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Title: Brain Mast Cells Affect Zinc Homeostasis: Implications for Learning and Memory

Student Researcher & Presenter: Amen Wiqas
Mentor: Rae Silver

Abstract: Mast cells are immune cells found in nearly every tissue of the body, and are best known for their roles in inflammation and host defense against parasites. Although their normal function in the brain is not fully understood, mast cells are found in greatest numbers in and around the hippocampus, and are known to contain zinc (Zn). In general, Zn is known to be an essential trace element for both the immune and nervous systems, a cofactor for over 300 enzymes, and has numerous effects related to growth, development, and behavior that are concentration dependent. We hypothesized that brain mast cells are important to Zn homeostasis, a process known to be tightly regulated, and that if brain mast cell number increases, free brain Zn decreases because of mast cell inclusion. To test this, coronal slices of mast cell deficient “sash” adult male mice brains were histologically stained by Timm’s sulphide silver method and compared to those of C57Bl/6 “wild type” littermates. We determined that sash mice stain more intensely for zinc than controls, with specific enrichment in the dentate gyrus of the hippocampus, as well as the amygdala, and perirhinal cortex: three brain areas associated with memory. Morphological and volumetric assessment of these brain areas is ongoing, but together these studies will inform future investigation of Zn effects on neurogenesis and memory-related behavior in mast cell deficient mice.

With thanks for support from the Arnold O. Beckman Foundation.
Title: Effect of Public Health Campaign Images on Attitudes Toward Obesity

Student Researcher & Presenter: Stefani Karr

Mentor: Sumati Gupta

Abstract: Obesity has been declared a public health epidemic and great attention has been given to increasing awareness and motivating the public to change their behavior. While it is important to encourage people to lead healthy lives, previous studies have highlighted the problem of using stigma as a motivation tactic in public health campaigns. The present study examines the effect of stigmatizing images in public health campaigns and participant racial identity on attitudes towards obesity. A sample of Columbia University students (n = 92) completed an online survey measuring their attitudes towards obesity after viewing either a stigmatizing public health campaign, a non-stigmatizing image of an obese individual, or a control image of nature. Results show that, in this sample, there was no significant effect of race on attitudes towards obesity. There was also no significant effect of the stigma displayed in an image on participants' attitudes towards obesity. These findings suggest that the use of stigmatizing images has no negative effect on college student’s attitudes towards obese individuals.
Title: A Mixed-Methods Analysis of Zine Authors' Minority Status and Attachment Style

Student Researcher & Presenter: Charlotte Quincoses

Mentor: Chana Etengoff

Abstract: The attachment style of a person factors into their temperament in relationships across all aspects of their lifestyle (Mikulince & Shaver, 2003). While attachment research has been conducted on minority populations before (Balsam, 2011; Brown, 2013; Cooper, 2013; Kalsner, 2003; Meyer, 1995), studies that are exclusively female oriented or about queer and racial minority populations as a whole are rarely conducted. The present study addresses whether a link exists between insecure attachment style and queer identified women and/or women of color (WOC) as prior research suggests that LGBTQ people of color report feelings of alienation from family and friends within their racial/ethnic communities; heterosexism in racial/ethnic minority communities and racism in LGBT communities (Balsam, 2011). Sixty female authored zines from the Barnard College Library collection were coded for attachment style using a 3 point Likert scale ranging from insecurely attached, mixed, or securely attached. Fifteen zines from each category of white heterosexual, queer WOC, queer white and heterosexual WOC authors were sampled. Zine authors' attachment style scores were analyzed in a two-way between participants ANOVA, with sexual identity (queer, heterosexual) and racial identity (white, WOC) as between subjects variables. The sexual identity and racial identity interaction was not significant, F(1, 56)= .179, p= .673. These findings suggest that among female zine authors in Barnard’s library, these traditionally marginalized groups of queer identified and WOC authors do not show less competence in their relationships than do the heterosexual and white group of female zine authors. These findings can lead to research focusing on the how zine publishing may buffer sexual and ethnic minority stress, leading to more securely attached individuals.
Title: A New Critical Period: Effort Training Increases Persistence

