consideration that is needed in order to responsibly address the future of research with nonhuman animals.

MATERNAL DIET INFLUENCES OFFSPRING FEEDING BEHAVIOR AND FEARFULNESS IN BIRDS. A. Bertin[1,2,3,4], N. Aigueperse[1,2,3,4], and L. Calandreau[1,2,3,4]. [1]INRA Val de Loire, UMR85 Physiologie de la Reproduction et des Comportements, [2]CNRS-UMR 7247, [3]Université François Rabelais de Tours, [4]IFCE F-37380 Nouzilly, France. aline.bertin@tours.inra.fr

Bird embryos are known to perceive and memorize chemosensory signals of the surrounding environment; however, the potential impact of the maternal diet has not previously been investigated. We hypothesized that bird embryos memorize the chemical signals of the maternal diet and that this perceptual learning may orient subsequent feeding behavior of the hatchlings. We fed laying hens standard food enriched with 2% menhaden oil (MH group) or 2% soybean oil (controls). The scent of menhaden was significantly more detected in MH egg yolks than in control yolks by a human panel. We analyzed the development and behavior of offspring towards different types of food, bearing or not bearing the menhaden scent. In a 3-min choice test with unfamiliar food (mashed cereals) MH chicks showed a clear positive orientation toward the unfamiliar food bearing the menhaden scent. By contrast, control chicks showed a preference for the non-odorized unfamiliar food. MH chicks expressed higher emotional reactivity level than control chicks as expressed by food neophobia and longer immobility in a restraint test. Chicks exposed in ovo to menhaden oil via the maternal diet preferentially oriented their feeding behavior towards food containing menhaden oil, but only when the food was unfamiliar. We propose that oil in the maternal diet engenders maternal effects and contributes to the development of behavioral phenotype in the offspring. In ovo chemosensory learning

may have evolved to prepare precocial offspring for their environment. This suggests a common principle of embryonic chemosensory learning across vertebrate taxa. [FeedPhobic ANR-12-JSV7-0011-01]

EMBRYONIC EXPOSURE TO COOL TEMPERATURE ENHANCES THE EXPRESSION OF FEAR-RELATED BEHAVIORS IN BIRDS. A. Bertin[1,2,3,4], L. Calandreau[1,2,3,4], F. Cornilleau[1,2,3,4], M. Meurisse[1,2,3,4], P. Constantin[1,2,3,4], E.N. de Haas[1,2,3,4], J. Delaveau[5], C. Rat[5], A.S. Darmaillacq[6], L. Dickel[6], S. Lumineau[7], C. Houdelier,[7] and C. Arnould[1,2,3,4]. [1]INRA Val de Loire, UMR85 Physiologie de la Reproduction et des Comportements. [2]CNRS-UMR 7247. [3]Université François Rabelais de Tours. [4]IFCE F-37380 Nouzilly, France. [5] INRA, UE1295, PEAT, 37380 Nouzilly, France. [6]Groupe Mémoire et Plasticité comportementale, Université de Caen Basse-Normandie, Caen, France. [7]UMR CNRS 6552, Ethos, Université de Rennes1, Rennes, France. aline.bertin@tours.inra.fr

In oviparous animals an embryo is likely to encounter periods when incubation temperatures are unfavourable. In birds, optimal development of avian embryos takes place within a narrow range of incubation temperatures. As parents occasionally leave the nest, embryos could be exposed chronically to cool sub-optimal temperatures. We tested whether unpredictable exposure to cool temperature influences the development of socio-emotional behaviors and cognitive capacity in a precocial species. A group of chicken (Gallus g. domesticus) embryos was incubated in a constant optimal temperature of 37.8°C (control group). Another group of embryos (c-chicks) was exposed unpredictably to a temperature of 27.2°C two times a day for one hour between embryonic days 12 and 20 (the day before hatching). Exposure to cool temperature did not affect significantly hatching success. A reduced growth was observed in chicks exposed to cool temperature. A significantly longer latency to touch a novel food was observed in c-chicks compared to controls. C-chicks also showed significantly longer duration of tonic-immobility and longer time immobile in a novel environment. The prenatal treatment did not affect the motivation to join congeners. C-chicks exhibited impaired performances in a detour task compared to controls. Our data showed that unpredictable exposure to cool temperature enhances the expression of fear-related behaviors in young birds. In addition to maternal effects engendered by the quality of eggs, incubation temperature also plays part in the construction of behavioral phenotypes. [PReSTO'Cog ANR-13-BSV7-0002-02]

EFFECTS OF UNPREDICTABLE VARIABLE PRENATAL STRESS (UVPS) ON BDNF DNA METHYLATION AND TELOMERE LENGTH IN THE ADULT RAT BRAIN. J. Blaze[1], A. Asok[1], C.D. Tulbert[2], A.E. Ronca[2,3,4,5], T.L. Roth[1]. [1]Department of Psychological and Brain Sciences, University of Delaware, Newark, DE 19716 USA. [2]Obstetrics and Gynecology, [3]Program in Neuroscience, [4]Molecular Medicine & Translational Science, Wake Forest School of Medicine, Winston-Salem, NC 27157 USA. [5]Space Biosciences Research Branch, NASA Ames Research Center, Moffett Field, CA 94035 USA. jblaze@psych.udel.edu

In utero exposure to stress can shape neurobiological and behavioral outcomes in offspring, producing vulnerability to psychopathology later in life. Animal models of prenatal stress likewise have demonstrated long-term alterations in brain function and behavioral deficits in offspring. For example, using a rodent model of unpredictable variable prenatal stress (UVPS), in which dams are exposed to unpredictable, variable stress across pregnancy, we have found alterations in body weight and anxiety-like behavior in adult male offspring. DNA methylation (addition of methyl groups to cytosines which normally represses gene transcription) and changes in telomere length (TTAGGG repeats on the ends of chromosomes) are two molecular modifications that result from stress and could be responsible for the long-term effects of UVPS. Here, we measured methylation of brain-derived neurotrophic factor (bdnf), a gene important in development and plasticity, and telomere length in the brains of adult offspring from the UVPS model. Results indicate that prenatally stressed adult males have greater methylation in the medial prefrontal cortex (mPFC) compared to non-stressed controls, while females have greater methylation in the ventral hippocampus compared to controls. Further, prenatally stressed males had shorter telomeres than controls in the mPFC. These findings demonstrate the ability of UVPS to produce epigenetic alterations and changes in telomere length across behaviorally-relevant brain regions, which may have implications for the phenotypic outcomes. [NIGMS (1P20GM103653) to TLR and NICHD (1R01HD50201) to AER.]

NEUROBEHAVIORAL TOXICITY OF ADOLESCENT METHYLMERCURY EXPOSURE IN MICE. S.R. Boomhower and M.C. Newland. Department of Psychology, Auburn University, Auburn, AL 36832 USA. Srb0028@auburn.edu

The developing fetus is particularly vulnerable to the neurobiology- and behavior-altering effects of exposure to methylmercury (MeHg), an environmental neurotoxicant that bioaccumulates in fish. It is well established though that the brain continues to develop after birth and throughout early life, as major neurobiological and behavioral changes unfold during the adolescent period. However, the neurobehavioral effects of adolescent MeHg exposure remain virtually unknown. The current experiments were designed to assess the effects of adolescent MeHg exposure on delay discounting (i.e., the preference for small, immediate reinforcers over large, delayed ones) and sensitivity to amphetamine (a dopamine agonist) using a mouse model. Thirty-six male C57Bl/6n mice were exposed to 0, 0.3, and 3.0 ppm MeHg via drinking water from postnatal day 21 to 59, the murine adolescent period. As adults, mice were allowed to respond for a droplet of milk delivered immediately and four droplets delivered after a series of delays for 35 sessions, which were followed by a dose-response determination of d-amphetamine (i.p.: 0.1 - 1.7 mg/kg). Adolescent MeHg exposure significantly impaired the acquisition of impulsive choice relative to controls. MeHg-exposed mice were also more sensitive to amphetamine-induced reductions in sensitivity to reinforcer amount and delay compared to controls. The current study is the first to demonstrate that adolescence is a period in which MeHg exposure may have long-lasting neurobehavioral effects. These findings carry significant implications for public health and policy.
[This research was supported by grants from Sigma Xi and Psi Chi awarded to SRB.]

ONTOGENY OF ULTRASONIC VOCALIZATION AND RESPIRATORY RESPONSES TO AN AVERSIVE EVENT IN RATS. J. Boulanger Bertolus[1], M. Rincon-Cortes[2], R. M. Sullivan[2], A.-M. Mouly[1]. [1]Lyon Neuroscience Research Center, INSERM U1028; CNRS UMR5292; Université Lyon 1, Lyon, France. [2]Emotional Brain Institute, Nathan Kline Institute, Child & Adolescent Psychiatry, New York University School of Medicine, New York, NY 10016 USA. julie.boulanger-bertolus@inserm.fr

When confronted with highly emotional events, either positive or negative, rats have been shown to emit vocalizations in the ultrasonic range (USVs). Although vocalizations are emitted at all developmental ages, they evolve throughout the rat's life, both in terms of quantity and quality. However, until now, very few studies have been exploring USVs with similar paradigms throughout the ontogenesis. Therefore, in this study, we investigated the simultaneous evolution of the behavior, USV and associated respiratory rate emitted in response to a mild foot-shock at three

developmental ages: infant (PN 12-14), juvenile (PN 22-24) and adult (PN 80-90). The foot-shock induced sustained emission of USVs at all ages, with significant differences in USVs frequencies and durations throughout development. We also characterized the reciprocal influences of the respiratory rate and freezing on USVs emission. Results suggest that USVs extend the expiration duration in adult, and to a lesser extent in juvenile rats, while they do not influence the respiratory rate in infants. Moreover, while USVs are mainly emitted during freezing behavior in adults, this seems less clear in juveniles and is not supported in infants. Finally we investigated whether the emission of USVs was modulated as a function of the predictability of the foot-shock arrival. We showed that when the shock was unpredicted, the level of USVs was significantly greater than when the shock was predicted. Interestingly, this difference was only observed in infant rats, with adult and juvenile animals showing similar levels of USVs emission in predictable and unpredictable conditions.
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EPIGENETIC MECHANISMS MEDIATING PERINATAL STRESS -INDUCED TRANSGENERATIONAL NEURONAL AND SYNAPTIC CHANGES IN PREFRONTO-LIMBIC-HYPOTHALAMIC (PLH) CIRCUITS. K. Braun, N. Groeger, K. Rether, A. Lesse, and J. Bock. Department of Zoology and Developmental Neurobiology, Otto von Guericke University Magdeburg, Germany 39120. katharina.braun@ovgu.de

Perinatal stress has been shown to program the developing organism to adapt brain and behavioral functions to cope with daily life challenges. We present evidence that the specific and individual effects of early life stress (ELS) on the functional development of brain and behavior emerge as a function of the type, intensity, timing and the duration of the adverse environment. Our research indicates that on one hand ELS may leave functional "scars" in prefrontal and limbic circuits and thereby impair stress coping, but on the other hand also supports the concept of "stress inoculation", resulting in resilience against stress and other adversities later in life. We also show that epigenetic and behavioral consequences of ELS can be transmitted to 2nd and 3rd generations.

ASSOCIATIONS BETWEEN SOCIOECONOMIC STATUS, EEG POWER AT BIRTH, AND COGNITIVE SKILLS DURING INFANCY. N.H. Brito[1], K.G. Noble[2], M.M. Myers[3], W.P. Fifer[3], and A.J. Elliott[4] with the PASS Research Network. [1]RWJF Health & Society Scholars, Columbia University, New York, NY 10032 USA. [2]Department of Pediatrics & Sergievsky Center, Columbia University Medical Center, New York, NY 10032 USA.[3]Departments of Psychiatry and Pediatrics, Columbia University Medical Center, New York, NY 10032 USA. [4]Center for Health Outcomes and Prevention, Sanford Research, Sioux Falls, SD 57104 USA. nhb2111@cumc.columbia.edu

Childhood socioeconomic status (SES), typically characterized by parental education, family income, and parental occupation (McLoyd, 1998), is strongly associated with children's cognitive development (Brooks-Gunn & Duncan, 1997). We previously observed socioeconomic disparities emerging between 15 and 21 months of age for both language and declarative memory skills during the first years of life (Noble et al., in press). The present study examined associations between SES, resting EEG power at birth, and cognitive skills at 15-months in a sample of 66 full-term infants (gestational age = 37-42 weeks). These infants were originally recruited from a cohort of participants in a longitudinal study investigating the relation between prenatal exposures and birth outcomes (http://safepassagestudy.org/). Results indicated no associations between SES and EEG power at birth. EEG power at birth, however, was related to both language and memory outcomes at 15-months, controlling for both sex and gestational age. Left-frontal gamma power was related to later VPC memory scores ($\beta = 0.36$, $p = 0.02$, $R^2 = .16$) and left-parietal low-gamma power was related to later PLS-Auditory language scores ($\beta = 0.27$, $p = 0.04$, $R^2 = .11$). Results suggest SES disparities in brain activity are not apparent at birth, but differences in EEG power at birth may influence trajectories for early cognitive skills.
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ASSOCIATIONS BETWEEN MU RHYTHM REACTIVITY AND IMITATION IN INFANCY: A PILOT STUDY. L.J. Bryant, K. Cuevas, K. Valerio, and J. Sahani. Department of Psychology, University of Connecticut, Waterbury, CT 06702 USA. lauren.bryant@uconn.edu

The EEG mu rhythm (infant: 6- to 9-Hz), which is recorded from central sites overlying the sensorimotor cortex, reacts (i.e., decreases in power relative to baseline) to the observation and execution of actions, and is thus theorized to be an analog of activity within a human neural mirroring system. Similarities in mu reactivity to both action observation and execution have led to the hypothesis that perception of anotherÂ¿s actions is mapped onto an internal motor representation of the observer (Cannon et al., 2014). Therefore, mu rhythm has been postulated to be associated with imitation (Oberman et al., 2008), though associations between mu rhythm and imitation in infancy remain relatively uninvestigated. The current study used the puppet imitation task (Barr et al., 1996) to examine associations between mu rhythm and imitation in infancy. EEG was recorded while infants observed a baseline stimulus (non-biological motion) and an adult demonstrate a sequence of actions on a puppet, and while infants imitated these actions. At 6 months of age (n = 6), there was a negative trend between imitation scores and mu rhythm reactivity during the observation of the target actions, $r(4) = -.54$. In contrast, during later infancy (age range: 12-24 months, n = 11), there was a positive association between left hemisphere mu reactivity during demonstration and imitation scores, $r(9) = .66$, $p = .03$. These initial findings suggest that mu rhythm reactivity is associated with imitation during infancy, but there are potential age-related shifts in the nature of this association.
[NIH grant R03HD081333 to KC]

THE DEVELOPMENTAL CASCADE OF A HAND PREFERENCE FOR ACQUIRING OBJECTS INTO A HAND PREFERENCE FOR THEIR UNIMANUAL MANIPULATION. J.M. Campbell, E.C. Marcinowski, and G.F. Michel. Department of Psychology, The University of North Carolina at Greensboro, Greensboro, NC 26170 USA. infantde@uncg.edu

Michel's Cascade Theory (1983) proposes that hand preference develops as the result of a sequence of previous experiences provided by lateralized asymmetric behaviors. To investigate whether one asymmetric behavior has an influence on the development of a subsequent asymmetric behavior, hand preferences for two manual actions were recorded. Object acquisition and unimanual manipulation were observed, using separate assessment procedures, monthly from 6 to 14 months of age. During different play scenarios, objects either were presented to the infant on the table (acquisition) or two identical objects were pressed into the infant's hands simultaneously (unimanual manipulation). The relative frequency of use of the right and left hand were then recorded for analysis. A latent class analysis identified three developmental trajectories in the acquisition data; one exhibiting development of a right hand preference, one exhibiting a development of a left hand preference and one

with no clear preference. The relative frequency of left- and right-hand unimanual manipulation actions across all months also were subjected to hierarchical linear modeling to investigate the relation between the acquisition hand preference (as identified by latent class) and unimanual manipulations. The results show that, although hand preference for acquisition is distinguishable from 6 months of age, a hand preference for unimanual manipulation does not begin to appear until 11 months of age. These results support the Cascade Theory's proposal that one established laterally asymmetric behavior (acquisition hand preference) will influence the subsequent development of a lateral asymmetry for another behavior (i.e., unimanual hand preference).

HUMAN NEONATAL CONSUMPTION OF THE COLOSTRUM, A BIOCULTURAL EXPERIENCE. J. Candau. University of Nice Sophia Antipolis, Nice, France. joelcandau@gmail.com

The first results of an ongoing research program on human colostrum highlight that the mother's gift of the colostrum to the newborn follows extremely variable biocultural rules. The colostrum transfer to the newborn is indeed under the control of complex social and cultural processes. From ethnographical data collected in Bolivia, Brazil, Burkina Faso, Cambodia, France, Germany, and Morocco, we will show that multiple cultural processes (public health policies, food habits, body techniques, impurity representations, folk biology and physiology, medicinal practices, native health conceptions) can improve or disrupt the neonate infants' exposure to continuity between amniotic and lacteal experiences.
[This research is funded by ANR.]

CORTICOSTEROID RECEPTOR EXPRESSION IS LINEARLY RELATED TO INDIVIDUAL DIFFERENCES IN NOVELTY EXPLORATION. M.J. Caruso[1,2], R.A. Crouse[1], and S.A. Cavigelli[1,2,3]. [1]Department of Biobehavioral Health, Pennsylvania State University, University Park, PA 16802 USA. [2]The Center for Brain, Behavior, and Cognition, Pennsylvania State University, University Park, PA 16802 USA. [3]The Huck Institutes for the Life Sciences, Pennsylvania State University, University Park, PA 16802 USA. mjc5038@psu.edu

Human behavioral inhibition (BI) is characterized by low novelty exploration (neophobia) and susceptibility to internalizing disorders. Animal models have demonstrated that, similar to humans, neophobic rodents have elevated basal and novelty-induced hypothalamic-pituitary-adrenal (HPA) axis activity. HPA and emotion regulation are associated with mineralocorticoid, glucocorticoid, and corticotropin releasing hormone receptor (MR, GR, CRHR1) activity in the hippocampus, hypothalamus, and prefrontal cortex (PFC), and altered receptor signaling in these regions is associated with anxiety and depression. We tested whether young adult exploratory behavior predicts later adulthood MR, GR, and CRHR1 mRNA expression and anxiety- and depression-like behavior. In male Sprague-Dawley rats, exploratory behavior was measured at two months of age in two novel arenas (one social, one non-social), and then anxiety- and depression-like behavior were measured with the elevated plus maze and sucrose preference test at the same age and 2 months later (2 and 4 months of age). Exploratory behavior at 2 months was not strongly related to anxiety- or depression-like behavior at the same age, but did predict anxiety-like behavior 2 months later (at 4 months of age). Young adult exploratory behavior also linearly predicted hippocampal and hypothalamic GR, and PFC CRHR1 expression, with longer latencies (i.e. neophobia) predicting reduced mRNA expression. Exploratory behavior did not predict MR expression in any area. We are analyzing GR and MR protein levels in the hippocampus and hypothalamus to assess subregion-specific changes in receptor expression. Results suggest that BI-related susceptibility to mood disorders may be related to altered corticosteroid receptor signaling in multiple areas.