Student Researchers: Sara Fruchter, Nina Plotnikov

Presenter: Nina Plotnikov

Mentor: Lisa Son

Abstract: Can persistence be trained? Seventh-grade and college-aged students experienced either high or low effort training via a series of, respectively, hard or easy anagrams to solve. Then, on computer, they were presented with a list of trivia questions to each of which they could answer that they know or don’t know the answer. Reaction times – as a measure of persistence – were recorded. Afterwards, the questions judged as “not known”, along with the answers, were re-presented to be judged as having been new or familiar (but forgotten). Results showed an age effect – persistence during the trivia task increased significantly, particularly longer response times for Judgments of Not Knowing (JoNKs), following high effort training, but for only the seventh graders. The data suggest that as individuals get older, training efforts weaken, and our confidence in not knowing become more resilient.
Title: Category Formation and Spatial Proportions

Student Researcher & Presenter: Eva Gelernt

Mentor: Koleen McCrink

Abstract: When forming categories to group similar objects, children are more likely to pay attention to the shapes of the objects than other features (such as their size or color). Children are also attentive to the function of objects when forming categories; for example, if they appreciate that if two items were both made with the intention to crush ice, they can both be considered a blender - no matter their shape. In this study, we capitalized on children’s ability to reason about proportion as a way to highlight the role of function, and examined whether this manipulation interfered with their overriding shape bias. Kindergarten-aged children, and a comparison group of adults, were presented with a standard item that received a nonsense category label (“This is a Swug”), and then asked to choose which of two test items also should be part of that category (“Which of these is a Swug?”). These test items pitted the size of the stimulus, the shape of the stimulus, and the proportion of the stimulus’ subparts against each other, to see which of these cues best-led participants to extend category membership. Half of the participants heard information about the function of the objects (“The Swug has big ears to hear if something is coming to eat him and little legs to run away quickly”), and half the location of the objects (“The Swug lives in the forest, because he loves all of the colors and sounds”). We observed a persistent shape bias in children; however, a bias to categorize based on proportion became more prominent for both children and adults when functional information was given. This proportion bias was stronger overall in the adult population. Thus, we found that adults override their shape bias when proportional information about function was present, and that even for children proportional information is useful for categorization in the context of reasoning about the function of objects. These results suggest that everyday spatial reasoning capabilities influence how children and adults categorize objects and conceptualize their world.
Abstract: Oxytocin is released both centrally and peripherally and can affect numerous physiological and behavioral processes, ranging from parturition and lactation to sociality and emotionality. Though oxytocin-containing cells are found throughout the brain, they are highly enriched in neurosecretory areas of the hypothalamus, including the supraoptic nucleus (SON) and paraventricular nucleus (PVN). Previous studies in rats have reported pubertal-related increases in hypothalamic oxytocin mRNA expression, which may contribute to the changes in the processes noted above. In an effort to further examine pubertal-related changes in oxytocin-containing neurons in the hypothalamus of rats, we quantified the number and somal size of oxytocin cells in the SON and PVN of prepubertal and adult male and female rats (n=6 per age and sex). Based on the previously reported increase in hypothalamic oxytocin gene expression, we hypothesized that adults would have a greater number of oxytocin cells in the SON and PVN compared to prepubertal animals. Moreover, we hypothesized that oxytocin cells would be larger in adult compared to prepubertal animals. To test these hypotheses, male and female rats at either 30 (prepubertal) or 70 (adult) days of age were perfused and brains were sectioned throughout the rostral-caudal extent of the hypothalamus. Free-floating coronal sections were then immunohistochemically processed to identify oxytocin-containing cells in the SON and PVN. Two bilateral counts covering an area of 15,625 mm² were made and cell counts were averaged. For soma size, 40% of all cells from each region were analyzed using ImageJ and cross-sectional areas were computed and averaged. Though we found no significant changes in the number of oxytocin-containing cells in either the SON or PVN of prepubertal or adult males and females, we did find a significant main effect of age for somal size. Specifically, the soma of oxytocin-containing cells in SON and PVN were larger in the adult males and females than the prepubertal males and females. These data are the first to report a pubertal-related increase in the size of oxytocin cells in the hypothalamus of rats. Though the functional implications of these data are unclear, these structural changes may be related to the pubertal increases in oxytocin mRNA expression previously reported. Given the pleiotropic effects of oxytocin on physiological and behavioral functions, it will be important to further investigate changes in oxytocin-containing cell groups, particularly during the transition from puberty to adulthood when many of these functions are in flux.
Title: A Childhood Grief Workbook to Assist Psychotherapists

Student Researchers & Presenters: Emily Playfair, Elizabeth Kelly

Mentor: Sumati Gupta

Abstract: Messy Feelings: Talking about Loss is a therapeutic workbook created to help children living with the loss of a parent or sibling express their experience in a non-threatening way while creating conversations with caregivers and professionals. The aim of this study is to learn how the workbook is being used in clinical settings and to gather information regarding the usefulness of Messy Feelings: Talking about Loss, specifically to what extent the workbook is useful in determining what modalities a child finds helpful in therapy and assessing the psychological issues in the child’s life. Messy Feelings: Talking about Loss is recruiting participants via email through listservs and by directly contacting professionals. Professionals fill out a survey regarding demographic information of their practice and request workbooks, which are received in an email. Professionals will be reached out to for survey responses regarding the usefulness of the workbook at a month after their receipt of the workbook.
Title: Effects of Physical Stability on Self-perceived Social Stability in Ballerinas and Non-dancers

Student Researcher & Presenter: Rachel Liebert

Mentor: Robert Remez

Abstract: Does an unstable physical environment affect the self-perception of social stability? One influential study reported that the imposition of an unstable posture could affect the assessment of the durability — that is, metaphoric stability — of a romantic relationship. Postural instability was varied by asking a participant to sit in a wobbly or stable chair, or to stand on one or both feet. The current study examined this effect in two ways: 1) by looking for an effect of postural expertise through a test for an effect of instability on trained ballet dancers compared to non-dancers; and, 2) by examining a gradient of social relations, from close to distant. If a history of practice en pointe makes a ballerina feel more stable than a non-dancer when each is standing on one foot, then judgments of social stability should differ accordingly. However, no difference should be observed when instability is imposed by sitting in a wobbly chair. If the precedent report generalizes to other social relations, then self-appraisal of close and distant relations should be susceptible to the effects of variation in postural stability. Participants completed a self-report measure about the stability of four social relations while standing on both feet, standing on one foot, seated in a steady chair, or seated in a wobbly chair. The results have the potential to inform an account of somatic perception in social relations.
Title: Parents Value Children's Outdoor Play, So Why Don't They Let Them Do It?

Student Researchers: Lisa Levenson, Karen Sanchez, Vanessa Moquillaza,
Allegra Califano

Presenter: Lisa Levenson

Mentor: Tovah Klein

Abstract: In a world where technology is increasingly being used as a tool to “occupy” children, it is important to understand whether and how parents still value play that functions outside of the classroom, outside of screen time, and outside of the home. Clements (2004) investigated the current status of outdoor play and noted that mothers believe outdoor play positively affects development of physical and motor skills, social skills, cognitive skills, and communication skills. Despite all of the positive developmental gains that result from outdoor play, safety concerns seem to greatly hinder parents from allowing their children to fully reap the benefits. The present study was designed to better understand why the time allotted for children to play outdoors is decreasing, despite the clear developmental gains that result uniquely from this type of play. Participants were parents of toddlers enrolled at the Barnard College Toddler Center, and researchers were provided with transcripts that asked participants about the benefits and values of outdoor play, along with any concerns the parent had with his/her child playing outdoors. Results showed safety concerns, and more specifically, the urban environment and the need for supervision as being variables that affect parental views and allowance on outdoor play. Results also showed parents seeing several benefits to outdoor play, including their children gaining a connection to nature, and their children developing both emotionally and socially. Ultimately, it’s important to address the concerns of parents in order for their children to develop the valuable skills obtainable through outdoor play.
Title: Factors Influencing Memorization Priory for a Gendered List