PERSISTENCE OF ETHANOL-INDUCED SENSITIZATION DURING THE PREWEANLING PERIOD OF THE RAT. S. Castelló[1], G. D'Aloisio[2], J.C. Molina[1,2], and C. Arias[1,2]. [1]Instituto de Investigación Médica M. y M. Ferreyra INIMEC-CONICET-UNC, Córdoba, Argentina, 5000. [2]Facultad de Psicología, Universidad Nacional de Córdoba, Córdoba, Argentina, 5000. stefcastello@gmail.com

Drugs of abuse as amphetamine or cocaine induce sensitization to the locomotor stimulating effect in adult and in preweanling rats. However, during infancy this learning effect is observed only after a short interval of time, between training and testing. During infancy, particularly during de 2nd postnatal week of life, rats are highly sensitive to ethanol. In a previous study we have shown short-term ethanol-induced sensitization when subjects were trained during the 2nd postnatal week. This effect was context-dependent, in that it was only observed when pups were trained and tested in different contexts. The present series of experiments was designed to explore the persistence of the sensitization effect across the preweanling period. Pups were trained with ethanol during the second or the third postnatal week of life, and were tested 2 or 7 days later. Our results showed that, contrarily to what has been observed with other drugs during infancy, sensitization to ethanol persisted at least 7 days in rats trained during the 2nd postnatal week of life. In older pups, the same procedure induced tolerance instead sensitization. This pattern of results suggests that infancy is a valuable period for the study of the neurobiological determinants underlying ethanol-induced sensitization and the relationship of this effect with ethanol intake.
[PICT 0999 FONCyT to JCM]

NEONATAL AND INFANTILE ATTRACTION TO ODORS FROM MATERNAL DIET DURING GESTATION: THE PARTICULAR CASE OF ALCOHOL. M.G. Chotro, University of the Basque Country UPV/EHU, San Sebastian, Spain. g.chotro@ehu.eus

Fetal exposure in the amniotic fluid to chemosensory stimuli coming from maternal diet may define neonatal and infantile attraction to those stimuli, determining later acceptance of substances as part of the diet. When the pregnant rat consumes alcohol, the distinctive flavor of this drug becomes more attractive for the offspring, resulting in increased consumption and liking of alcohol in neonates, infants, and even adolescents. Considering that maternal alcohol ingestion exposes fetuses to the chemosensory and the pharmacological aspects of alcohol, I will discuss the possible interactions between these facets of the drug to explain the results of our last studies.

THE BEHAVIORAL EFFECT OF POSTNATAL CORTICOSTERONE ADMINISTRATION IN DEVELOPING RATS DEPENDS ON ITS DURATION AND PATTERN OF ELEVATION. D.I. Claflin[1,2], S.J. Jensen[1], L.R. Greenfield[1], C.L. Wentworth-Eidsuane[2], M. Kraszpulski[2], K.D. Schmidt[1], M.B. Hennessy[1,2] . [1]Department of Psychology and [2]Department of Neuroscience, Cell Biology, and Physiology, Wright State University, Dayton, OH 45435 USA. dragana.claflin@wright.edu

Recent emphasis has been given to the effects of early-life stress in developmentally immature and vulnerable organisms that persist into adulthood. Activation of the hypothalamic-pituitaryadrenal axis in response to stress includes a release of glucocorticoids which can result in positive or negative effects on cognitive

performance across the lifespan. It is generally accepted that very low and very high levels of circulating glucocorticoids are detrimental to learning and memory while moderate levels can be facilitatory. Because tasks engaging the hippocampus are particularly sensitive to glucocorticoid actions, and the hippocampus has a critical role in learning and memory, this interplay between glucocorticoids and the development of learning can be examined using trace eyeblink classical conditioning. Here we present a series of studies in which we administered the glucocorticoid corticosterone (CORT) to Long Evans rat pups on postnatal Day 15 and assessed learning on Day 24 using trace eyeblink classical conditioning. Release of corticosterone into the bloodstream at both a high pharmacological dose (subcutaneous pellets) over 5 days and at a modest elevation (subcutaneous osmotic minipumps) over 2 days impaired acquisition of trace eyeblink conditioning. In contrast, CORT injections (twice daily, subcutaneous) which delivered a very high dose for less than 4 hours at a time, facilitated learning. Across all studies, males appeared to be more sensitive to the effects of corticosterone. Together, these data suggest that the overall level, duration and pattern of elevation of corticosterone play a role in the lasting behavioral effects observed.
[NIH #R15MH081257; WSU Comprehensive Neuroscience Center]

SEX DIFFERENCES IN EEG ACTIVITY DURING EXEUCTIVE PROCESSING: A COMPARISON OF INFANTS AND YOUNG CHILDREN. K. Cuevas[1], S.D. Calkins[2], and M.A. Bell[3]. [1]Department of Psychology, University of Connecticut, Storrs, CT 06269 USA. [2]Human Development and Family Studies, University of North Carolina at Greensboro, Greensboro, NC 27402 USA. 3Department of Psychology, Virginia Tech, Blacksburg, VA 24061 USA. kimberly.cuevas@uconn.edu

Executive functions (EFs) are linked with optimal cognitive and social-emotional development. Despite behavioral evidence of sex differences in early childhood EF, little is known about potential sex differences in corresponding brain-behavior associations. The present study examined changes in 4-year-olds' (n = 144) 6-9 Hz EEG power and coherence in response to increased executive processing demands ("Stroop-like" vs. "non-Stroop" day-night tasks). Although there were no sex differences in task performance, an examination of multiple scalp electrode sites revealed that boys exhibited more widespread changes in EEG power as compared to girls. Further, multiple regression analyses controlling for maternal education and non-EF performance indicated that individual differences in boys' and girls' EF performance were associated with different frontal neural correlates (i.e., different frontal scalp sites and different measures of EEG power). However, 6-9 Hz frontal functional connectivity (EEG coherence) did not differ as a function of increased inhibitory demands. For comparison purposes, we reanalyzed our data with 10-month-olds (n = 173) to determine whether sex differences in EF-related EEG were present during infancy. Although infants exhibited increases in 6-9 Hz frontal functional connectivity (EEG coherence) in response to added inhibitory demands (i.e., reversal versus non-reversal trials on the A-not-B task) there were no changes in 6-9 Hz EEG power (Cuevas, Swingler, Bell, Marcovitch, & Calkins, 2012). However, there were no significant Condition × Sex interactions for either EEG measure. The data reveal valuable information concerning the emergence of sex differences in the neural systems underlying executive processing during infancy and early childhood. [NIH grant R01HD049878 to MAB.]

CORTISOL IN MOTHER'S MILK IN THE NEONATAL PERIOD INFLUENCES LATER INFANT SOCIAL BEHAVIOR AND COGNITION IN RHESUS MONKEYS. A.M. Dettmer, A.M. Murphy, D. Guitarra, E. Slonecker, M.A. Novak, J.S. Meyer, and S.J. Suomi. Laboratory of Comparative Ethology, Eunice Kennedy Shriver National Institute of Child Health & Human Development, Poolesville, MD 20837 USA. adettmer@gmail.com

Mother's milk contains hormones, such as cortisol, that are increasingly thought to influence neonatal and subsequent infant development. Recent studies have linked cortisol in mother's milk with infant temperament in both human and nonhuman primates, but no studies have examined how cortisol in milk affects infant behavior in a social setting or cognitive functioning. We studied rhesus macaque mother infant dyads (Macaca mulatta, N=24) from birth through 8 months. Milk samples were collected twice in the first 30 days of life and assayed for cortisol concentrations. From months 4-8, we observed each infant twice weekly in 10-min sessions to study their social behavior in a group setting (e.g., initiate and receive play, grooming, and mounting). For a subset of infants (n=8), we collected cognitive data in their group living environment at the same time to assess performance on a response inhibition task. We found that higher cortisol concentrations in mother's milk in the first 30 days of life were negatively correlated with initiation of social behaviors later in development ($r = -0.445$, $p=0.029$), and positively correlated with percentage of trials correct on the cognitive task to assess inhibitory control ($r=0.733$, $p=0.039$). Collectively, these findings lend support to the "lactational programming" hypothesis, whereby glucocorticoids ingested through milk contribute to the development of infant behavioral phenotype.
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INFLUENCE OF OLFACTORY FEAR CONDITIONING ON OLFACTORY NEUROANATOMY AND SENSITIVITY IN SUBSEQUENTLY CONCEIVED GENERATIONS. B.G. Dias[1] and K.J.Ressler[1,2]. [1]Department of Psychiatry and Behavioral Sciences, Yerkes National Primate Research Center, Emory University, Atlanta GA 30329, USA. [2]Howard Hughes Medical Institute, Chevy Chase MD 20815, USA.

Historical events have generated data indicating that stressors experienced by a generation also affect descendant generations not directly exposed to those stressors. Using an animal model of olfactory fear conditioning, my research (and talk) aims to shed light on the nature and mechanisms by which such inter- and trans-generational transmission and inheritance occur.
[HHMI funding to KJR, Office of Research Infrastructure Programs/OD P51OD011132 to the Yerkes National Primate Research Center]

THE EXPERIENCE OF CANCER AFFECTS THE RELATIONSHIP BETWEEN PARENT AND CHILD HYPOTHALAMIC PITUITARY ADRENAL (HPA) FUNCTION. S.M. Dinces[1], S.N. Hile[1], L.N. Rowell[1], J.F.L. Pinner[1], R.E. Rieger[1], N.C. Moss[1], R.S. Allen[1], M.E. Thompson[2], A.C. Tang[1,3,4], R.D. Annett[5]. [1]Department of Psychology, University of New Mexico, Albuquerque, NM 87131 USA. [2]Department of Anthropology, University of New Mexico, Albuquerque, NM 87131 USA. [3]Department of Neurosciences, University of New Mexico, Albuquerque, NM 87131 USA. [4]International Science and Engineering, National Science Foundation, Arlington, VA 22230 USA. [5]Department of Pediatrics, University of Colorado Denver, CO 80045 USA. sdinces@unm.edu

Rodent studies show that offspring experience of moderate stress can modify the association between the infant's and the mother's HPA function. Therefore, having a mother with poor HPA function does not mean that her offspring will necessarily have

similarly poor function. Here we examine whether this modifiability of the relation between parental and child HPA function generalizes to humans. HPA function was examined in parents and their children from healthy control (HC) and pediatric cancer survivor (CS) families. Multilevel modeling was applied to data from a nested-design study (85 children, 5-18 years old, from 64 families, HC:n=32; CS:n=32) to characterize the relation between parent (baseline and post-stress salivary) and child (hair) cortisol measures within HC and CS groups, controlling for child age, sex and parent ethnicity. A second analysis was performed; examining whether corticosteroid exposure as part of cancer treatment affects the association between parent and child cortisol. The interaction effect between cancer experience and parental cortisol on child HPA function was significant (Baseline:F(1,46.23)=4.53,p=.039; Post-Stress:F(1,47.21)=8.99,p=.004) with a more positive association between parent and child cortisol in HC compared to CS families. The interaction effect between child corticosteroid exposure and parent cortisol was significant (Baseline:F(1,61.02)=4.76,p=.033; Post-stress:F(1,61.42)=6.04,p=.017) with a more positive association between parent and child cortisol in the non-exposed (N=67), compared to the exposed group (N=11). Parallel to findings from the rodent model, these results reveal a modifiability of the relation between parent and child HPA function by child corticosteroid exposure and indicate plasticity of HPA function beyond infancy.

CHILD EXECUTIVE FUNCTIONING IS PREDICTED BY PARENT HYPOTHALAMIC PITUITARY ADRENAL (HPA) FUNCTION IN BOTH CANCER SURVIVORS AND HEALTHY CONTROL CHILDREN. S.M. Dinces[1], S.N. Hile[1], L.N. Rowell[1], J.F.L. Pinner[1], R.E. Rieger[1], N.C. Moss[1], R.S. Allen[1], M.E. Thompson[2], A.C. Tang[1,3,4], and R.D. Annett[5]. [1]Department of Psychology University of New Mexico, Albuquerque, NM 87131 USA. [2]Department of Anthropology, University of New Mexico, Albuquerque, NM 87131 USA. [3]Department of Neurosciences, University of New Mexico, Albuquerque, NM 87131 USA. [4]Office of International Science and Engineering, National Science Foundation, Arlington, VA 22230 USA. [5]Department of Pediatrics, University of Colorado Denver, CO 80045 USA. sdinces@unm.edu

Exposure of infant rats to mild stress associated with a relatively novel non-home environment can modify the influence of maternal HPA function on offspring cognitive function. To determine whether the impact of these converging early life influences generalize to humans, we investigated whether experience of cancer, a major chronic stressor, can change the influence of parent HPA function on child executive function (EF). Eighty-one children, ages 5-18, from 63 families (Healthy Controls=32, Cancer Survivors=31) were included in a nested-design study. To identify major dimensions underlying EF, principle component analysis was performed on 9 measures of EF (NIH Examiner). The first three components accounted for 78.47% variance with the first interpreted as attention control, the second as responsivity to stimuli, and the third as response inhibition. Parent HPA function was indexed by normalized evoked salivary cortisol response (CORTne=PreStress -PostStress)/PreStress) to the Trier Social Stressor Task (TSST). Multilevel modeling was applied to each of these three components with cancer experience and parental cortisol as predictor variables controlling for child age, showing a significant main effect of parent CORTne on the component of child attention control (F(1,51.35)=4.08,p=.049)---parents with higher rise in cortisol response to the TSST had children with higher levels of attention control. This result suggests that parent ability to increase cortisol output in response to a stressful event can predict child attention control across different stress conditions. Therefore improving parent self-stress regulation may positively contribute to cognitive development in children experiencing different levels of stress.

ADOLESCENT FEAR MEMORIES AND DNA METHYLATION FOLLOWING EXPOSURE TO CAREGIVER MALTREATMENT. T.S. Doherty and T.L. Roth. Psychological and Brain Sciences, University of Delaware, Newark, DE 19716 USA. tdoherty@psych.udel.edu

Rats exposed to adversity early in life display altered developmental trajectories of fear behavior. The mechanisms underlying these behavioral shifts remain to be elucidated, though epigenetic alterations such as DNA methylation are an excellent candidate. Specifically, methylation of plasticity-related genes, including bdnf, may contribute to altered fear behavior following disruption of the caregiving environment. Previously we assessed alterations in DNA methylation in adolescent rats that had been exposed to our caregiver maltreatment paradigm and discovered that females exhibited gene-specific (bdnf) changes in response to maltreatment whereas maltreated-males exhibited changes on a global level, including global alterations in DNA hydroxymethylation, a recently identified cytosine modification that plays a role in learning and memory. The aim of the current study was to assess fear behavior outcomes in adolescent rats exposed to our caregiver maltreatment paradigm and to assess whether there is a relationship between these outcomes and our measures of global and gene-specific epigenetic alterations in the adolescent brain. Infant male and female Long Evans rats were subjected to either nurturing care (from their biological mother or foster dam) or maltreatment from a foster dam for 30 minutes daily from postnatal day (PN) 1 to PN7. Between PN30 and PN35 we investigated cued fear conditioning, extinction, and recall. Results will be discussed in the framework of consequences and mechanisms of early-life stress.
[The University of Delaware Research Foundation and NIGMS 1P20GM103653 to TLR]

PERCEIVED MALTREATMENT AND DEVELOPMENT OF RISKY PERSONALITY FACTORS AND FUTURE ORIENTATION: RISK FOR ALCOHOL USE DURING ADOLESCENCE. H. Edalati and M.D. Krank. Department of Psychology, University Of British Columbia, Kelowna, BC, Canada V1V 1V7. hanie.edalati@ubc.ca

Research has indicated a strong relationship between maltreatment and earlier initiation of drinking, higher rates of alcohol abuse and later dependence in adolescents. However, the underlying pathways of these relationships are not clear. We examined the effects of perceived maltreatment (i.e., perceived neglect and violence) on risky personality factors (including anxiety sensitivity, hopelessness, impulsivity, and sensation seeking) and future orientation (i.e., the ability of time perspective, planning ahead, and anticipation of future consequences) and tested if these factors mediate the relationship between perceived maltreatment and alcohol use in adolescents. Adolescents (n = 142, 51% females) aged 13-17 years old (M = 14.48, SD = 1.09) were assessed. Results indicated that higher perceived violence was associated with higher levels of hopelessness, impulsivity, and sensation seeking, whereas, higher perceived neglect only increased hopelessness. In addition, both perceived neglect and violence were associated with lower levels of future orientation. Sensation seeking emerged significant over and above other mediators (i.e., impulsivity and future orientation) in the relationship between violence and recency of alcohol use ($F(4, 124) = 13.32$, $p < .001$). Findings suggest that adolescents who experienced violence may use alcohol to enhance positive affect and experience intense stimulation. Intervention programs for alcohol use in adolescents should consider the effects of maltreatment, particularly violence. Maltreated adolescents with

higher risk of alcohol use would benefit from interventions that target their feelings, decision making, motivations, and behavioural control.