Student Researchers: Ali Schulz, Stephanie Weiner, Anna Weill

Presenter: Ali Schulz

Mentor: Kenneth Light

Abstract: Learning occurs when associations are made, which involves complex memory and cognitive processing. The ability to detect salient data in the environment is an important contributing aspect of learning because organisms are able to focus processing ability on relevant and novel stimuli. However, there are differing schools of thought in terms of which types of information are processed more quickly and effectively. Most prevalent theories in learning psychology state that organisms learn novel information more readily (e.g., Rescorla-Wagner model). This information is surprising to the organism due to a disparity between expectation and reality, making it more likely to form a strong association and be encoded. In the area of social psychology, theories purport that our priority can shift from novel (non-normative) to non-novel (normative) information based on cognitive load. This provides an interesting convergence of hypotheses for further testing. This study sought to test which of these two theories correctly predicted subject’s abilities to memorize a list of gender/job pairings. Specifically, this study tested the learning of expectancy-incongruent and expectancy-congruent gender/job pairs. Forty-five female undergraduate students at Barnard College in the Introduction to Psychology course were used as subjects. Each participant was presented with a sheet of paper containing 24 randomized gender stereotype congruent(12) and incongruent(12) gender-occupation pairs to memorize for one minute. Then, after a 30-second break, each participant was given 2 minutes to write down as many pairs as she could remember. Finally, the process was repeated for food pairings that were typical or atypical. Results indicated that these were processed differently in terms of was is normative, as subjects recalled more non-normative gender/job pairs and more normative normative food pairings. We propose that the socially-based nature of gender bias is responsible for these differences. Future research will seek to determine the subjects’ actual gender/job biases because it cannot be assumed here that all subjects had a traditional bias.
Title: Recognition of Gender/Occupation Bias

Student Researcher: & Presenter: Autumn Austin

Mentor: Kenneth Light

Abstract: Weiner et.al conducted a study reporting that participants recalled significantly more incongruent gender-occupation pairings than congruent. The present study explores the effect of gender occupation biases on recognition. Participants were asked to memorize a list of gender occupation pairings and then asked to check off the gender they recognized as being previously paired with the occupation. Thirty-two Barnard College undergraduate students participated. Participants recognized more correct pairings than they recalled in the previous study, supporting that idea that recognition is easier than recall. The effect found in recall that congruent pairings were remembered more effectively than incongruent pairings failed to be found here for recognition. Also, participants made similar errors with incongruent and congruent pairings reporting a pairing as present, when they were not. Thus neither accurate recognition nor false memories demonstrated bias. This study demonstrated that recognition works differently than recall for gender-occupation biases. This further supports that recall provides unique insight into the way our biases function in learning and memory.
Title: Why the Harsh Treatment? Deservingness Beliefs in the Interrogation Room

Student Researchers: Eva Gelernt, Xinni Liu, Deborah Levine, Shaakya Vembar, Maleeha Naqvi, Khrystyna Tsunyak

Presenter: Xinni Liu

Mentor: Larry Heuer

Abstract: Contemporary theories of procedural justice (e.g., Thibaut and Walker, 1975; Tyler, 1989) cannot readily explain people’s support for negative treatment, such as harsh interrogation tactics. The present study draws on theorizing about deservingness (e.g., Lerner, 2011; Feather, 1992; 1999) to test a matching hypothesis to explain support for disrespectful treatment in an interrogation context. A 2 (morality: high vs. low) x 2 (treatment: respectful vs. disrespectful) between-subjects design was utilized. This study employs an adaptation of the Russano et al. (2005) paradigm to alter the participant's behavior: in the “low moral behavior” condition, a confederate instigates cheating from a naïve participant while working on a set of problems. In the “high moral behavior” condition, the participant is not led to cheat, and no cheating occurs. Upon completion of the problem set, the experimenter accuses both the participant and confederate of cheating in either a respectful or disrespectful manner. Two hypotheses were tested: 1) participants in the positive (no cheating) condition would believe they deserved more positive treatment, and 2) as predicted by Feather’s (1992) matching hypothesis, matches between the morality of a participant’s (positive or negative) behavior and the (positive or negative) treatment of the participant are more likely to be judged fair by the participants. Results support both hypotheses. There was a significant main effect of the morality manipulation on participants’ reports that they deserve respect. Also, the matching hypothesis is in the predicted direction and of a moderate effect-size, though not yet statistically significant: fairness judgments are higher when the (positive or negative) treatment the participants received was matched to the (positive or negative) value of their behavior. This study adds to others (e.g. Heuer, Blumenthal, Douglass, and Weinblatt, 1999) that show an important role for deservingness, independent of respectful treatment, for judgments of procedural fairness.
Title: High Risk Sexual Behavior in Cocaine-Using Older Adults