INDIVIDUAL DIFFERENCES IN STRESS REACTIVITY IN A HIGH RISK SAMPLE. R.D. Eiden[1] and D.A. Granger[2,3]. [1]Research Institute on Addictions, State University of New York at Buffalo, Buffalo, NY 14203 USA. [2]Institute for Interdisciplinary Salivary Bioscience Research Arizona State University, Tempe, AZ 85281 USA. [3] Johns Hopkins University School of Nursing Johns Hopkins University Bloomberg School of Public Health Baltimore, MD 21218 USA. eiden@ria.buffalo.edu

This study examined the association between prenatal tobacco exposure (PTE) and the rate of change in cortisol in response to frustration at 16 months of child age. Data were collected from 212 mother-infant dyads (66 non-smokers and 146 smokers) using a prospective design with sample recruited in pregnancy. PTE was assessed using maternal salivary cotinine and self-reports in pregnancy and infant meconium after delivery. Toddler reactivity was assessed during an arm restraint paradigm designed to elicit frustration. Saliva for cortisol was collected at pre-task, post-task 1 (20 minutes after frustration), and post-task 2 (40 minutes after frustration). Latent growth modeling was used to examine study hypotheses. Results indicated significant variability in intercept ($t = 5.52$, $p < .001$) and slope ($t = 3.75$, $p < .001$), and a significant association between the intercept and the slope ($r = -.24$). Higher pre-task cortisol was associated with less change from pre to post-task. The conditional growth model with PTE status regressed on intercept and slope fit the data well ($\chi 2 = 7.40$, $p = .12$, CFI = .99, RMSEA = .06). PTE was significantly associated with both intercept ($\beta = -.24$, $t = -2.95$, $p = .003$) and slope ($\beta = .21$, $t = 2.19$, $p = .03$). Children in the PTE group had lower pre-task cortisol and a greater increase in cortisol from pre to post-task compared to the control group. Results indicate that PTE is associated with changes in the stress-response system perhaps as a result of toxic stress.
[NIH grant # R01 DA019632 to RDE]

INVESTIGATING THE FACTORS AFFECTING YOUNG CHILDREN'S SOCIAL AND ASOCIAL LEARNING PREFERENCES. E. Flynn[1], C. Turner[1], and L.-A. Girardeau[2]. [1]Centre for Coevolution of Culture and Biology, School of Education, Durham University. [2]Department of Biological Sciences, Université du Québec à Montréal. e.g.flynn@durham.ac.uk

The current study examined the trajectory of children's decisions about learning socially or individually. Ninety-six children (48 girls) aged 3- and 5-year-olds were shown two novel puzzle boxes (one hard, one easy). They were asked if they would like to attempt to try to open it on their own (individual) or after watching an adult model (social); these preference were either met or violated. 79% of children chose to learn by watching a model. Children who had their learning preference met in both conditions were also significantly quicker at beginning the task ($t(71)=2.00$, $p=.050$), and retrieving the reward ($t(73)=2.78$, $p=.007$).
[ESRC Grant ES/J021385/1 to EGF and L-AG]

ASSESSING NEWBORN CRAWLING IN RESPONSE TO TERRESTRIAL OPTIC FLOW. [1], D. Anderson[2], and M. Barbu-Roth[1]. [1]Laboratoire de Psychologie de la Perception, Université Paris Descartes – CNRS, Paris, France. [2]Department of Kinesiology, San-Francisco State University, San Francisco, CA 94132-4161 USA. vince.forma@hotmail.fr

We have recently reported a very precocious coupling between vision and crawling in humans, evidenced by 3 day-old newborns increasing their leg stepping in response to terrestrial optic flows simulating their motion forward or backward. However, as few full arm steps were observed in the aforementioned study it was difficult to determine if optic flows modified arm stepping. Here we investigated whether coding leg and arm movements based on the number of individual flexion and extension movements, rather than on the number of flexion-extension cycles, would yield additional results. Twenty-six 3 day-old infants were video recorded in a prone position on a transparent water-mattress, through which a checkerboard pattern was projected. Three conditions were presented randomly for one minute to each infant: (1) Static – the checkerboard was static, (2) Toward – the checkerboard moved toward the infant simulating forward self-motion, and (3) Away – the checkerboard moved away from the infant simulating backward propulsion. A significant effect of Condition for the number of leg flexions and extensions, $F (2, 50) = 3.2$, $p < .05$, revealed that Toward and Away elicited significantly more leg movements than Static. Though no effect of Condition on arm movements was observed, more movements were made on the right side, $F (1, 25) = 6.8$, $p < .05$ and a significant interaction between movement type (flexion/extension) and Side, $F (1, 25) = 5.1$, $p = .03$ revealed no differences on the left side but more flexion than extension movements on the right side. The new method provides further insight into the character of newborn crawling.
[ANR grant ANR-11-BSH2-007 01; Région Ile-de-France grant; NICHD grant HD050638; NCMHHD grant P20MD00262]

THE EFFECT OF D-PENICILLAMINE ADMINISTRATION DURING PRENATAL ETHANOL EXPOSURE IN 5 AND 14 DAY-OLD RATS. M. Gaztañaga[1], A.Angulo-Alcalde[1], N.E. Spear[2], and M.G. Chotro[1]. [1]Faculty of Psychology, University of the Basque Country UPV/EHU, Donostia-San Sebastian, Spain. [2]Department of Psychology, Binghamton University, Binghamton, NY 13902, USA. mirari.gaztanaga@ehu.es

Ethanol exposure during the last days of gestation increases ethanol acceptance in neonate, in infant and in adolescent rats. Recent studies with neonate rats evidenced the crucial implication of acetaldehyde, the first metabolite of ethanol, in ethanol reinforcement at this early age. Previous studies in our and other laboratories have shown that after ethanol exposure during the last gestational days, the intake and palatability of ethanol increases when measured on postnatal day (PD) 1, 5 and 14. Therefore, in this study we investigated the role of acetaldehyde on the prenatal ethanol exposure effect. We administered dams during gestational days 17-20 with water, ethanol or ethanol + D-Penicillamine (DP) and the offspring was tested with three different procedures. On Postnatal day 5 (Experiment 1) pups were assessed with an operant conditioning procedure using ethanol 6% as the reinforcer. On PD 14 (Experiment 2) pups' ethanol (6%) consumption was evaluated as well as their taste reactivity to this same ethanol solution. The results of both experiments confirmed that eliminating acetaldehyde produced after prenatal ethanol exposure reduces the postnatal positive response to ethanol, highlighting the important role of acetaldehyde on ethanol reinforcing properties during early development.

PRENATAL EXPERIENCE SHAPES PERCEPTION OF PROSODY AT BIRTH. J. Gervain[1,2]. [1]Université Paris Descartes, Paris, France. [2]CNRS, Paris, France. judit.gervain@parisdescartes

In four NIRS studies, we explored how prenatal experience with language shapes speech perception abilities at birth. As speech heard in utero is filtered by maternal tissues, it is mainly prosodic information that is transmitted to the fetus. We therefore investigated whether the perception of prosody at birth shows the influence of the

prosodic patterns of the language(s) heard prenatally. We found that monolingual French newborns grouped tone sequences that contrasted in duration in a French, adult-like manner, i.e. iambically, as short-long, as is found in the prosody of French, but showed no grouping for pitch, a cue less used in French prosody, whereas the bilinguals whose other language relies on pitch contrasts showed an adult-like, trochaic (high-low) grouping for pitch, suggesting an important prenatal influence.

THE PERCEPTION OF TIME-COMPRESSED SPEECH AT BIRTH. J. Gervain[1,2] [1]Université Paris Descartes, Paris, France. [2]CNRS, Paris, France. judit.gervain@parisdescartes

Adults rapidly adapt to time-compressed speech up to 40% compression with respect to the original duration in their native language, as well as in unfamiliar languages, if those are rhythmically similar to their native language, suggesting that adaptation is based on auditory, rather than syntactic or semantic cues. However, it remains unclear whether this adaptation ability is the result of extensive experience with language or whether it is automatically achieved by the auditory system. In three NIRS and EEG studies with newborns, we have explored whether newborns are able to adapt to time-compressed speech. We have found that French-exposed newborns readily adapt to accelerated French and Spanish, a rhythmically similar language, at 60% compression, but not at 30% compression, showing a similar adaptation pattern as adults. This suggests that prenatal experience with the prosody of the native language already shapes the speech perception system early in development.

COMPARING THE EFFICACY OF MATERNAL FLUOXETINE AND EXERCISE IN A RODENT MODEL OF POSTPARTUM DEPRESSION: OUTCOME OF BOTH MOTHER AND MALE AND FEMALE OFFSPRING. A.R. Gobinath[1], R.J. Richardson[2], C. Chow[2], J.L. Workman[2], S.E. Lieblich[2], A.M. Barr[3], L.A.M. Galea[1,2]. [1] Program in Neuroscience, University of British Columbia, Vancouver, British Columbia, Canada, V6T 1Z3. [2] Department of Psychology, University of British Columbia, Vancouver, British Columbia, Canada, V6T 1Z4. [3] Department of Anesthesiology, Pharmacology, & Therapeutics, University of British Columbia, Vancouver, British Columbia, Canada, V6T 1Z3. agobinath@psych.ubc.ca

Postpartum depression (PPD) affects approximately 15% of mothers and can have negative effects on the mother-infant dyad. Pharmacological antidepressants such as fluoxetine (Prozac) are commonly used to treat PPD. However, fluoxetine can remain active in breast milk and potentially impact offspring development. For this reason, non-pharmacological therapies, such as exercise, may be more agreeable. Unfortunately, it is unclear whether exercise is efficacious for treating PPD while preserving normal offspring development. To investigate this, we treated dams daily with high levels of corticosterone (40 mg/kg), to induce a depressive-like phenotype, or oil during the postpartum. Within the oil and corticosterone conditions, four additional antidepressant groups were created: 1. Fluoxetine (Prozac; 10 mg/kg) + exercise (voluntary access to running wheel); 2. Fluoxetine + no exercise; 3. Saline (vehicle for fluoxetine) + exercise; 4. Saline + no exercise. Male and female offspring were weaned and then tested in adulthood for anxiety-like behaviour using the novelty suppressed feeding task and for stress reactivity using the dexamethasone suppression test. Preliminary findings indicate that maternal postpartum fluoxetine reversed corticosterone-induced disruptions in maternal care, regardless of exercise condition. Additionally, preliminary findings indicate that exercise had a greater antidepressant-like effect than fluoxetine for the dams. For this reason, we predict that exercise will result in a protective effect particularly in the adult male offspring. Our findings will shed light on how the postpartum antidepressant treatments (Prozac, exercise) differentially affect the well-being of the mother as well as the male and female offspring.
[Funded by CIHR to LAMG.]

A POSITIVE TACER-3 ALCOHOL SCREEN IN PREGNANCY PREDICTS LATER ALCOHOL USE PROBLEMS IN CHILDREN. J.H. Hannigan[1,2,3,4], L.M. Chiodo[7], J. Janisse[5], R.J. Sokol[2,4], V. Delaney-Black[6]. [1]Merrill Palmer Skillman Institute for Child & Family Development, [2]Department of Obstetrics & Gynecology, [3]Department of Psychology, [4]C.S. Mott Center for Human Growth & Development, [5]Department of Family Medicine & Public Health Sciences, and [6]Carman & Ann Adams Department of Pediatrics, Wayne State University, Detroit, MI, 48202, USA. [7]College of Nursing, University of Massachusetts, Amherst, MA, 01003, USA. j.hannigan@wayne.edu

Identifying prenatal alcohol consumption is essential to prevention of fetal alcohol spectrum disorders (FASD). Our prior research showed that the TACER-3 alcohol screen is effective at selectively identifying both women drinking at fetal risk levels and neurobehavioral effects associated with prenatal alcohol exposure in 4-year old children. The current research was designed to further validate the TACER-3. We hypothesized that more alcohol-related problems would be seen in teens born to mothers who had a positive prenatal TACER-3 screen than in teens born to TACER-3-negative mothers in a prospective high-risk urban cohort. At 14 years old, TACER-3-positive teens were more likely than TACER-3-negative teens to meet criteria for alcohol abuse (10.5% vs 1.4%, $\chi^2 = 5.5$, $p = 0.019$) and to report problems due to current drinking (42.9% vs 17.2%, $\chi^2 = 7.6$, $p = 0.006$). Similarly, at 19 years old, 36.4% of TACER-3-positive teens met criteria for alcohol abuse or dependence via parent or teen report compared to only 12.7% of TACER-3-negative teens ($\chi^2 = 8.1$, $p<0.004$). Similar results were found after controlling for many important maternal and family characteristics in logistic regression analyses. The results suggest that the relatively simple TACER-3 alcohol screen administered during pregnancy effectively predicts later alcohol use problems in teen offspring. The risk drinking in pregnancy that is detected by the TACER-3 has cross-generational impact on sensitivity to early alcohol use problems. The results also imply that alcohol use/abuse problems may be associated with FASD.
[Supported by grants from the US National Institutes of Health (R01-DA08524 & R01-DA016373) to Professor Delaney-Black.]

MODERATELY-PREMATURE AND FULL-TERM INFANTS PERFORM DIFFERENTLY ON A COGNITIVE/EYE-HAND "TOUCHPAD TASK" AT 4-MONTHS (SAME GA). E. Hanrion-Monnier[1], C. Granier-Deferre[1], and A.J. DeCasper[1,2]. [1]Institut de Psychologie, Université Paris Descartes, Sorbonne Paris Cité, LPPS-EA 4057, Boulogne-Billancourt, 92000, France. [2]Department of Psychology, University of North Carolina, Greensboro, NC 27410, USA. carolyn.granier-deferre@parisdescartes.fr

Introduction: Eighty-four percent of the 15 million premature births in the world each year occur between 32-37 weeks Gestational Age (GA). Most infants survive without intensive care; gross development is unremarkable and they are not closely monitored. However, in the early school years about 30% of them have compromised neuropsychological profiles, relative to their full-term peers. This research aimed to detect performance differences in a cognitive/eye-hand task between 4-month old full-term infants (n=30) and their corrected age preterm peers (n=14).
Procedure: The task used here is one of several tasks programmed into a touchpad ("Baby Learn©", 2014). Here, each touch on a small Smiley-Face target caused it to

jump 2cm to a new location while saying, “Bravo Bébé!”. Otherwise, the target did not move or speak. The precise location (in mm-coordinates) and temporal characteristics (in msec) of each touch were recorded.
Results: Almost all infants were self-motivated to interact with the Smiley Face. Statistically, premature infants made fewer on-target-touches/min, had longer latencies between touches and made more discrepant off-target- touches than their full-term peers.
Conclusion: Differences can be detected in how moderate pre-term and full-term infants perform on a task requiring contingency learning, sustained attention, fine motor control and eye-hand coordination. The infants’ performances on other tasks in “Baby Learn©” are used to isolate the source of the differences seen here, e.g., insensitivity to response contingencies and/or less fine-motor control. We are also assessing the long-term predictive validity of the “Baby Learn©” test battery.

CHILDREN IMITATE ACTIONS WITH OBJECTS AFTER A DELAY WITHOUT OBVIOUS USE OF RATIONAL INFERENTIAL PROCESSES. M. Heimann, A. Edorsson, A. Sundqvist, and F. Koch. Department of Behavioral Sciences and Learning, Linköping University, SE 581 83 Linköping, Sweden. mikael.heimann@liu.se

It has been proposed that infants imitate actions with objects based on rational inferential processes. As example, Gergely, Bekkering & Király, (2002) reported imitation of a novel action only if the hands of the experimenter were visible, not when they were covered. In order to replicate these findings, sixty-one children with a mean age of 14.8 months (95% CI [14.3, 15.3]) were tested (36 girls) with the hands of the experimenter visible (n =26) or occupied (n= 35) The children were observed in the laboratory, at home or at daycare. The head touch procedure (Meltzoff, 1988) was used. The object consisted of a round plastic lamp mounted on a black wooden block, an object the infants had never seen before. The novel action demonstrated in the deferred imitation condition was for the experimenter to lean forward and press down the panel with the top of her forehead so that the lamp was turned on. We found an imitation rate of 27 % when hands were visible and 37 % when hands were occupied. Differences between conditions are not significant (Fisher’s exact test, p = .58). The higher frequency was observed in the hands occupied condition, counter to Gergely et al’s results. One explanation for our lower imitation rate is that about half the sample was tested at home. Using only the results from the lab imitation rates of 40 % (visible hands) and 53 % (occupied hands) were observed (p = .70). Thus, no support for rational imitation was observed.
[The Swedish Council for Working Life and Social Research, grant #2008-0875 to MH]

MK-801 IMPAIRS THE ACQUISITION OF CONTEXTUAL FEAR IN THE CONTEXT PRE-EXPOSURE FACILITATION EFFECT (CPFE) PARADIGM IN ADOLESCENT RATS. N.A. Heroux, P.A. Robinson-Drummer, J.B. Rosen, and M.E. Stanton. Department of Psychological and Brain Sciences, University of Delaware, Newark, Delaware, 19716 USA. nheroux@psych.udel.edu

The context pre-exposure facilitation effect (CPFE) is a contextual fear conditioning paradigm in which there are three phases: learning about the context, acquiring the context-shock association, and retrieving/expressing the context-shock association. In adult rats, NMDA receptor antagonism during standard contextual fear conditioning impairs retention but not postshock freezing (Sanders and Fanselow, 2003). In contrast, antagonizing NMDA receptor functioning in the basolateral amygdala (BLA) on the training day of the CPFE impairs freezing during retention (Matus-Amat et al., 2007). The role of NMDA receptors during the training day of the CPFE in developing rats is currently unknown. Therefore, the current study assessed the effects of training day injections of MK-801 on post-shock freezing and retention in postnatal day (PD) 31 rats. In Experiment 1, i.p. injections of .1 mg/kg MK-801 given before training impaired retention test freezing relative to saline controls. In Experiment 2, the same dose of MK-801 given before training disrupted post-shock freezing. Experiment 3 replicated the findings of our previous experiments by assessing both post-shock and retention test freezing following systemic injections of 0, .025 .05, or .1mg/kg MK-801 before CPFE training. Only the highest dose impaired postshock and retention freezing. In summary, acquisition of the context-shock association during the training day of the CPFE is NMDA receptor dependent in developing rats. The CPFE paradigm may make post-shock freezing NMDA-receptor dependent in a manner that contrasts with standard contextual fear. Future experiments examining postshock freezing at earlier stages of ontogeny may help elucidate the mechanisms of the CPFE.
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PRENATAL MATERNAL EFFECTS ARE MODULATED BY A PRECOCIAL BIRD’S POSTNATAL MATERNAL CARE. C. Houdelier[1], O. Le Bot[1], N. Aigueperse[1], E. de Margerie[1], A.S. Darmaillacq[2], L. Dickel[2], C. Arnould[3,4,5,6], L. Calandreau[3,4,5,6], A. Bertin[3,4,5,6], and S. Lumineau[1]. [1]UMR CNRS 6552, Ethologie animale et humaine, Université de Rennes1, 35042 Rennes, France. [2]Groupe Mémoire et Plasticité comportementale, Université de Caen Basse-Normandie, 14032 Caen, France. [3]INRA Val de Loire, UMR85 Physiologie de la Reproduction et des Comportements, [4]CNRS-UMR 7247, [5]Université François Rabelais de Tours, and [6]IFCE F-37380 Nouzilly, France. Cecilia.houdelier@univ-rennes1.fr

As for mammalian species, maternal influences play a fundamental role in the behavioural development birds’ offspring, and thereby in the emergence of phenotypic variability. Prenatal maternal effects are mediated notably by maternal steroids in egg vitellus whose levels are influenced by females’ characteristics/environment and modulate chicks’ development. During the postnatal period, females’ presence or maternal care affects offspring’s emotive and social behaviours. Surprisingly, interactions between these two maternal effects have been poorly analysed although they play a crucial role during behavioural development making understanding them essential. In this context, we investigated the potential modulation of postnatal maternal care on the consequences of a prenatal stress in Japanese quail chicks. Previous reports showed that social instability in laying quails increased their offspring’s emotional reactivity in relation to the increase of yolk testosterone levels in their eggs. We raised offspring of stressed females either with an adoptive mother (mothered set, N = 29) or in group of young (non-mothered set, N = 27). Our results showed that mothered chicks were lighter during their first three weeks and their emotional reactivity levels were lower than non-mothered chicks. Thus, our results highlight that, as mothered chicks became less emotive than non-mothered chicks, birds’ maternal care can reverse the phenotypic consequences of a prenatal stress. Mechanisms of such interactions need to be explored, particularly by analysing mother-offspring interactions during the mothering period.
[PReSTO'Cog ANR-13-BSV7-0002-02]

INTERVENING EARLY TO AFFECT TELOMERE LENGTH. J.R. Hoye[1], A. Asok[1], K. Bernard[2], T.L. Roth[1], and M. Dozier[1]. [1]Department of Psychological and Brain Sciences, University of Delaware, Newark, DE, 19716 USA. [2] Department of Psychology, Stony Brook University, Stony Brook, NY, 11794 USA. jhoye@psych.udel.edu

In a randomized clinical trial, we assessed whether a brief parenting intervention reduced telomere attrition among children adopted internationally. Children adopted internationally often exhibit physical, cognitive, and social delays as a result of their early experiences of care (Gunnar et al. 2000). Telomere length, which indicates cellular aging, is associated with early stress, and may be a mechanism through which stress causes disease and aging (Price et al. 2012). Early adverse experiences, such as orphanage care and neglect, are associated with shorter telomere length (Asok et al., 2013; Drury et al., 2011). Forty-nine children (around 2 years old) adopted into families in the United States were randomly assigned to one of two intervention conditions. The parents of children assigned to the experimental intervention received Attachment and Biobehavioral Catch-up, a 10-session intervention targeting parental nurturance and sensitivity; parents of children in the control intervention condition received an intervention of the same duration, length, and frequency that targeted cognitive and physical development. A third non-randomized group (n = 15) was included with no intervention component. Children's telomeres were assessed when children were about 5 years old (M = 66.30 months, SD = 7.82). Children whose parents received the experimental intervention had longer telomeres (T/S ratio) than children in the other two groups F (2, 50) = 4.57, p = .015. These results highlight the power of a brief intervention in remediating biological effects of early deprivation and indicate that experimental manipulation of telomere length is possible.
[This research was supported by Edna Bennett Pierce and by NIH grant R01 MH084135 to MD.]

NEONATAL MERCURY EXPOSURE ALTERS HIPPOCAMPUS-DEPENDENT MEMORY AND ANXIETY IN RATS. P.S. Hunt, Department of Psychology, College of William & Mary, Williamsburg, VA 23187 USA. pshunt@wm.edu
Mercury is a teratogen and prenatal exposure to this heavy metal can produced significant negative effects in the offspring. Work with humans that were exposed to mercury via environmental events during gestation has revealed that cognitive deficits are long-lasting and may be more severe when exposure occurred during the third trimester of pregnancy. Here we use a model of neonatal mercury exposure wherein rats were injected with mercury (0, 1, or 2 mg/kg) once daily on postnatal days 4-9. Animals were tested in early adolescence. Major findings were that hippocampus-dependent tasks (trace and contextual fear conditioning) were more sensitive to mercury effects than was delay conditioning; mercury-exposed animals expressed less conditioned fear than controls. Further, the highest dose (2 mg/kg) resulted in abnormal responses on measures of anxiety (elevated plus maze and open field tests), the pattern of which suggests reduced anxiety in mercury-exposed animals. Collectively the results indicate that "third-trimester equivalent" exposure to mercury can produce deficits in some types of memory, and exposure to higher levels produces more general effects through reduced fear/anxiety. These results confirm that mercury is a teratogenic agent that has long-lasting consequences for cognitive and emotional behaviors.

EARLY FACE-TO-FACE INTERACTIONS IMPROVE SOCIAL DEVELOPMENT IN NURSERY-REARED INFANT RHESUS MACAQUES (MACACA MULATTA). S.S.K. Kaburu[1,2], E.A. Simpson[1,2], A. Paukner[2], S.J. Suomi[2], and P.F. Ferrari[1]. [1]Dipartimento di Neuroscienze, Università di Parma, Parma, Italy. [2]Eunice Kennedy Shriver National Institute of Child Health and Human Development, Laboratory of Comparative Ethology, Poolesville, MD, USA. stefano.kaburu@nih.gov

Children who face social neglect in early childhood exhibit problems in regulating their social behavior later in life, such as difficulty to form social bonds, lack of understanding social cues, and failure to seek comfort from a caregiver. While a broad range of studies has shown how early social experience can affect development, evidence that the effects of neglect can be buffered or even reversed is still scant. To investigate this question, we used rhesus macaques as a model species since, similarly to humans, mother and infant macaques form strong social bonds and frequently engage in face-to-face interactions during the first month of life. Infant macaques were separated from their mothers on the day of birth and reared by human caretakers in a primate nursery. Infants were randomly assigned to receive either 1. Face-to-face interactions and handling by human caregivers, 2. Handling only, or 3. Standard care for the first 28 days of life. At 40 days old, our data show that infants under the face-to-face intervention both spent more time looking at social interactions as measured by eyetracking technology and displayed higher rates of social contact when interacting with peers compared to both controls, but that by 6 month old, all groups displayed comparable social preferences Our study offers the first evidence that the provision of face-to-face social interactions early in life can enhance social development.
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NEW LEARNING VS UNLEARNING: EXAMINATION OF THE INFRALIMBIC CORTEX-AMYGDALA-HIPPOCAMPUS CIRCUITRY IN EXTINCTION OF CONDITIONED FEAR
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Extinction of conditioned fear refers to the decrease in conditioned responding to a fear-eliciting stimulus due to the repeated presentation of that stimulus without any outcome. Extinction involves the formation of a new memory of "safety" that competes with the original fear memory ("danger") in adult rats. This is evidenced by rats exhibiting the return of fear when tested in a context different to extinction (i.e., renewal). The prevailing theory proposes that extinction memory consolidation involves the amygdala communicating to the ventral hippocampus (vHPC) and infralimbic cortex (IL). Therefore, we temporarily disconnected this circuitry at the time of extinction by simultaneously inactivating the IL and vHPC by infusing muscimol, a GABAA agonist, prior to extinction. The cannulas were implanted in the IL and the vHPC in one of three ways: ipsilateral, contralateral and bilateral. We observed that rats treated with saline displayed robust renewal of extinguished fear, as did rats infused with muscimol in the ipsilateral condition. Rats that received contralateral or bilateral infusions of muscimol prior to extinction failed to display renewal of fear when tested the day after extinction. These results suggest that extinction may "unlearn" the original fear memory when the IL-amygdala-vHPC circuitry is disrupted. This finding is consistent with the idea that extinction reverses the original fear memory in juvenile rats, in which the connections between those brain regions are immature. We are now using retrograde tracers to map projections from the amygdala to vHPC and IL, and co-labelling it with c-Fos.

EFFECTS OF PERINATAL STRESS AND FLUOXETINE ON CIRCADIAN BEHAVIOUR OF ADULT MICE. V. Kiryanova[1,2] , V. M. Smith[1,2] , M. C. Antle[1,2] & R. H. Dyck[1,2,3]. [1]Department of Psychology, [2]Hotchkiss Brain Institute, and [3]Cell Biology and Anatomy, University of Calgary, Calgary, Alberta, Canada. rdyck@ucalgary.ca

Women of child-bearing age are the population group at highest risk for depression. Fluoxetine (Flx) is the antidepressant most commonly used by pregnant women. Flx and maternal stress can both affect fetal development. We previously demonstrated that perinatal exposure to Flx alters circadian rhythms of mouse offspring. The present study is the first to investigate the combined effects of maternal stress and perinatal exposure to the SSRI Flx on the circadian behaviour of mice as adults. METHODS: Mouse dams were exposed to chronic unpredictable stress (embryonic (E) day 7 to E18), Flx (E15- postnatal day 12), and combination of stress and Flx. A separate control group consisted of animals that were not exposed to stress or Flx. At two months of age, male offspring were placed in recording chambers and circadian organization of wheel running rhythms and phase shifts to photic and non-photic stimuli were assessed. RESULTS: We found that prenatal stress lead to smaller phase-delays to light during the early subjective night. Furthermore, mice exposed to perinatal stress and Flx took longer to re-entrain to 8-hour light phase advance in the animal model of jetlag. Mice exposed to perinatal Flx and mice exposed to perinatal stress showed increased phase-advances to light during the late subjective night. Interestingly, combination of stress and Flx normalized behavioural phase shifts to late-night light exposure. CONCLUSION: Our results suggest that perinatal exposure to Flx, maternal stress, and their combination, lead to discernible, persistent changes in circadian system function of adult mouse offspring.
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SOME LIKE IT HOT: TEMPERATURE PREFERENCE AND REPRODUCTION IN HARTLEY AND HAIRLESS GUINEA PIGS. G.A. Kleven, P. Joshi, and S.A. Bellinger. Department of Psychology, Wright State University, Dayton, OH 45435 USA. gale.kleven@wright.edu

Hairless guinea pigs are the result of a spontaneous recessive mutation first identified in 1978. Recommendations for the care of this strain often include housing at warmer temperatures (24 °C), even though it is unknown if these conditions are beneficial to the animal. The aim of this study was two-fold: (a) determine the impact of temperature on reproduction in female Hairless guinea pigs, and (b) compare temperature preference of the Hairless and Hartley strains. Weight, estrus cycle, and pregnancy outcomes were recorded for females maintained at both 22 and 24 °C. Temperature preference was determined by observing each strain in a ring-shaped apparatus containing a non-linear gradient, maintained by separately controlled heating mats (24-38 °C). Guinea pigs were placed either singly or in pairs at randomized starting points within the apparatus, and observed for 30 minutes. When placed alone in the apparatus, all 3 groups spent more time in the 30 °C zones. However, when tested as pairs, Hartley females preferred the cooler zones (24-30 °C), while Hairless guinea pigs preferred a warmer range (30-38 °C). Hairless females maintained in warmer housing conditions (24 °C) became obese over time. However, when transferred to a 22 °C environment, weight and reproductive measures returned to baseline. These results confirm a thermoneutral temperature preference (30 ± 2 °C) for both strains, and suggest that housing temperature may have significant impact on reproductive factors. Additionally, these studies reveal the important role of social context in thermoregulatory behavior for both Hartley and Hairless guinea pigs.

SLEEP AFTER LEARNING ENHANCES FLEXIBILITY OF MEMORY RETRIEVAL IN 12-MONTH-OLD INFANTS. C. Konrad[1], J.S. Herbert[2], S. Schneider[1], S. Lorek[1], and S. Seehagen[1]. [1]Department of Psychology, Ruhr-Universität Bochum, Bochum, 44787, Germany. [2]Department of Psychology, University of Sheffield, Sheffield, S10 2TP, UK. carolin.konrad@rub.de

In the present study, we examined the effect of sleep on the flexibility of declarative memory retrieval using a deferred imitation paradigm (Barr et al., 1996; Hayne et al., 1997). Forty-one 12-month-old infants were randomly assigned to a nap condition, a no-nap condition, or a baseline-control condition. In a demonstration session, infants in the nap and no-nap condition watched an experimenter perform three target actions on a hand puppet. To enhance encoding opportunities, infants were allowed to practice the target actions three times immediately afterwards (Hayne et al., 2003). Flexibility of memory retrieval was assessed in a test session 4-hours later with a puppet that was identical in shape but different in color from the one used during the demonstrations. Infants in the nap condition were scheduled to sleep (> 30 min) during the 4-hour interval while infants in the no-nap condition were naturally scheduled to stay awake. Sleeping behavior was monitored using actigraphy. Infants in the baseline-control condition only saw the stimuli during the test session to assess spontaneous production of the target actions. The results indicate that only infants in the nap condition performed a significantly higher number of target actions at test than infants in the baseline-control condition, $t(20.99) = -2.202$, $p = .039$. Our results point towards a facilitative effect of sleep on the flexibility of memory retrieval in 12-month-old infants. This indicates that sleep-dependent memory consolidation can change the quality of memory traces already in infants.
[This research was supported by Deutsche Forschungsgemeinschaft Grant SE 2154/2-1.]

NEUROMOTOR (POSTURAL) DEVELOPMENT AS A PREDICTOR OF DEVELOPMENTAL CHANGE IN INFANT HANDEDNESS. A. Koucheki, J.M. Campbell, and G.F. Michel. Department of Psychology, The University of North Carolina at Greensboro, Greensboro, NC 26170 USA. infantde@uncg.edu

A dynamic systems perspective suggests that the posture of an infant may illicit changes in an infant's handedness (Corbetta & Thelen, 1996). Previous research found that posture influenced the amount of symmetrical (bimanual) reaching during infancy, but not hand preference (Babik, Michel, Sheu, & Campbell, 2014). Although distinguishing the developmental features between posture and hand use was useful, less useful was having age as a predictor to identify the change in hand preference. Because age is an arbitrary predictor of development, it is not useful for predicting other developmental trajectories. The objective of the current study was to explore whether an infant's postural abilities could predict changes in an infant's hand preference, irrespective of age. Three hundred and three infants were observed using Touwen's indices of neuromotor development to specify the infant's development of motor and postural control monthly from ages 6-14 months. Hand preference for acquisition was also observed during these same months. Separate group based trajectory analyses were conducted to identify latent groups of infants who were developing along different neuromotor trajectories (especially in control of their posture) and hand preference trajectories. The infants were compared for their latent group assignments for both their neuromotor and hand preference development so as to identify the relation between these two developing abilities. The results show that there is a relation between neuromotor (postural) development and the development of a hand preference. Neuromotor development, rather than age, may be a better predictor of developmental process of hand preference.

HOW ESTABLISHED HAND PREFERENCE FOR ACQUISITION INFLUENCES THE CONSISTENCY OF HAND PREFERENCE FOR MANIPULATION. J. Latta, J.M. Campbell, E.C. Marcinowski, and G.F. Michel. Department of Psychology, The University of North Carolina at Greensboro, Greensboro, NC 26170 USA. infantde@uncg.edu

Recent work established that the development of hand preference for object acquisition during infancy predicts hand preference for unimanual manipulation (Campbell, Marcinowski, Babik, & Michel, 2015). This discovery supports the cascade theory (Michel, 1983), which states that the development and stabilization of one lateralized behavior will influence the development of later lateralized behaviors. Further examination of this data is intended to clarify whether monthly fluctuations in unimanual hand preference differ for infants with either a right, left, or no preference for acquisition. Handedness for acquiring objects was determined based on a valid assessment of handedness (Michel, Ovrut, & Harkins, 1986). Infants were then selected according to their acquisition hand preference (30 right, 30 left, and 30 no preference). Unimanual manipulation was assessed by placing two identical toys in each of the infant's hands for 17 trials. The frequency of the actions performed were analyzed from video recordings. Acquisition hand preference groups were compared according to four criteria: 1) the number of times that an infant switched between a positive and a negative manipulation hand index (HI) score 2) number of positive HI scores that an infant exhibited across all observations 3) the number of significant HI scores and 4) the number of switches between significant HI scores. Results show that infants without a hand preference for acquisition switch between positive and negative HI scores more often than infants with a right or left preference, and also switch more frequently between significant right and left HI scores. This indicates that infants with a left or right hand preference for acquiring objects are consistent in using their left or right hand (respectively) for manipulating them.
[NSF grant DLS 0718045 to GFM and NIH T32HD007376 to Julie Campbell]

CREATING A PARADIGM FOR STUDYING CROSS-MODAL ASSOCIATIVE EPISODIC MEMORY IN PRESCHOOLERS A.E. Learmonth. Department of Psychology, William Paterson University, Wayne, NJ 07470 USA. learmontha@wpunj.edu

Memory is not made of single items but rather the associations among those items. Despite this, most memory research has focused on associations within a single modality, often limited to the visual realm. The present work represents a methodology to study how memory for associations of features occurs in the auditory-visual domain for realistic items. In the present study, eighteen children (ages 4-5) studied animal/sound pairings and then were tested on intact and rearranged pairs of items that were composed of an animal picture and a species typical sound. Crucially, there were multiple instances of each type of animal so the memory test required episodic memory to distinguish intact and rearranged animal/sound pairs. That is, it was not enough to remember one saw a cat because two cats were presented, each with a distinct meow. When piloting the present work, a primary problem was in getting the children to understand the task. That is, it was difficult for children to understand that two different cats made two different meows and that this was important information to which to attend. The participants were resistant to learn this distinction and instead focused on the fact that the cats were making the "correct" sound. During these initial pilot tests, children responded "yes" to every item. After extensive training, participants were successful at discriminating intact and rearranged items, although the false alarm rate remained high. The poster will describe both the effective methodology as well as the attempts that were less successful.

SENSITIVE PERIODS IN AFFECTIVE DEVELOPMENT: NONLINEAR MATURATION OF FEAR LEARNING. F. Lee, Sackler Institute for Developmental Psychobiology, Weill Medical College of Cornell, Department of Psychiatry, New York, NY 10065 USA. fslee@med.cornell.edu

Fear learning emerges early in life, but the capacity to express and extinguish fear memories undergoes dynamic changes across development. In particular, during adolescence, extinction learning for cued fear memory is diminished. During this same time frame period, rodent studies have uncovered a coinciding sensitive period of suppressed expression of contextual fear. We draw upon the model of critical period regulation within the visual system and present burgeoning evidence suggesting that parallel mechanisms may regulate the qualitative changes in fear learning across development.

ANIMAL RESEARCH: TIME TO TALK! K. Leech. European Animal Research Association, London, EC1R 3AW UK. kleech@eara.edu

Despite its clearly recognized achievements, promise for future discoveries, and ongoing public outreach efforts, nonhuman animal research is often not well understood and is commonly misrepresented. The scientific community can and must play an essential role in efforts to advance public education, promote public dialogue, and shape policy and practice. This talk will describe a range of efforts and venues by which scientists can actively contribute to public education and dialogue in order to improve broad understanding of the role nonhuman animal research plays in promoting the welfare of both people and other animals.

LOOKING FOR POTENTATION OF LATENT INHIBITION IN PREWEALING RATS. U. Liberal, M. Gaztañaga, A. Angulo, and G. Rodríguez. [1]University of the Basque Country (UPV-EHU). unai.liberal@ehu.eus

Non-reinforced preexposure to a cue usually weakens subsequent conditioning in which that cue is used as the conditioned stimulus (CS). Studies with adult rats have shown that the presence of an added cue during preexposure to the target can modulate the magnitude of this latent inhibition effect. When the target and the added cues are from the same sensorial modality (e.g., two flavors) the magnitude of the latent inhibition to the target is reduced (e.g., Honey & Hall, 1988; 1989). However, when the target is an odor (e.g., almond) and the added cue is a taste (e.g., salt), the latent inhibition suffered by the target is enhanced (e.g., Rodríguez & Hall, 2008). In the present study, we tested whether using this latter set of stimuli in a procedure with prewealing rats as subjects may produce a potentation of latent inhibition as observed with adult rats. In total three phases were carried out: preexposure (postnatal days 14, 15, and 16), conditioning, (postnatal days 17 and 18) and test (postnatal day 19) Results are discussed in terms of the generality of currently proposed mechanisms of latent inhibition (e.g., Hall & Rodríguez, 2010) to be applied to early stages of ontogeny.

METHAMPHETAMINE ABUSE IN ADOLESCENCE: EXAMINATION OF DRUG INTAKE, EXTINCTION AND REINSTATEMENT USING THE INTRAVENOUS SELF-ADMINISTRATION PARADIGM. S.J. Luikinga[1,2], H.B. Madsen[1,2], I.C. Zbukvic[1,2], A.J. Lawrence[1,2], and J.H. Kim[1,2]. [1]The Florey Institute of Neuroscience and Mental Health,

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Methamphetamine abuse is a growing problem in Australia, particularly among adolescents. Here we used the intravenous self-administration paradigm to compare methamphetamine abuse-related behaviour in adolescent (postnatal day 35) and adult (postnatal day 70) rats. Rats were trained to lever press to obtain methamphetamine at a dose of 0.03 mg/kg/infusion. Methamphetamine delivery was paired with a cue light which served as the conditioned stimulus. Following acquisition, responding to a high (0.1 mg/kg/infusion) and low (0.01 mg/kg/infusion) dose was tested. Rats' lever pressing was subsequently extinguished by removal of drug and cue. To model cue exposure therapy, we also gave 0, 1, or 2 sessions of 120 presentations of the cue light in the absence of the lever (i.e., cue extinction). All rats were then subjected to a cue-induced reinstatement test. Both adolescent and adult rats acquired methamphetamine self-administration in a similar manner, but once acquired, adolescent rats administered more methamphetamine per kg ($p < 0.05$), an effect recapitulated at the high dose ($p < 0.05$). Rats of both ages exhibited robust cue-induced drug-seeking following extinction, but reinstatement was reduced in rats that received cue extinction ($ps < 0.05$). Overall, our results suggest that adolescents may be less susceptible to the aversive effects of methamphetamine compared to adults, which may contribute to their increased abuse liability. We have also identified CS extinction training as a behavioural intervention that may effectively reduce cue-induced craving and relapse in both adolescents and adults.

EXTINCTION OF CONDITIONED CUES REDUCES INCUBATION OF COCAINE CRAVING IN ADOLESCENT AND ADULT RATS. H.B. Madsen[1,2], I.C. Zbukvic[1,2], S. Luikinga[1,2], A.J. Lawrence[1,2], and J.H. Kim[1,2]. [1] Behavioural Neuroscience Division, The Florey Institute of Neuroscience and Mental Health, Parkville, VIC 3052, Australia. [2]Florey Department of Neuroscience and Mental Health, University of Melbourne, Parkville, VIC 3052, Australia. heather.madsen@florey.edu.au

Relapse to drug use can occur in addicted individuals even despite long periods of abstinence, and this is often precipitated by exposure to drug associated cues the evoke craving. In both animals and humans it has been observed that cue-induced drug craving actually increases over the first few weeks of abstinence, a phenomenon termed 'incubation of craving'. As adolescence represents a unique period of vulnerability to developing drug addiction, the first aim of this study was to compare incubation of cocaine craving in adolescent and adult rats. P35 (adolescent) and P70 (adult) rats were trained to lever press to obtain intravenous cocaine at a dose of 0.3 mg/kg/infusion, and drug delivery was paired with illumination of a stimulus light (conditioned stimulus, CS). Following acquisition of stable responding, rats were tested for cue-induced cocaine-seeking after either 1 or 30 days of abstinence. A third group rats was also tested after 30 days of abstinence, however these rats received 4 CS extinction sessions during the abstinence period (120 non-contingent CS presentations without drug). Adolescent and adult rats acquired and maintained a similar level of cocaine self-administration, and rats of both ages exhibited a higher level of cue-induced cocaine-seeking if they were tested after 30 days of abstinence compared to 1 day. Incubation of cocaine craving was significantly reduced in rats that received CS extinction training. These results indicate that CS extinction during abstinence may effectively reduce cue-induced relapse at a time when cue-induced drug craving is usually high.

THE EFFECT OF EARLY LIFE ADVERSITY ON EMOTIONAL MEMORIES DURING DEVELOPMENT. G. Manzano-Nieves[1] and K.G. Bath[2]. [1]Department of Neuroscience, Brown University, Providence, RI 02906 USA. [2]Department of Cognitive, Linguistic, and Psychological Sciences, Brown University, Providence, RI 02906 USA. gabriela_manzano_nieves@brown.edu

Acute traumatic events and prolonged stress incurred early in life increase the risk of developing anxiety and depressive-like behaviors in both humans and animal models. It is hypothesized that these early life experiences alter the development and functioning of circuits that are critical for processing and learning about emotional stimuli. Here, we sought to test the effects of a form of early life stress (ELS) on the development of learning and memory of cues that predict adverse outcomes. ELS consisted of reducing maternal access to bedding and nesting materials from postnatal days 4 to 11. Subsequently, on postnatal day 21, 28, or 50, control reared or ELS mice underwent fear conditioning, where a tone was co-terminated with a foot-shock. Consistent with previous work, we observed no effect of age on fear memories in control mice. However, in ELS reared mice, both male and female mice were found to have significantly lower levels of freezing following conditioning at postnatal day 21, compared with all other groups. In addition, we observed significant sex differences in the rates of within session learning beginning at postnatal day 28. Based upon these results, we hypothesize that ELS can alter the development and expression of even the most basic forms of fear learning and expression, which may manifest differently in males and females. This work holds relevance for understanding how ELS impacts basic processing and learning about emotional cues in the environment. However, more work will be required to understand the mechanisms underlying these behavioral observations.

DOES INFANT HANDEDNESS TRAJECTORY AFFECT STACKING ABILITY? E.C. Marcinowski, J.M. Campbell, and G.F. Michel. Department of Psychology, The University of North Carolina at Greensboro, Greensboro, NC 26170 USA. ecmarcin@uncg.edu

The Modified Progressive Lateralization Theory of Handedness suggests that a hand preference results from a history of cascading manual asymmetries for a variety of actions throughout infancy (Michel, 1983). An infant who consistently uses their preferred hand for a variety of actions would gain proficiency using that preferred hand and consequently, perform more proficiently on other challenging manual sensorimotor tasks, such as stacking. The ability to stack has been linked with a number of cognitive abilities, including spatial abilities and language; so linking infant handedness with stacking could provide one behavioral mechanism by which handedness might affect cognitive development. This project tested the relation between infant handedness and stacking ability. One hundred and eighteen infants (65 males) were assessed for hand preference (6-14 months) and stacking ability (11-14 months) at monthly visits. A multilevel Poisson longitudinal model revealed that stacking increased quadratically across the 11-14 month ages and stable right-handers changed differently from infants with no hand preference. In addition, a greater proportion of stable and shifting right-handed infants used their right hands to stack; yet there were no significant differences in hand use for infants with a left or no preference. These results provide the first evidence that an infant hand preference enables infants to perform burgeoning manual skills (stacking), and future studies should examine whether these differences extend to the development of other, more sophisticated cognitive abilities.
[NSF grant DLS 0718045 to GFM]

OXYTOCIN, MATERNAL BEHAVIOR, AND EXCITATORY-INHIBITORY BALANCE. B.J. Marlin[1], M. Mitre[1,2], J.A. D'amour[1], M.V. Chao[2], R.C. Froemke[1]. [1]Skirball Institute, Neuroscience Institute, Department of Otolaryngology, Department of Neuroscience and Physiology, NYU School of Medicine, New York, NY 10016 USA. [2]Skirball Institute, Neuroscience Institute, Department of Cell Biology, Department of Psychiatry, NYU School of Medicine, New York, NY 10016 USA. robert.froemke@med.nyu.edu

Oxytocin is important for social interactions and maternal behavior. However, little is known about when, where, and how oxytocin modulates neural circuits to improve social cognition. Here I will discuss new data from our lab on how oxytocin enables maternal behavior in new mother mice. Specifically I will focus on experience-dependent plasticity in the auditory cortex related to recognizing the significance of pup distress calls, which are important for mother mice retrieving lost pups back to the nest. Expression of retrieval behavior required left but not right auditory cortex, was accelerated by oxytocin in left auditory cortex, and oxytocin receptors were preferentially expressed in left auditory cortex. Neural responses to pup calls were also lateralized, with co-tuned and temporally-precise call-evoked excitatory and inhibitory responses in left cortex of maternal but not pup-naive adults. Pairing calls with oxytocin enhanced call-evoked responses by balancing the magnitude and timing of inhibition with excitation in virgins. Our results describe fundamental synaptic mechanisms by which oxytocin increases the salience of acoustic social stimuli. Furthermore, oxytocin-induced plasticity provides a biological basis for lateralization of auditory cortical processing.

BILINGUAL EXPOSURE SHAPES RESTING STATE BRAIN NETWORKS BY 4 MONTHS OF AGE. M. Molnar, B. Blanco, M. Carreiras, and C. Caballero. Basque Center on Cognition, Brain, and Language, Donostia, Spain. m.molnar@bcbl.eu

To test whether bilingual exposure (as a long-term environmental factor) affects the developing language neural circuitry, we measured the resting state brain networks in 4-month-old infants from monolingual and bilingual environments using a near-infrared spectroscopy system. Functional connectivity was evaluated by computing the correlation between the time courses of the oxy-, deoxy- and total hemoglobin signals. Network metrics of intra-hemispheric and inter-hemispheric connectivity revealed that a bilingual environment affects the configuration and the development of resting state functional brain networks, as it requires the engagement of additional bilateral frontal and temporal brain regions.

DOES UNPREDICTABLE VARIABLE PRENATAL STRESS (UVPS) ALTER MATERNAL CARE AND MODULATE TELOMERE LENGTH IN ADULT RAT BRAIN? E.L. Moyer [1], A. Asok[2], J. Blaze[2], T.L. Roth[2], and A.E. Ronca[1,3-5]. [1]Space Biosciences Research Branch, NASA Ames Research Center, Moffett Field, CA USA. [2]Department of Psychological and Brain Sciences, University of Delaware, Newark, DE USA. [3]Obstetrics and Gynecology, [4]Program in Neuroscience, and [5]Molecular Medicine & Translational Science, Wake Forest School of Medicine, Winston-Salem, NC USA. eric.l.moyer@nasa.gov

Exposure to stress in the womb can influence neurobiological and behavioral outcomes in offspring, leading to increased vulnerability to psychopathology in later life. Using a rat model, we previously reported increased body weight and anxiety-like behavior in stress-exposed adult male, but not female, offspring. Our companion poster (Blaze et al., ISDP, 2015) reports significant alterations in telomere length (TTAGGG repeats on the ends of chromosomes) in adult male rat brain following UPVS. Sprague-Dawley female rats were time mated, then confirmed sperm positive (Gestational day [G]0). Beginning on G1 dams were randomly assigned to either: Unpredictable, Variable Prenatal Stress (UVPS) or Non-Stressed (NS) Control conditions throughout gestation. UVPS dams were exposed daily to three different stressors: (1) White Noise, (2) Strobe Light, and (3) Tube Restraint. Stressors were presented individually once per day on an unpredictable schedule (morning [0600-1200hr]; afternoon [1200-1800hr]; evening [1800-2400hr]) for one of three durations (15, 30 or 60min). Parturition was videographed in UVPS and control dams. We analyzed pup delivery times, as well as characteristic forms of maternal care, including nursing and pup licking. Our preliminary findings suggest that shortened telomere length in the medial prefrontal cortex (mPFC) of adult males (reported by Blaze et al., ISDP 2015) may be modulated by maternal care patterns.
[NICHD (1R01HD50201) to AER and NIGMS (1P20GM103653).]

AN EARLY LIFE TREATMENT THAT INCREASES MATERNAL BEHAVIOR DECREASES INCENTIVE SALIENCE IN A SEX-DEPENDENT MANNER IN RATS. R. Nadal[1,2],S. Fuentes[1,2], J. Carrasco[3], A. Hatto[1,3], J. Navarro[1,4], M. Monsonet[1,2], J. Ortiz[1,3], and A. Armario[1,3]. [1]Institut de Neurociències, [2]Psychobiology Unit (School of Psychology), [3]Animal Physiology Unit (School of Biosciences), and [4]Biochemistry Unit (School of Medicine), Universitat Autònoma de Barcelona, Spain 08193. roser.nadal@uab.es

Although exposure to early life stress (ELS) may induce at adulthood an increase in the vulnerability to Psychopathology, under some circumstances ELS may also increase resilience and coping to further stressors. We studied the long-term sex-dependent effects of an ELS model that consisted in the restriction of the nesting material during the first postnatal days, in Long Evans rats. The treatment increased maternal behavior (arched-back and licking-grooming) and decreased the time spent off the nest. In adulthood, half of the animals were exposed to an acute immobilization session (IMO), whereas the others remained undisturbed. Fourteen days after IMO animals were exposed to 5 days of autoshaping to study the incentive salience of cues paired with food, in food-deprived animals. ELS in IMO-exposed rats decreased in females the sign-tracking behavior towards the food paired cues. At the same time, in situ hybridization analysis indicated that tyrosine hydroxylase expression in the ventral tegmental area in females exposed to IMO decreased in ELS animals. Such as sign-tracking behavior has been related to the development of drug addiction, these results suggest that the superimposition of early and adult stress may exert “protective effects”. [Plan Nacional sobre Drogas 2011/021 to RN, Red de Trastornos Adictivos RD12_0028_0014 to AA]

THE INFLUENCE OF MATERNAL ANTENATAL STRESS AND CORTISOL ON BIRTH OUTCOMES. S. Nazzari[1,2], F. Ciceri[2], N. Dottori[2], M. Molteni[2], F. Rice[1], P. Fearon[1], and A. Frigerio[2]. [1]Research Department of Clinical, Educational and Health Psychology, University College London, London, UK. [2]Child Psychopathology Unit, Scientific Institute, IRCCS Eugenio Medea, Bosisio Parini, Lecco, Italy. sarah.nazzari.13@ucl.ac.uk

Recent studies have investigated the biological mechanisms underlying the association between maternal stress during pregnancy and negative birth and infant outcomes. There is some evidence that an anomalous functioning of the maternal Hypothalamic Pituitary Adrenal (HPA) axis during pregnancy can affect the length of gestation and several birth outcomes, such as weight, body length, and head

circumference, although results are not unequivocal. The main objective of this ongoing study was to explore the effects of maternal antenatal stress (i.e. depressive and anxiety symptoms) and HPA functioning, as indexed by salivary cortisol, on birth outcomes. As part of a wider longitudinal study, 28 pregnant women completed the Edinburgh Postnatal Depression Scale (EPDS) and the State-Trait Anxiety Inventory (STAI) between 30-33 gestational weeks, and provided three saliva samples per day on two consecutive days between 34-36 gestational weeks (upon waking; 30 minutes post-waking and before going to bed). New-borns' (all > 37 gestational weeks) birth weight, body length and head circumference were determined from medical records. Hierarchical multiple regressions indicated that both maternal anxiety symptoms and cortisol levels, separately, predicted infant birth weight, after controlling for pre-pregnancy BMI, current BMI and infant's gender, while only maternal cortisol significantly predicted infant body length and head circumference. The implications of the current findings will be further discussed in light of the prenatal programming model.
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THE EFFECTS OF EARLY, PROFOUND DEPRIVATION ON BRAIN AND BEHAVIORAL DEVELOPMENT: TIMING IS EVERYTHING. C.A. Nelson[1], N.A. Fox[2], and C.H. Zeanah[3]. [1]Department of Pediatrics, Harvard Medical School, Cambridge, MA 02138 USA. [2]Department of Human Development, University of Maryland, College Park, MD 20742 USA. [3]Department of Psychiatry, Tulane University, New Orleans, LA 70118 USA. Charles_nelson@harvard.edu

In this talk I will discuss the effects of profound early deprivation on brain and behavioral development within the context of the Bucharest Early Intervention Project (BEIP). Following a baseline assessment (average age=22 months), institutionalized infants were either randomly assigned to high quality foster care or to remain in institutional care. Across many domains of development, children assigned to foster care had better outcomes than those assigned to care as usual; importantly, evidence of sensitive periods was observed in specific domains (EEG, IQ, Attachment, Language). Children placed before age 2 experienced better outcomes than those placed after this age. These findings will be discussed in the context of the larger literature on sensitive periods in human development.

DEFERRED IMITATION, ASSOCIATIVE MEMORY AND COMMUNICATION IN 14-MONTH-OLD CHILDREN. E. Nordqvist[1], M. Rudner[1], M. Lindgren[2], M. Johansson[2], and M. Heimann[1]. [1]Dept. of Behavioral Sciences and Learning, Linköping University, SE 581 83 Linköping, Sweden. [2]Department of Psychology, Lund University, SE 223 50 Lund, Sweden. emelie.nordqvist@liu.se

The presentation will build on two recent studies that combine behavioral observations of memory (deferred imitation, DI), electrophysiological (Event-Related Potentials, ERP) measures of associative memory and parental reports of language in 14-months-old children. In both studies, an ERP (Nc) response indicating associative memory as well as a correlation between Nc and DI was observed. Further analysis revealed strong individual variability: The clearest relationship with ERP was noted for the subgroup of children performing non-optimally on the DI tasks. In addition, we also found a statistically significant correlation between parental report of receptive language and our ERP measure of associative memory.
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HIGH FREQUENCY ELECTROCORTICAL COHERENCE: EFFECTS OF SEX AND SLEEP POSITION. J. D. Nugent[1], M.M. Myers[1, 2, 3], P.G. Grieve[3], and WP. Fifer[1, 2, 3]. [1] New York State Psychiatric Institute, Department of Developmental Neuroscience, New York, NY, 10032 USA. [2] Department of Psychiatry, Columbia University, New York, NY, 10032 USA.[3] Department of Pediatrics, Columbia University, New York, NY, 10032 USA. nugentd@nyspi.columbia.edu

The prone sleep position is a risk factor for Sudden Infant Death Syndrome (SIDS); however, it is unclear why prone sleeping increases SIDS risk. Electroencephalagram (EEG) coherence (COH) is a measure of synchrony in activity at different sites. This study assessed EEG COH during sleep in prone and supine positions in newborn and 1 month old infants, an age of increased vulnerability to SIDS. This current study tested the hypothesis that EEG COH would be greater in the prone sleep position, a known risk factor for SIDS. High density (128 lead) EEG was recorded from sleeping infants (GA >36) during a ten minute baseline period. Inspection of results suggested effects of position on COH were more pronounced at higher frequencies and only in newborns. As one example, COH between the right frontal polar and right occipital brain regions, at 22-24 Hz, were: newborn prone=0.56±0.02, newborn supine=0.40±0.04; 1 month prone=0.42±0.02, 1 month supine=0.39±0.04). Two-way ANOVA revealed a significant position by age interaction (p=0.041). Post-hoc analyses showed that COH declined with age, but only in the prone position (prone p<0.005; supine p=0.49), and that prone COH was higher than supine but only in newborns (newborns p<0.0001; 1 month p=0.93). Perhaps increased coherence at high frequencies in the prone position at newborn age reflects a CNS adaptive response to this positional vulnerability, a response that is no longer elicited at 1 month when the infants are at greater risk for SIDS.
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THE INCIDENCE OF DEPRESSION IN PREGNANT WOMEN IS HIGH IN A URUGUAYAN POPULATION AND PREDICTED BY EMOTIONAL AND PHYSICAL ABUSE IN MOTHERS´ FAMILY OF ORIGIN: A PILOT STUDY. D.E. Olazábal[1], A.S. Fleming[2], G. Grandi[3], D. Musetti[3], G. Rey[4], L. Fernández[1], G. Laporte[4], F. Medici[4], E. Nicolaisen[1]. [1]Departamento de Fisiología, Facultad de Medicina, UdelaR, Montevideo, Uruguay. [2]Department of Psychology, University of Toronto, Mississauga, Canada. [3]Mutualista CASMU, Montevideo, Uruguay. [4]Clínica Ginecológica B, Hospital de Clínicas Dr. Manuel Quintela, Facultad de Medicina, UdelaR. dolazabal@fmed.edu.uy

Many studies show a high incidence (5-30%) of depression during pregnancy (prenatal depression) around the world. Prenatal depression is also predictor of postpartum depression. There has been no study in the Uruguayan population of the factors that trigger prenatal depression or predict it. In the current study we investigated whether a history of child trauma and parental bonding predicts prenatal depression. Fifty pregnant women from a heterogeneous Uruguayan population recruited in two health institutions were randomly invited to participate and complete demographic information, and the Spanish versions of the Child Trauma Questionnaire (CTQ), the parental bonding instrument (PBI), and the Edinburgh Postnatal Depression Scale (EPSD). Twenty percent of the recruited population showed symptoms of prenatal depression (Edinburgh score >10). EPDS scores were predicted by CTQ factors, Emotional abuse (R^2=.52) and Physical abuse (R^2=.49) and by PBI factor, Maternal

Care ($R^{2=}$-.26). Stepwise or logistic regression showed that the emotional abuse dimension could alone predict as much as the other dimensions of the CTQ or variables of PBI. There was no relationship between EPSD during pregnancy and age, educational level, or income. This study suggested that, like other forms of depression, prenatal depression is high in the Uruguayan population. Besides, emotional and physical abuse are important risk factors, and the screening of depression and child trauma during pregnancy using EPDS and CTQ scales could permit the early detection of unattended severe cases of depression in pregnant women.

SEX AND GESTATIONAL AGE DIFFERENCES IN AUTONOMIC CONTROL OF HEALTHY NEWBORNS DURING SLEEP. M. Ordonez-Retamar[1], N. Burtchen[1,2], J.S. Yang[1], J.D. Nugent[1], M.M. Myers[1,3,4], and W.P. Fifer[1,3,4]. [1]Division of Developmental neuroscience, New York State Psychiatric Institute, New York, NY, 10032 USA. [2]Children's Hospital at Montefiore, Albert Einstein College of Medicine, Bronx, New York 10467 USA. [3]Department of Psychiatry, Columbia University, New York, NY, 10032 USA. [4]Department of Pediatrics, Columbia University, New York, New York, 10032 USA. ordonez@nyspi.columbia.edu

Late preterm newborns (LPT, born at 35-36 weeks) show immature autonomic nervous system (ANS) control during sleep compared to full term newborn infants (FT, born at 39-40 weeks), Burtchen et al 2015. It is also recognized that males are at higher risk than females for neonatal morbidity and mortality and a range of neurodevelopmental disorders. Previous studies have shown that there are significant differences between male and female newborns in brain activity, as measured by electroencephalogram during sleep, Piraquive et al 2014. In this current study we asked if there were significant effects of sex and gestational age at birth with regard to ANS control of heart rate (HR). Three groups of infants were studied within 72 hours of delivery: late preterm (LPT, 35-36 wks GA; 29 male 40 female), early term (ET, 37-38 wks GA; 41 male, 38 female) and full term (FT, 39-40 wks GA; 63 male, 59 female). Markers of ANS functioning during active sleep were basal HR and average beat to beat change in RR-intervals (rMSSD). Across all infants, rMSSD increased as a function of gestational age ($p<0.05$). HR decreased from LPT to FT ($p<0.05$). Across all ages, male newborns had lower HR than females (122.9bpm vs. 126.5bpm, $p<0.05$) and higher rMSSD (0.015msec vs. 0.012msec, $p<0.05$). Sex differences were more pronounced in the FT group (HR $p<0.01$, rMSSD $p<0.05$). Future studies will investigate whether sex differences in developmental trajectories of autonomic control are related to sex differences observed in neurodevelopmental disorders.
[Supported by NIH Grant R37HD32774.]

SYNCHRONICITY IN MILK ODOR AND NEONATAL MILK ODOR ATTRACTION AND SUCKLING IN THE LABORATORY MOUSE. B. Patris[1], S. Al Aïn[2], and Benoist Schaal[1], CNRS, University of Burgundy, Dijon, France. [2]Québec University, Trois-Rivières, Canada. bruno.patris@u-bourgogne.fr

Synchronicity of maternal-infantile actions conditions mammalian reproduction. It is thus essential to understand the sensory/neural/behavioral events that time mother-infant exchanges around milk. Using different behavioral assays (2-odor choice and suckling tests), we exposed mouse pups of different ages (birth to weaning) to the odors of milk collected at various postpartum times. Our data indicate that the younger the pups the more they preferred age-matched milk/nipples to non age-matched milk/nipples. This selective response disappeared in preweaning pups. These findings will be discussed in the light of perinatal learning processes and situated in the context of the murine communal nursing.

EARLY LIFE STRESS ALTERS GENE EXPRESSION AND ACTIVITY PATTERNS IN THE MESOLIMBIC DOPAMINE SYSTEM AND ENHANCES SUSCEPTIBILITY TO DEPRESSION. C.J. Peña, I. Purushothaman, A.K. Friedman, R.C. Bagot PhD, M-H Han, L. Shen, and E.J. Nestler. Icahn School of Medicine at Mount Sinai, New York, New York, 10029 USA. catherine.pena@mssm.edu

Adverse experiences and stress during childhood enhance the risk of depression and other psychiatric disorders in adulthood. However, knowledge of the neurobiological and transcriptional mechanisms underlying these outcomes is still limited. We have developed a paradigm in mice whereby postnatal stress in a sensitive period alters susceptibility to depression-like behavioral abnormalities and are accompanied by broad changes within the brain's reward circuitry. Mice were standard reared or exposed to early life stress (ELS) at different time periods, reared normally during adolescence, and then half of each group underwent chronic social defeat stress in adulthood. Depression-like behaviors were tested, physiological recordings were captured in the ventral tegmental area (VTA), and RNA-sequencing was performed on nucleus accumbens (NAc) and VTA brain samples. Postnatal ELS in a sensitive period significantly enhanced susceptibility to social defeat stress in adulthood. Several measures of anhedonia and anxiety were heightened with ELS in combination with social defeat. RNA-sequencing revealed distinct patterns of gene expression in VTA and NAc subsequent to ELS, and may represent a pre-depressive pro-susceptible transcriptional state prior to behavioral onset of depression. ELS alone likewise altered the firing rate and other physiological responses in VTA dopamine neurons, suggesting that activity in this area may be an early marker of enhanced susceptibility to a depressive state. Novel, bioinformatically identified, upstream regulator gene targets were manipulated virally and were able to prevent depression-like behavior. These studies may inform new targets for therapeutic intervention in early life critical periods.
[Supported by NIMH and HDRF awards to EJN.]

NEUROBEHAVIORAL CONSEQUENCES OF EARLY LIFE ABUSE: FEAR, AGGRESSION, AND MATERNAL PROTECTION OF PUPS. R.E. Perry[1,2,3,4] and R.M. Sullivan[1,3,4]. [1]Emotional Brain Institute, Nathan Kline Institute, New York University, New York, NY 10016 USA.[2]Neuroscience and Physiology, NYU Sackler Institute, New York, NY 10016 USA. [3]Child Study Center, Child & Adolescent Psychiatry, New York University School of Medicine, New York, NY 10016 USA. [4]NYU Neuroscience Institute, NYU Langone Medical Center, New York, NY, 10016 USA. rosemarie.perry@nyumc.org

Infant abuse produces increased sensitivity to threat and a heightened prevalence of aggressive and violent behaviors emerging by adolescence in humans. Here we use a rodent model of infant abuse to assess the expression of fear and aggression, and investigate the neurobiological underpinnings mediating the effects of abuse. Rat pups were reared with a normal or abusive mother (postnatal days 8-12), and tested in a Threat Response Selection Test (TRST) and Resident Intruder Test (RIT) as adults. In the TRST, individuals were placed in the center of a tri-sectioned arena and given the option to approach a predator odor, or hide in a hut. In the RIT, animals were single-housed for a week, before introducing a same-sex intruder into their home cage for 10 minutes. Previously abused rats displayed decreased hiding, increased approach and interaction with the predator odor, and decreased amygdala c-Fos activation. Furthermore, infant abused mothers showed poor protection of their pups in the TRST. Additionally, infant abused rats showed increased offensive behaviors in the RIT. The presentation of maternal odor during the RIT and TRST normalized the

behavior of previously abused rats, through a circuit involving the prefrontal cortex. Infant abuse alters behavioral responses and amygdala activation to threat, making it more likely for one to place itself in harm's way. Understanding the neurobiology of threat responding and its modulation by infant experience will provide insight for treatment of fear and aggression-related disorders that occur after abuse.
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EFFECTS OF MATERNAL CARE ETHANOL PREFERENCE AND SENSITIVITY TO ETHANOL INDUCED SEDATION HYPNOSIS. D.O. Popoola and N.M. Cameron. Department of Psychology, State University of New York, Binghamton, NY 13902 USA. dpopool1@binghamton.edu

We investigated the influence of natural variations in maternal care on ethanol consumption and sensitivity to ethanol-induced sedation. Long Evans litters were categorized into high or low licking and grooming (LG). Using a free two-bottle choice test, high and low offspring were tested for 5% v/v ethanol consumption and preference for four weeks (PND 32-57). Using the loss of righting reflex (LORR) paradigm, offspring were tested at PND 42 (mid-adolescence) for sensitivity to acute 20% v/v ethanol-induced sedation at 3.0g/kg and 3.5g/kg ethanol dose. Male offspring were also tested with LORR at 3.0g/kg or 3.5g/kg ethanol dose at PND 50 (late adolescence), and 3.0 g/kg at PND 92-95 (adulthood). Low-LG female, consumed less total fluid (ethanol + water) in general, and preferred 5% ethanol to water over the last three weeks of consumption compared to High-LG female. Maternal care had no effect on male ethanol consumption, preference, and total fluid consumption. While maternal care didn't alter sensitivity to acute ethanol-induced sedation during mid-adolescence, Low-LG male were more sensitive to ethanol-induced sedation than High-LG at all tested doses during late adolescence and adulthood. LG frequency also negatively correlated with sensitivity during late adolescence while the correlation approached ($p = 0.057$) significance in adults. Therefore, maternal care sex-dependently influences alcohol consumption, and age-dependently mediates male sensitivity to alcohol-induced sedation. We are currently investigating this age dependent effect on sensitivity in female, and also the mechanisms underlying these behavioral effects.

TRAIT ANXIETY PREDICTS MEDIAL PREFRONTAL CORTEX GABA SYSTEM PROTEIN EXPRESSION IN POSTPARTUM RATS. C.M. Ragan and J.S. Lonstein. Neuroscience Program and Behavioral Neuroscience Program, Department of Psychology, Michigan State University, East Lansing, MI 48824 USA. raganch1@msu.edu

Typically, early postpartum females have lower anxiety compared to nulliparous females, but some postpartum women (and laboratory rats) experience elevated anxiety after giving birth that interferes with mother-infant interactions and socioemotional development of offspring. This peripartum anxiety is strongly predicted by previous high anxiety in humans and maternal rats. Although the neurobiological mechanisms associated with differences in anxiety among mothers is unclear, central GABA neurotransmission has been implicated in anxiety in nulliparous and randomly-selected postpartum females. In the current study, we selected 8 low-anxious and 8 high-anxious female rats based on the time spent in the open arms of an elevated plus maze on postpartum day 7. We then analyzed protein expression of GAD_{65} (responsible for synthesis of GABA released from terminals), and the vesicular GABA transporter (vGAT; responsible for uptake and storage of GABA into vesicles) in the medial prefrontal cortex (mPFC), an area associated with emotion regulation. We found a negative correlation between vGAT expression in the mPFC and the number of open arm entries driven by the high-anxious females. We also found a trend suggesting a positive correlation between GAD_{65} expression and open arm time in the low-anxious females. There was no relationship between vGAT expression and open arm entries, nor between GAD_{65} expression and anxiety, in the high-anxious females. There was no association between vGAT expression and open arm time nor GAD_{65} and anxiety in the low-anxious females. These data suggest that differential cortical GABA regulation may contribute to behavioral differences between high- vs. low-anxious mothers.

ELECTROPHYSIOLOGICAL RESPONSES DURING ERROR MONITORING AS A POTENTIAL BIOMARKER FOR ANXIETY. M.L. Ramos[1], A. Casas[1], M. Bechor[1], J.W. Pettit[1], W.K. Silverman[2], B.C. Reeb-Sutherland[1]. [1]Department of Psychology, Florida International University, Miami, FL USA. [2]Child Study Center, Yale University School of Medicine, New Haven, CT USA. mramo033@fiu.edu

Anxiety disorders are one of the most common psychological disorders observed within a pediatric population. Thus, understanding the neural mechanisms underlying the etiology of anxiety may be useful in identifying potential biomarkers which may be used to inform both treatment and diagnosis. One potential biomarker for anxiety is the error-related negativity (ERN), an event-related potential (ERP) component associated with error detection (Moser et al. 2013). Specifically, individuals with anxiety have been shown to display greater ERN amplitude compared to healthy individuals (Ladoucer et al., 2006). However, few studies have examined these differences within a pediatric population. The current study examined the ERN in youth with an anxiety disorder (N=10, 7 male, 11.60 years) and non-anxious youth (N=11, 7 male, 12.98 years). Participants completed 384 trials (50% congruent) of the arrow version of the Eriksen flanker task while simultaneous EEG was collected. Data were filtered, segmented, and baseline corrected offline and the ERN was identified within a 0-75 ms time window post-error. Repeated measures ANOVA with site (Fz, Cz) as the within subjects factor and group (anxious, non-anxious) as the between subjects factor was conducted. A significant site x group effect was found ($F(1,19)=14.432$, $p<.01$). Follow-up t-tests determined that the ERN was marginally greater in youth with anxiety compared to healthy youth at Cz ($t=-2.087$, $p=.051$) but not Fz. These findings provide further evidence for increased neural activation during error monitoring in youth with anxiety suggesting that the ERN may be a potential biomarker of risk for the development of anxiety.
[Supported by NIH Grant R34MH097931]

EFFECT OF SPATIAL MANIPULATIONS AND NMDA-RECEPTOR ANTAGONISM ON THE ONTOGENY OF OBJECT-IN-CONTEXT RECOGNITION IN THE RAT. A.I. Ramsaran and M.E. Stanton. Department of Psychological and Brain Sciences, University of Delaware, Newark, DE, 19716 USA. adamr@udel.edu

The ontogeny of contextual learning and memory remains controversial for developmental behavioral neuroscientists (Revillo et al., Physiol Behav., 2015, in press). A key difficulty surrounds the spatial versus nonspatial nature of the contextual cues processed by preweanling rats (e.g., Pugh & Rudy, Dev Psychobiol, 1996, 29(2), 87-100). Using the object-in-context recognition (OiC) task, we previously demonstrated that postnatal day (PD) 17 rats can learn associations between contextual stimuli and objects and retain these memories over short retention intervals when contexts are defined by salient proximal and distal cues (Ramsaran, Westbrook, & Stanton, ISDP 2013, San Diego, CA). In the current study, we manipulated the contextual cues or object placements in our OiC preparation to examine whether the ontogenetic profile and/or role of NMDA receptors would be altered in task variants

that were explicitly spatial in nature. We report that OiC memory emerges in the rat before PD17 when contexts were distinguished by different proximal and distal cues. In contrast, when contexts could be discriminated only by the distal spatial environment or when spatial information about the objects needed to be associated with contextual stimuli (object-place-context recognition; OPC task), task performance emerged between PD21 and 26 and PD26 and 31, respectively. In addition, systemic injections of .06 mg/kg MK-801 prior to training impaired performance in the latter spatial task variants, but not in our standard OiC task. Thus, the ontogeny and NMDA-receptor-dependence of contextual learning and memory are influenced by the degree of spatial processing necessary for task performance.
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ROLE OF CONTEXT IN THE EXTINCTION PARADIGM IN PREWEANLING RATS. D.A. Revillo, G. Trebucq, G. Paglini, and C. Arias. Department of Cellular and Molecular Neurobiology, Instituto de Investigacion Medica M y M Ferreyra IMMF-INIMEC-CONICET-UNC, Córdoba, Argentina. damian_revillo@hotmail.com

While Pavlovian extinction has been widely studied in adult organisms, only few studies have focused on this effect during infancy. Although it is currently accepted that the extinction effect reflects new –context-dependent- learning, this is not so clear during infancy, because some studies did not find recovery of the extinguished CR before postnatal day (PD) 21. The authors concluded that extinction during infancy erases the CS-US association. However, we have recently reported evidences of renewal, more rapid reacquisition, reinstatement and spontaneous recovery of an extinguished CR in preweanling rats. The present study analyzed the possibility of recovering an extinguished CR with a reinstatement procedure in a fear conditioning paradigm, on PD17 (Experiment 1-4) and on PD23 (Experiment 5). At the same time, it was explored the role of context salience as a procedural variable that may affect extinction during the preweanling period. In accordance with previous studies form our laboratory, results shown that preweanling rats expressed a previously extinguished CR after a single experience with an unsignaled US (Experiments 2 and 4a). Furthermore, this result was only found when subjects were trained and tested in salient contexts, but not in standard ones (Experiments 3 and 4b). Finally, Experiment 5 demonstrated the reinstatement effect on PD23 in a standard context. These results are in agreement with previous findings showing that the extinction effect during infancy shares features with extinction learning in adult organisms.
[BID-PICT 0892 to G. Paglini and C. Arias]

PATHWAY TO PATHOLOGY: EARLY LIFE TRAUMA AND AMYGDALA SEROTONIN. M. Rincón-Cortés[1,2,3]. [1]Neuroscience and Physiology, Sackler Institute at the NYU School of Medicine. [2]Emotional Brain Institute at the Nathan Kline Institute and NYU. [3]Child Study Center at the NYU Langone Medical Center. millie.rinconcortes@med.nyu.edu

Infant experiences program brain development and alter later life behaviors. Although infants are biologically predisposed to attach to their caregiver, adverse early life experiences involving the caregiver negatively program neural systems controlling mood, memory, and emotion, and confer susceptibility to later life psychopathology. Clues from clinical and basic research suggest this is due to compromised brain development and disturbed emotion regulation, although the underlying mechanisms remain poorly understood. For my dissertation, I employed complementary rodent models of infant trauma, which result in adverse and enduring effects that parallel the neurobiological sequelae of childhood abuse, to better understand the developmental mechanisms by which infant trauma programs a pathway to later life psychopathology. Both infant trauma paradigms converged in producing a later life depressive-like behavioral phenotype characterized by impaired social interactions, high immobility in the Forced Swim Test (FST), and amygdala dysfunction. Surprisingly, olfactory trauma-linked cues had an unexpected positive value in adulthood and actually repaired the adult neurobehavioral dysregulation induced by infant trauma. Blocking amygdala 5-HT eliminated the rescue effect; increasing amygdala 5-HT and blocking CORT mimicked it, highlighting a role for an amygdala 5-HT/CORT interaction as the underlying mechanism. These findings provide insights into the link between childhood abuse and later depression, but also suggest that trauma-linked cues share properties with antidepressants and safety signals, which alter amygdala activity to provide relief from stress and fearful states.
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REAL-TIME ANALYSIS OF COVERT ATTENTION USING STEADY-STATE VISUAL EVOKED POTENTIALS REVEALS ROBUST INHIBITION OF RETURN DURING FREE-LOOKING BY YOUNG INFANTS. S.S. Robertson. Department of Human Development, Cornell University, Ithaca, NY 14853 USA. ssr4@cornell.edu

We probed the dynamics of visual foraging in 3-month-olds in real-time using steady-state visual evoked potentials (SSVEPs) to detect the spontaneous allocation of covert attention to non-fixated, peripheral objects. The objects were 3 toy ducks (separated horizontally by 11 deg) flickering at 8, 10 or 12 Hz. Amplitudes of SSVEPs driven by each object were extracted using point-by-point Fourier analysis of the EEG signal from scalp electrodes over extra-striate cortex. When the infant was fixating the center object and SSVEP amplitudes indicated that covert attention to one peripheral object had been high and the other low for 250 ms (HiLo), an event (synchronous ±45 deg rotation of both peripheral objects at 2 cycles/s for 2 s) was triggered 31 or 625 ms after HiLo ended. Reactive gaze shifts to peripheral objects were analyzed off-line from video-recorded corneal reflections of the objects. Gaze shifts to the peripheral object that had been the target of covert attention during HiLo were substantially slower than shifts to the opposite side (1219±115 vs. 887±81 ms after event onset, p=.02). The proportion of shifts to the opposite side did not differ from 0.5, and shifts during events triggered after short and long delays did not differ in direction or latency. The results demonstrate robust inhibition of return (IOR) following the spontaneous (un-cued), brief allocation of covert attention during free-looking in 3-month-olds. IOR during infant free-looking is likely to promote visual exploration by facilitating inspection of potentially more informative locations.
[NIFA grants 227267 and 1004111 to SSR]

INTRA-DORSAL HIPPOCAMPAL ANTAGONISM OF MUSCARINIC ACETYLCHOLINE RECEPTORS DISRUPTS THE CONTEXT PREEXPOSURE FACILITATION EFFECT. P.A. Robinson-Drummer, N.A. Heroux, and M.E. Stanton. Psychological and Brain Sciences, University of Delaware, Newark, DE, 19716 USA. probinson@psych.udel.edu

Cholinergic dysfunction produced by neonatal alcohol exposure can be mitigated by developmental cholinergic enhancement (Monk. et al., 2012, Hippocampus 22:1750–

1757). This dysfunction also contributes to learning impairments in juvenile rats tested in a variant of context fear conditioning known as the context preexposure facilitation effect (CPFE) (Dokovna et al., 2013, Behavioral Brain Research, 248:114–120). However the specific brain regions subserving cholinergic effects on the CPFE during development are not known. Scopolamine, a muscarinic acetylcholine receptor antagonist, disrupts the CPFE in juvenile rats, when administered systemically before preexposure, training and testing, or before any single phase alone (Dokovna, & Stanton, 2012, ISDP Abstract). The current experiment extended these findings by locally infusing scopolamine into the dorsal hippocampus on the preexposure day. On PD 31, juvenile rats received bilateral infusions of scopolamine (35ug) or PBS 10mins before preexposure to the training context (Pre group) or an alternate context (Alt-Pre group). Twenty-four hours later, all animals immediately received two 2s, 1.5mA shocks in the training context. Testing occurred in the training context 24hrs later. The Pre group exhibited significantly more fear to the training context than the Alt pre group. However, Pre group animals given scopolamine before preexposure were not significantly different from the Alt-Pre group. This finding illustrates a specific role of dorsal hippocampal cholinergic function in contextual fear conditioning in juveniles. Enhancing hippocampal cholinergic function may reverse deficits in the CPFE produced by neonatal alcohol exposure.
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ADOLESCENT ETHANOL CONSUMPTION ENHANCES ETHANOL REINFORCEMENT DURING ADULTHOOD IN ALCOHOL-PREFERRING (P) RATS. Z.A. Rodd, J.E. Toalston, R.L. Bell, S.R. Hauser, G.A. Deehan Jr., E.A. Engleman, and W.J. McBride. Indiana University School of Medicine, Department of Psychiatry, Indianapolis, IN 46202 USA. zrodd@iupui.edu

Adolescent ethanol consumption (AEC) is associated with an increase rate of alcoholism during adulthood, which is enhanced in individuals with a family history of alcoholism. In a series of experiments, the effects of AEC on adult EtOH-related behaviors were determined in P rats. In the first experiment, P rats were allowed to self-administer EtOH or saccharin (Sac) during adolescence and the tested for EtOH self-administration during adulthood. The reinforcing properties of oral EtOH consumption was quantitatively examined through use of a progressive ratio test. AEC, but not adolescent Sac consumption (ASC), increased the acquisition and decreased the rate of extinction of EtOH self-administration during adulthood. In addition AEC, but not ASC, increased the breakpoint value for EtOH during adulthood. The effects of AEC on the effects of EtOH within the posterior ventral tegmental area (pVTA) were also assessed. The results indicate that AEC reduced the EtOH concentration required to support self-administration directly into the pVTA. In addition, AEC reduced the EtOH concentration required to be microinjected into the pVTA to stimulate dopamine release in the nucleus accumbens shell (effect was also potentiated by AEC. The data indicate that AEC in a rodent model of alcoholism produced persistent alterations in the drug reward pathway that is indicative of increased sensitivity to EtOH and a potentiated/prolonged response to EtOH. The increase in reward sensitivity during adulthood following AEC may be a biological basis for the long-lasting deleterious priming effects that AEC has for adult alcoholism.
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UNPREDICTABLE VARIABLE PRENATAL STRESS PROGRAMS ENDURING EFFECTS ON THE STRESS AXIS IN MALE AND FEMALE RATS. A.E. Ronca[1-4], J. Varholick[2], E.L. Moyer[1], J.L., Bollinger[5], C.D. Tulbert[2], and L.A. Baer[6]. [1]Space Biosciences Research Branch, NASA Ames Research Center, Moffett Field, CA USA. [2]Obstetrics & Gynecology, [3]Program in Neuroscience, and [4]Molecular Medicine & Translational Science, Wake Forest School of Medicine, Winston-Salem, NC USA. [5]Department of Brain and Behavioral Sciences, Indiana University, Indianapolis, IN USA. [6]Surgical Sciences, University of Texas Medical School, Houston, TX USA. April.E.Ronca-1@nasa.gov

We previously reported programming effects of unpredictable, variable prenatal stress (UVPS) on adult body weight and anxiety responses in male, but not female offspring. The adrenal gland regulates a number of essential physiological functions in adult organisms through the production of steroids and catecholamines. Maintenance of adrenal structure and function is regulated through the integration of extra- and intracellular signals. We hypothesized concomitant changes in the expression of four key genes within the stress axis of three-month-old male, but not female, rats exposed to UVPS. We used reverse transcription and fluorescence based quantitative real-time polymerase chain reaction (RT-PCR to analyze expression of: (1) Proopiomelanocortin (POMC) polypeptide, the precursor of the pituitary adrenocorticotropic hormone (ACTH), (2) ACTH receptor/melanocortin 2 receptor (MC2R) the mechanism by which POMC regulates adrenal glucocorticoid (GC) biosynthesis and secretion, (3) Steroidogenic Acute Regulatory Protein (StAR), a mitochondrial protein stimulated by ACTH, and (4) Cytochrome P450, family 11, subfamily A, polypeptide 1 (P45011a1), [CYP], an enzyme that localizes to the mitochondrial inner membrane and catalyzes the conversion of cholesterol to pregnenolone, the first and rate-limiting step in the synthesis of the steroid hormones. Sprague-Dawley female rats were time mated, then confirmed sperm positive (Gestational day [G]0). On G1 dams were randomly assigned to either: Unpredictable, Variable Prenatal Stress (UVPS) or Non-Stressed (NS) Control conditions. UVPS dams were exposed daily to three different stressors: (1) White Noise, (2) Strobe Light, and (3) Tube Restraint. Stressors were presented individually once per day on an unpredictable schedule (morning [0600-1200hr]; afternoon [1200-1800hr]; evening [1800-2400hr]) for one of three durations (15, 30 or 60min). To control for potential changes in postnatal maternal care, newborn pups were fostered to non-manipulated, newly parturient dams. A significant difference was observed in pituitary POMC across stress conditions ($p<.01$), with a trend ($p=.08$) observed for adrenal StAR. A significant sex difference was observed for adrenal CYP ($p<.01$), with a trend ($p=.06$) observed for MC2R. Collectively, our findings provide evidence that unpredictable, variable stress experienced during fetal life shapes the adult stress axis in males and females.
[Supported by NICHD 1R0150201.]

DOES BILINGUALISM DELAY LANGUAGE ACQUISITION OR SPEED IT UP? EVIDENCE FROM A SIMULTANEOUS EEG-FNIRS STUDY. S. Rossi[1,2,3] and M.F. Gugler[1]. [1]Department of Medical Psychology, Medical University of Innsbruck Austria. [2]Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany. [3]Clinic for Cognitive Neurology and Medical Faculty, University of Leipzig, Germany. sonja.rossi@i-med.ac.at

So far, it is not clear whether bilingualism beneficially or rather adversely affects language development. To address this question a language learning study was performed in 6-month-old bilingual and monolingual infants. Brain plasticity effects were monitored by the electroencephalography (EEG) and the functional near-infrared spectroscopy (fNIRS) while infants underwent a semantic word learning training.

Results showed training-induced modulations and transfer effects to untrained items suggesting an increased flexibility in word learning reflected by more mature neuronal responses in bilingual compared to monolingual infants. We will discuss these results highlighting the importance of combining EEG and fNIRS in assessing language development.

EPIGENETIC CONSEQUENCES AND TRANSGENERATIONAL INHERITANCE OF STRESS. T. L. Roth. Department of Psychological and Brain Sciences, University of Delaware, Newark DE 19716 USA. troth@psych.udel.edu

Epigenetic alterations have emerged as biomarkers for measuring the impact of stress and as mechanisms by which adversity could interact with DNA to affect brain function and health, including the increased risk for a range of psychiatric disorders within and across generations. I will introduce the topics of epigenetics and transgenerational inheritance, and in doing so briefly highlight some our own studies providing empirical support for the ability of maltreatment to produce epigenetic alterations within and across generations.
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NEUROBEHAVIORAL CONSEQUENCES OF DISRUPTED MOTHER-INFANT RELATIONSHIP: NONHUMAN PRIMATES. M.M. Sanchez[1,2]. [1]Department of Psychiatry & Behavioral Sciences, Emory University School of Medicine, Atlanta, GA 30322, USA. [2]Yerkes National Primate Research Center, Emory University, Atlanta, GA 30329, USA. mmsanch@emory.edu

Maternal care plays a critical role in the regulation and development of social, emotional and stress responses in primate infants. Taking advantage of a naturalistic animal model of adverse maternal caregiving we have observed long-term alterations in attachment, social behavior (increased aggression, decreased affiliation) and emotional and stress regulation of infants that experienced adverse caregiving. Brain regions controlling these functions, in particular, prefrontal-amygdala circuits and the brain serotonin system are also affected. The possibility that adverse caregiving accelerates the maturation of prefrontal-amygdala circuits critical for emotional regulation in primates will be discussed.
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STRESS IMPAIRS COGNITIVE FLEXIBILITY IN 15-MONTH-OLD INFANTS. S. Seehagen, S. Schneider, and N. Zmyj. Department of Psychology, Ruhr-Universität Bochum, Bochum, Germany. sabine.seehagen@rub.de

Stress affects cognitive functioning in human adults. Learning and memory under acute stress are characterized by an increased use of rigid habitual response strategies, at the cost of flexible cognitive strategies. Glucocorticoids play a crucial role in promoting this shift from hippocampus-dependent to dorsal striatum-dependent memory. However, the immediate effects of stress on infant cognitive functioning are not well understood. We examined the effect of acute stress on 15-month-old infants' cognitive flexibility. Twenty-six infants were randomly assigned to a stress or to a no-stress condition. After a stress manipulation phase, infants in both conditions participated in an instrumental learning task. In this task, infants first learned to push two different buttons, each one producing a distinct sound and light effect. Then, infants were allowed to push one of the buttons until this action became habitual. At test, infants had access to both buttons. Pushing them did not produce any effect. Infants who had undergone stress induction continued to perform the hitherto effective habitual action at test. Infants in the no-stress condition flexibly adjusted their behavior by disengaging from the habitual action in favor of exploring an alternative action (i.e., pushing the button they had not learned to push habitually). These findings show that stress impairs infants' ability to learn from the consequences of their actions and thus to adjust their behavior to changing demands of their environment. By disrupting the development of a flexible behavioral repertoire, frequent exposure to stress during the first years of life could restrict knowledge acquisition.

COMPARISON OF SENSORY, MOTOR AND COGNITIVE DEVELOPMENT IN 3XTG-AD AND 5XFAD MOUSE MODELS OF ALZHEIMER'S DISEASE. S. Shin, A. K. Glenn, J. C. Whitehead, C. E. Blaney, K. R. Stover and R. E. Brown. Department of Psychology and Neuroscience, Dalhousie University, Halifax, NS, Canada B3H 4R2. richard.brown@dal.ca

The 5XFAD mouse model of Alzheimer's disease (AD) exhibits impaired motor performance in the Rotorod by 10 months of age, while the 3xTg-AD mouse model shows better performance as early as 6 months of age. Due to the difference in motor behaviour phenotype and earlier onset of AD pathology in 5xFAD mice, this study compared the neurodevelopmental profile of 5XFAD and 3×Tg-AD mouse models to their respective wildtype (WT) controls. A neurodevelopmental test battery assessing sensory, motor and cognitive memory development was performed on 5xFAD and 3xTg-AD pups and their WT controls from 2 to 24 days of age. Both 3xTg-AD and 5XFAD mice developed auditory startle sooner than WT controls. In comparison to the WT controls, there was an earlier onset of forelimb grasp and hindlimb grasp reflexes in the 5XFAD and 3xTg-AD mice, respectively. 5XFAD mice showed no delay in motor development, while 3xTg-AD mice showed delayed development in the righting reflex, negative geotaxis, and forelimb grip strength. 3xTg-AD mice exhibited less activity in the open field while the female 5XFAD mice had increased rearing activity. The 3xTg-AD mice showed impaired memory unlike the 5xFAD mice, as 3xTg-AD mice did not habituate to the novel object. 5XFAD mice also demonstrated advanced cognitive abilities as they burrowed in the home bedding sooner than WT controls. Unlike the 3xTg-AD mice, the 5XFAD mice showed no neurodevelopmental deficits. This study highlights the importance of investigating the consequences of genetic manipulation on early development of transgenic mouse models of AD.

PREMATURITY AND UNDERWEIGHT: PREDICTORS FOR PSYCHOMOTOR DEVELOPMENT? A. Sistiaga[1], M. Estevez[2], M. Gaztañaga[3], J. Aliri[4], G. Labayru[5], J. Acha[3], and M.D. Elorza[6]. [1]Personality, assessment and psychological treatment department, University of the Basque Country (UPV-EHU), San Sebastian, Spain 20018. [2]Department of Neonatology; Donostia Universitary Hospital, San Sebastian, Spain 20014. [3]Department of Basic Psychological Processes and their Development, University of the Basque Country (UPV-EHU), San Sebastian, Spain 20018. [4]Department of Social Psychology and Methodology of the Behavioral Sciences, University of the Basque Country (UPV-EHU), San Sebastian, Spain 20018. [5]Brain Damage Unit, Aita Menni Hospital, Arrasate-Mondragón, Spain 20509. [6]Department of Neonatology, La Paz Hospital, Madrid, Spain 28046. andone.sistiaga@ehu.eus

The literature suggests that prematurity and low birth weight are related to worse neurological development and poorer school performance later in life. Thus, the aim of this study is to analyze the effects of prematurity and weight on psychomotor

development in a group of premature newborns at the corrected age of 24 months. The study sample consisted of 135 children born in 2011, prior to 37 weeks. Psychomotor development was measured with the Bayley Scales of Infant and Toddler Development, Third Edition (BSID-III), which assesses 5 areas of development: cognitive, receptive and expressive language, and fine and gross motor skills. Linear regressions were conducted to evaluate whether gestational age and weight at birth predicted BSID-III scores in the overall sample, as well as separately in the, early prematures (n=42; birth before 32 weeks) and late prematures (n=73; birth between 34 and 36+6 weeks). Whereas gestational age did not predict psychomotor development, children´s weight at birth (z score) did; infants with lower weight for their gestational age had worse fine motor performance. This effect was even greater in the late premature's group, where weight at birth also predicted cognitive performance. However, in the analysis of the early premature group the gestational age but not the weight at birth has an important effect over all developmental areas. This preliminary data suggest a differential effect of both predictors according to the prematurity level. Besides, results reinforce the interest of late premature's group in the study of significant predictor variables for neurodevelopment.

FLEXOR AND EXTENSOR MUSCLE RECRUITMENT DURING LEG MOVEMENTS IN CHICK EMBRYOS. S. Sun and N.S. Bradley. Division of Biokinesiology and Physical Therapy, University of Southern California, Los Angeles, CA 90089. sooyeons@usc.edu

Prior to hatching, chick embryos produce repetitive limb movements (RLMs). RLMs exhibit features of stepping in hatchlings, including leg flexor and extensor alternation at step cycle frequencies. Typically, flexor activity is rhythmic for many cycles, whereas extensor activity often drops out. We hypothesize that the spinal pattern generator for stepping more readily recruits leg flexor muscles than extensors. The purpose of this study is to determine if flexor and extensor muscle recruitment differs during RLMs. Embryonic day 20, we recorded spontaneously generated RLMs from either hip and ankle muscles ipsilaterally, or ankle muscles bilaterally. To test for differences in flexor and extensor recruitment, RLM burst counts and burst amplitudes for antagonist muscles of the hip and/or ankle were compared within embryo (N=21, Wilcoxon signed rank test). Results indicated that flexor bursts outnumbered extensor bursts in 35 of 37 antagonist muscle pairs, and the difference was significant ($p < 0.001$). Flexor peak burst amplitude was lowest if the extensor was not recruited during the RLM, and greatest if the extensor participated in all cycles of the RLM ($p < 0.006$). Our results provide evidence that flexor muscle recruitment and extensor recruitment differ during RLMs. Results suggest that flexor muscles are recruited at lower levels of pattern generator drive, and extensors are recruited as drive increases, consistent with our hypothesis. Our findings also suggest that the spinal pattern generator preferentially recruits flexor motor pools independent of extensors, and rarely recruits extensors independent of flexors.
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DNA METHYLATION MEDIATING THE IMPACT OF MATERNAL SOCIAL STATE ON OFFSPRING PHENOTYPE. M. Szyf[1], R. Massart[1], L. Cao[2], S. Suomi[3], and S. King[2]. moshe.szyf@mcgill.ca [2]. [1]Department of Psychiatry, McGill University, Montreal, QC, Canada. [2]Psychosocial Research Division, Douglas Hospital Research Centre, Montreal, QC, Canada. [3]Laboratory of Comparative Ethology, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health, Bethesda, MD USA. moshe.szyf@mcgill.ca

Early life adversity is known to have long-lasting impact on the phenotype of the offspring, particularly important are the associations between early life adversity and development of psychiatric disorders later in life. What are the mechanisms that mediate between exposure to stress during gestation and long-term effects on mental health? We have been testing in the last decade the hypothesis that epigenetic processes such as DNA methylation mediate the impact of the environment on the phenotype later in life. DNA methylation is a mechanism that marks genes during development and provides identical DNA sequences with different identities. Experiments in rodents demonstrated that low maternal care resulted in changes in DNA methylation in the glucocorticoid receptor gene in the hippocampus, which remained throughout life and altered the life long behavior of the offspring increasing anxiety and responsivity to stress. Similarly in humans we noted differences in DNA methylation in the glucocorticoid gene in hippocampi of adults who were abused as children. Our recent studies show that these changes in DNA methylation in response to early adversity affect broad regions of the genome and that they are not limited to the brain and occur in the immune system as well. We propose that the changes in DNA methylation in response to early life adversity are "adaptive genomic" mechanisms that adapts life-long genome programming to the anticipated life-long environment based on stress signals received during gestation and early life. We will present data from nonhuman primates and humans indicating that overlapping genes are altered in response to both prenatal and postnatal stress in multiple tissues; placenta, the immune system and the prefrontal cortex. A fraction of these alterations in the methylome remain in a gender specific way into adulthood. We have evidence from a study of a natural disaster in humans that objective stress is associated with changes in DNA methylation that are detectable in T cells and remain into adolescence. We will discuss the hypothesis that stress hormones might be mediating the genome wide and system wide response of the methylome to stress. Glucocorticoids might act as "integrators" that translate the social stress signals during gestation to genome wide methylation changes across multiple systems.

MECHANISMS OF CRITICAL PERIOD BRAIN DEVELOPMENT. A.E. Takesian[1,2] and T.K. Hensch[1,2]. [1]FM Kirby Neurobiology Center, Boston Children's Hospital, Harvard Medical School, Boston, MA 02115 USA. [2]Center for Brain Science, Department of Molecular and Cellular Biology, Harvard University, Cambridge, MA 02138 USA. Anne.Takesian@childrens.harvard.edu

Developing neural circuits are dramatically impacted by the environment, but such plasticity declines with age, restricting therapeutic approaches to improve adult brain function. A focus on the cellular and molecular mechanisms underlying these developmental trajectories across brain regions has identified specific events controlling the onset and closure of such critical periods. The onset of the critical period is triggered by the maturation of specific GABAergic inhibitory circuits. Targeting these circuits using pharmacological or genetic manipulations can either accelerate onset or induce a delay. Critical period closure occurs by the emergence of molecular brake-like factors, which stabilize neural networks and pose limitations on circuit rewiring. Interestingly, many of these factors are found within the inhibitory circuitry and surrounding extracellular milieu. Lifting these brakes reinstates critical periods, opening windows of plasticity to restructure adult circuitry. Thus, identifying neural targets that switch on and off critical periods will have far-reaching impact, including therapeutic strategies for neurodevelopmental and psychiatric disorders, recovery from brain injury, and lifelong learning.

THE ROLE OF LANGUAGE CUES ON FLEXIBLE MEMORY RETRIEVAL AT 12-MONTHS OF AGE. G. Taylor[1] and J.S. Herbert[2]. [1]Department of Psychology, Lancaster University, LA1 4YF, UK. [2] Department of Psychology, University of Sheffield, S10 2TN, UK. g.taylor4@lancaster.ac.uk

From 12-months of age, infants can flexibly retrieve their memories in the puppet imitation task across a change in the form or colour of the puppet after a 10 minute delay but not across a change in the form and the colour of the puppet (Hayne et al., 1997; Jones & Herbert, 2008). Language cues can enhance flexible memory retrieval across a change in the form of the puppet at 12-months of age (Herbert, 2011). The present study investigated the role of language cues for facilitating flexible memory retrieval across a change in the colour and form of the puppet. Twelve-month old infants were shown three target actions with a puppet and were given the opportunity to reproduce those actions on a puppet that differed in form and colour 10 minutes later. Half the infants heard verbal labels during the demonstration and test, and half the infants did not. Imitation performance by infants in the full language and empty language groups did not exceed baseline performance. Thus, language cues do not facilitate flexible memory retrieval on a task that is too difficult for 12-month old infants. CDI data revealed no correlations between infant's language comprehension and their imitation performance in either group. Given that there was no relationship between infants' language comprehension and imitation performance in the full language group, the present experiment suggests that language cues may direct attention to relevant parts of the demonstration rather than providing an additional cue for recall (see Balaban & Waxman, 1997).

MATERNAL BUFFERING OF ADOLESCENT RISK TAKING: INSIGHTS FROM NEUROSCIENCE. E.H. Telzer. Department of Psychology, University of Illinois, Champaign, IL 61820 USA. ehtelzer@illinois.edu

Despite being one of the healthiest developmental periods, morbidity and mortality rates increase dramatically during adolescence, largely due to preventable, risky behaviors. Because neural regions involved in motivation and cognitive processes undergo significant reorganization during adolescence (Nelson et al., 2005), the adolescent brain is thought to be highly flexible and malleable (Crone and Dahl, 2012) and therefore particularly sensitive to social influences. While prior work has focused on the social contexts which may increase risk taking, for instance peer presence (Chein et al., 2011), social contexts can also decrease risk taking, such as parental presence. Indeed, parents represent one of the most direct and proximal sources of influence over teenagers. In the current study, we examined how maternal presence influences adolescents' safe and risky decisions. Twenty-four adolescents were scanned as they completed a simulated driving course in the presence of their mother and alone during fMRI. We find that adolescents make significantly fewer risky decisions in the presence of their mother compared to alone, which was associated with greater recruitment of the VLPFC when making safe decisions, decreased activation in the ventral striatum following risky decisions, and greater functional coupling between the ventral striatum and VLPFC when making safe decisions. Our findings suggest that mothers serve to buffer adolescents' engagement in risky behaviors by altering their neural processing. Importantly, we show that parents do not merely decrease adolescent risk-taking by serving as gatekeepers but that parents may actually change the ways in which adolescents think and reason about risks.

THE BENEFICIAL EFFECTS OF A POSITIVE ATTENTION BIAS AMONGST CHILDREN WITH A HISTORY OF PSYCHOSOCIAL DEPRIVATION: REDUCING ANXIETY AND STRESS REACTIVITY. S. Troller-Renfree[1], K. McLaughlin[2], M. Sheridan[3,4], C.A. Nelson[3,4,5,6], C.H. Zeanah[7], and N.A. Fox[1]. [1]Department of Human Development and Quantitative Methodology, University of Maryland, College Park, MD, 20742 USA. [2]Department of Psychology, University of Washington, Seattle, WA, 98195 USA.[3]Harvard Medical School, Boston, MA, 02115 USA. [4]Boston Children's Hospital, Boston, MA, 02115 USA. [5]Harvard Center on the Developing Child, Cambridge, MA, 02138 USA. [6]Harvard Graduate School of Education, Cambridge, MA, 02138 USA. [7]Tulane University School of Medicine, New Orleans, LA, 70118 USA. str@umd.edu

Children raised in institutions experience psychosocial deprivation that has been shown to negatively impact attention, emotion regulation, and increase prevalence of psychiatric disorders. The current study examined the relations between attention biases and anxiety in children in the Bucharest Early Intervention Project. 136 children abandoned into institutional care were randomized to receive a high-quality foster care intervention or care-as-usual. At age 12, 33 care-as-usual and 30 foster care children performed a behavioral dot-probe task with both threat and happy face stimuli, and indices of attention biases to threat and positive stimuli were calculated. As well, children were seen in a modified Trier stress paradigm and saliva was collected and measures of cortisol reactivity were computed. Results showed that children placed into the foster care intervention had a significant attention bias toward positive stimuli ($t(29)=3.631$, $p=.001$) but no bias towards threat , while children who received care-as-usual showed no bias to either threat or positive stimuli. The magnitude of the positive bias was predicted by the percentage of time a child had spent in high-quality foster care ($\beta=.283$, $t(61)=2.308$, $p=.024$) and was associated with less social withdrawal ($r(43)=-.302$, $p=.044$), overanxious behavior($r(43)=-.300$, $p=.045$), and social anxiety ($r(43)=-.298$, $p=.046$). Additionally, within the foster care group, happy biases were related to better (less blunted) cortisol reactivity during a social stress task ($\beta=.322$, $t(28)=2.118$, $p=.034$). Research assessing attention biases in children experiencing early environmental stress may refine our understanding of happy biases as a potential protective mechanism for stress reactivity and anxiety disorders.

MANIPULATION OF THE PRE- AND POST- WEANING SOCIAL ENVIRONMENT AND ITS EFECTS OF PREPULSE INHIBITION OF THE ACOUSTIC STARTLE RESPONSE ON C57BL/6. J.A. Varholick[1], X.J. Garza[2], R.L. Jordan[2], G.F. Michel[2], and J.D. Bailoo[1]. [1]Division of Animal Welfare, The University of Bern, Switzerland, 3012. [2]Department of Psychology, The University of North Carolina at Greensboro, Greensboro, NC 27403 USA. justin.varholick@vetsuisse.unibe.ch

Pre-pulse inhibition (PPI) is a tool that may be used to identify how early life stress can result in a deficient adult nervous system. Since both animals and humans demonstrate a PPI, animal research on PPI can be used to model the relation of the early social environment to later susceptibility to maladaptive adult behavioural phenotypes. The current study examined the effect on adult PPI of early life stress in C57BL/6 offspring reared under four social conditions: Animal-Facility Reared (Control), Early Handling (EH, daily 15 min separation), Maternal Separation (MS, daily 4 hr. separation from dam) and Maternal Peer Separation (MPS, daily 4 hr. separation from dam and of littermates); and two post weaning housing conditions: Socially Housed (SH, 2-3 individuals/cage) and Social Isolation (IH, 1 individual/cage). Four different PPI types; 0, 76, 80, or 84 dB; each 20ms duration, and a startle stimulus of 120 dB, 40ms duration, were presented and the percentage reduction of the startle response that occurred with a prepulse in comparison to the startle response that occurred without a prepulse (i.e., 0 dB prepulse) was calculated. Preliminary analyses

indicate that EH subjects displayed lower levels of PPI and ASR than AFR, MS & MPS offspring. The post weaning manipulation does not seem to affect display of PPI or the ASR and consistent with the human and animal literature, male mice display a greater ASR and PPI of the ASR than females.

SLEEP-MEDIATED CONSOLIDATION OF EPISODIC MEMORY IN CHILDREN AND ADULTS. J.-Y. Wang[1,2], F.D. Weber[1], and J. Born[1]. [1]Institute of Medical Psychology and Behavioral Neurobiology, University of Tübingen, Tübingen, Germany. [2]Graduate School of Neural & Behavioural Sciences| International Max Planck Research School, Tübingen, Germany. jingyi.wang@medizin.uni-tuebingen.de

A recent study in human adults indicated sleep's beneficial role for "what-where-when" episodic-like memory utilizing eye tracking. Using the same paradigm we investigate, if the advantage of deeper and longer sleep in school children (8-12 yrs.) further impacts episodic memory consolidation. Children experienced two short episodes one hour apart, each comprising four distinct female faces at different locations in a 3x3 grid on a PC screen. Episodic memory was tested implicitly by tracking eyes and explicitly by oral report, either 1 h later after the encoding (Pre-sleep group), or after a ~10.5 h retention interval that contained either an overnight sleep (Sleep group), or daytime wakefulness (Wake group). Preliminary results in children reflected performances of the same adult groups on the explicit "what-where-when" memory and was better in the Pre-sleep and Sleep group as compared to the Wake group children, while all groups had above chance performance. Unlike in adults, the implicit measures in the eye exploration pattern did not reflect children's explicit performance. We present ongoing work with a detailed comparison of adults and children's explicit vs. implicit measures and their relation to sleep-mediated consolidation.

STRESS BUFFERING OF CORTISOL RESPONSE IN GUINEA PIG PUPS: THE EFFECTS OF SOCIAL INTERACTIONS WITH UNFAMILIAR ADULT MALES. W. Watanasriyakul, M.B. Hennessy, and P.A. Schiml. Department of Psychology, Wright State University, Dayton, OH 45435 USA. tang.watanasriyakul@gmail.com

In mammals, the presence of a social partner can reduce or "buffer" hypothalamic-pituitary-adrenal (HPA) stress responses in threating conditions. These effects are generally observed in partners who are closely bonded (e.g., mother-infant; male-female monogamous mating partners). Previously, we compared the stress buffering effects on HPA activity of the mother, a familiar littermate, and an unfamiliar adult male in guinea pig pups exposed to a novel environment. As expected, the mother significantly reduced the cortisol stress response while the littermate did not. Surprisingly, the unfamiliar adult male reduced cortisol levels of the pups as effectively as did the mother. Further examination revealed that the adult male interacted with the pups more than did other social partners. It was hypothesized in the current study that social interactions between the pup and the adult male suppressed the cortisol response. Therefore, we examined effects of males that could interact with pups (conscious males) and males that could not (anesthetized males). Social interactions were frequently observed between the conscious adult male and the pups. Once again, the conscious male greatly suppressed plasma cortisol levels of pups. On the other hand, the cortisol levels of pups tested with the anesthetized male were as high as those of pups tested alone. The finding confirmed our hypothesis that social interactions were responsible for stress buffering effects of the males. This may due to the pups perceiving the interactions as play. Ongoing studies are currently investigating possible brain mechanisms underlining this effect.
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TRANSGENERATIONAL EPIGENETIC PROGRAMMING OF HYPOTHALAMIC MECHANISMS THAT REGULATE FEEDING AND OBESITY BY HIGH FAT DIET. A. Weller[1,2,3], A. Marco[1,2], T. Kisliouk[4], T. Tabachnik[1], and N. Meiri[4]. [1]Faculty of Life Sciences, [2]Gonda Brain Res Center, [3]Department of Psychology, Bar Ilan University, Ramat-Gan, Israel 52900. [4]Institute of Animal Science, ARO, The Volcani Center, Bet Dagan 50250, Israel. aron.weller@biu.ac.il

Parental obesity can affect the children's likelihood to overeat and develop obesity. Changes in epigenetic programming have been implicated as one of the mechanisms underlying this phenomenon. Using a rat model, we designed a study in which we exposed only the first generation to chronic high fat diet (HFD) and followed the effect on two consecutive generations of standard fed offspring. We focused on the promoter of the hypothalamic neuropeptide Pomc, which is crucially involved in control of food intake. HFD consumption by non-mated female rats (F0) significantly increased body weight and plasma leptin levels and attenuated Pomc mRNA expression. This was associated with hypermethylation of the Pomc promoter. Although as expected the HFD resulted in up-regulation of the transcription factor Sp1, the binding of Sp1 to the hypermethylated Pomc promoter was significantly reduced. Furthermore, perinatal exposure to maternal HFD lead to long term acquired alteration in DNA methylation patterns and posttranslational modifications of histone H3 lysine 9 (H3K9) that affect Pomc transcription in the F1 and F2 offspring. In addition, as a potential mechanism underlying the regulation of Pomc expression we found an involvement of a repressor complex including the binding of methyl binding domain 1 (MBD1) to the Pomc promoter, interacting with SETDB1 methyltransferase to promote the formation of methylation of H3K9. These findings contribute to our understanding of the mechanisms through which environmental cues are translated into stable changes in the Pomc gene, leading to obesity.

FRONTAL HIGH FREQUENCY EEG SPECTRAL POWER IS INCREASED DURING ACTIVE SLEEP IN NEWBORNS WITH CONGENITAL HEART DISEASE COMPARED TO HEALTHY CONTROLS. J.S. Yang[1], C.L. Weiss[2], P. Grieve[3,4], I.A. Williams[2], M.M. Myers[1,3,5], and W.P. Fifer[1,3,5]. [1]New York State Psychiatric Institute, Division of Developmental Neuroscience, New York, NY, 10032 USA. [2]Dept of Pediatrics, Division of Pediatric Cardiology, CUMC, Morgan Stanley Children's Hospital of New York-Presbyterian, New York, NY, 10032 USA. [3]Dept. of Pediatrics, Columbia University, New York, NY, 10032 USA. [4]Dept. of Biomedical Engineering, Columbia University, New York, NY, 10032 USA. [5]Dept. of Psychiatry, Columbia University, New York, NY, 10032 USA. jsy2116@cumc.columbia.edu

Congenital heart disease (CHD) is the leading cause of mortality and morbidity among infants with birth defects, and children born with severe forms of CHD are at high risk for a wide spectrum of neurocognitive difficulties. In this study, we investigated whether neurodevelopmental deficits associated with altered hemodynamics in fetuses with CHD were reflected postpartum in alterations to high frequency electroencephalogram (EEG) spectra, and whether EEG parameters could be used as early markers of neurodevelopmental deficits. We hypothesized high frequency EEG power would be lower in infants with CHD. Frontal EEG was specifically examined due to the region's importance for executive function and attention in infants and children. High-density EEG was recorded during sleep from infants (37-40w gestational age) diagnosed with CHD (n=39) and healthy full-term controls (n=233) within 72 hours of birth. EEG power was divided into three contiguous bands - beta (12-23Hz), low gamma (24-36Hz), and high gamma (37-48Hz). During active sleep, there was an unexpected significant

increase in power in the CHD cohort compared to controls within beta (13-24Hz, $p<0.01$) and low gamma (25-36Hz, $p<0.05$), with a similar though non-significant trend in high gamma (37-48Hz). Interestingly, no significant changes were observed in quiet sleep. We hypothesize that the increased high frequency EEG power during active sleep may signify a stress response or compensatory adaptation generated by changes in oxygen and nutrient delivery to the fetal brain due to structural heart defects and, for reasons unknown, these effects were sleep state dependent.
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EARLY DEPRIVATION ALTERS THE DEVELOPMENT OF AFFECTIVE AND SOCIAL BEHAVIOR IN RATS SELECTIVELY BRED FOR AN INFANTILE TRAIT. B. Zimmerberg and C. Bope. Psychology Department, Williams College, Williamstown, MA 01267 USA. bzimmerb@williams.edu

Animal models of child neglect have been valuable in understanding the deleterious effects of an early negative environment on brain development. There is mounting evidence that a history of early childhood maltreatment greatly increases the risk of developing a psychiatric disorder when there is also a genetic vulnerability. Negative effects have been shown to alter behavioral phenotypes of rodents via epigenetic mechanisms. In this study, the effects of Early Deprivation (ED) were examined in rats selectively bred for an infantile affective trait: high and low rates of ultrasonic calls (USVs) after brief maternal separation. High and Low male and female rat pups were isolated individually for three hours a day for the first week of life. At one week of age, High line subjects vocalized more than Lows, as expected, and had greater USV reductions after ED. No sex differences were observed in neonates. Line and sex differences were detected in behaviors on the zero maze with interactions with a prior ED history in adults. Low subjects also showed increased social behaviors as juveniles compared to High subjects. Similar to our findings with a positive early experience, Communal Nesting, a possible epigenetic effect of alterd erly environment was seen in measures of anxiety behavior, but not in measures of social behavior, in this genetic rodent model. These results parallel, with some interesting species differences, the recent findings by Kundakovic, Lim, Gudsnuk and Champagne (2013) using a mouse model of maternal separation.

LIMITS ON THE BILINGUAL ADVANTAGE IN INFANT MEMORY GENERALIZATION ON A TRANSFER TASK. L. Zimmermann[1], C. Nugent[1], N. Brito[2], and R. Barr[1]. [1]Psychology, Georgetown University, Washington, DC 20057 USA. [2]RWJF Health & Society Scholars, Columbia University, New York, NY 10032 USA. ljz7@georgetown.edu

Bilingual infants from 6- to 24-months show an advantage in memory generalization, flexibly reproducing actions on novel objects significantly more than age-matched monolinguals. Prior research demonstrated that a novel label helped monolingual 24-month-olds but not 18-month-olds generalize between perceptually different stimuli (Herbert & Hayne, 2000) but that 24-month-old bilinguals were able to generalize without novel labels (Brito, Grenell, & Barr, 2014). In the present study, we examined whether a novel would enhance memory generalization in bilingual 18-month-olds. During the demonstration an experimenter provided a novel label ("meewa" or "thornby") for the rattle and animal stimuli during demonstration and prior to the test 24 hours later. Infants were tested with the same stimulus set (cued recall) and with a novel version of the other stimulus set (memory generalization). Infants assigned to the baseline condition did not receive a demonstration. Our preliminary findings replicated those of Herbert and Hayne demonstrating that cued recall performance significantly exceeded baseline ($M_{baseline}$= 0.54, $M_{experimetnal}$= 1.46) but memory generalization did not exceed baseline across the 24-hour delay, and there were no significant effects of language status. These findings are consistent studies that have shown that during the second year of life, toddlers were not able to utilize novel labels in difficult transfer of learning tasks (Herbert & Hayne, 2000; Zack et al., 2013). The present study extends these findings by demonstrating that the memory generalization advantage is not due to overgeneralization or lack of discrimination by bilinguals and that there are constraints on the bilingual generalization advantage.
[This material is based upon work supported by the Georgetown University Graduate School]

AGE-RELATED CHANGES AND SEX DIFFERENCES IN VISUOSPATIAL WORKING MEMORY IN 2- TO 4-YEAR-OLDS. L. Zimmermann, R. Speidel, and R. Barr. Psychology, Georgetown University, Washington, DC 20057 USA. ljz7@georgetown.edu

Visuospatial working memory (VSWM) is the ability to briefly retain and manipulate visual and spatial information. Age-related improvements in VSWM on the A$\overline{B}$ task have been documented during infancy (Diamond, 1990) and between 3 and 7 years using search tasks (Ewing-Cobbs, Prasad, Landry, Kramer, & Leon, 2004). However, less work has investigated age-related differences across the preschool years. We tested 528 2-, 3-, and 4-year-olds using a VSWM object occlusion task, Spin the Pots (STP; Hughes & Ensor, 2005). Six stickers were hidden under six of eight colored cups. A lid covered the cups, the apparatus was spun 180 degrees and on each trial the child was allowed to find one sticker. Trials continued until all 6 stickers were retrieved. To succeed, children must update their memory about the location of the remaining stickers after each trial. 3(Age) x 2(sex) ANOVAs showed the success rate (stickers/#trials) was similar in 2- and 3-year-olds (M_2=.42, SD_2=0.17, M_3=.45, SD_3=0.18) but significantly increased in 4-year-olds (M_4=.54, SD_4=0.20), $F(2,527) =4.18$, $p < 0.001$. Older children also completed the task in significantly fewer trials, less time, and perseverated less than younger children. Girls had a higher success rate than boys, but there was no interaction between age and sex. The STP task was developmentally appropriate across a wide age range but also sufficiently difficult to detect age-related changes, sex differences, and limits to VSWM during early childhood. Overall these findings provide further support for rapid acquisition of working memory during early childhood.
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