Student Researcher & Presenter: Madeline Finkel
Mentor: Sumati Gupta

Abstract: Late adolescence and young adulthood have often been characterized as a time of experimentation with a range of risky behaviors, including substance use. In turn, substance use has been implicated in potentiating participation in high-risk sexual activity, e.g., lack of condom use. Existing research on these behaviors has focused on adolescents and young adults (no studies investigating the relationship of substance use to high-risk sexual behavior in older adults [M_Age = 50] appear in the literature), without yet exploring the potential link between cocaine use, in particular, and high-risk sexual behavior. The current study seeks to gain a more comprehensive understanding of this relationship, wherein risk is defined as the potential to contract sexually transmitted infections including HIV. The research encompasses both general and event-specific cocaine use and investigates whether self-report and task-based measures of impulsivity influence the link between cocaine use and high-risk sexual behavior. Starting at the level of identifying individual traits that determine type of contact with infected or infectious individuals, this endeavor’s ultimate goal is to build a clinical picture that also incorporates background seroprevalence in combination with structural determinants, including those physical, social, cultural, organization, community, economic, legal or policy factors that impede or facilitate efforts to avoid disease transmission. Preliminary data analysis lends evidence towards a negative correlation of moderate effect size between sexual risk and general cocaine use scores, revealing an inverse relationship between sexual risk and general cocaine use habits. Further, positive correlation of moderate effect size was found between sexual risk and impulsivity scores, indicating a direct relationship between sexual risk and impulsivity traits. Ongoing data collection will continue over the coming year at New York State Psychiatric Institute’s Substance Use Research Center to obtain a sample size sufficient for a regression analysis, which will ultimately determine directionality within these correlations as well whether impulsivity acts as a mediator of the relationship between cocaine use and sexual risk.
Title: Playing Alone or Playing Together: What Matters to Parents About Children's Play

Student Researchers: Hannah Dunn, Bryn Seltzer, Clara Choi, Zofia Trujillo

Presenter: Hannah Dunn

Mentor: Tovah Klein

Abstract: Early attachment relationships are at the core of our emotional psyche and social relationships from toddlerhood to adulthood (Lieberman, 1991; Sroufe, 2005; Sroufe & Waters, 1977). Through solo and interactive play with parents and peers, the child builds from and explores the attachment relationship, and their sense of self (Gowen, 1995; Singer & Singer, 2005). However, little research exists examining how parents view solo and interactive play. In this study, researchers analyzed transcripts from 40 interviews of parents from the Barnard Toddler Center in an effort to understand parental views on the influences of solo and interactive play on their child’s development. Through a qualitative analysis of parental responses, eight recurrent themes emerged describing the emotional, cognitive, and social benefits of solo and interactive play, with both parents and peers. The kinds of play parents view as beneficial has a strong influence on the kinds of activities in which a child engages, and ultimately, impacts early learning experiences (Fisher 2008). The present study, therefore, allows researchers to move towards a more comprehensive understanding of parent-child, as well as peer-to-peer play interactions, and the central role of the primary attachment relationship in early development.
Abstract: The activation of the hypothalamic-pituitary-adrenal axis in response to stress, and the subsequent release of glucocorticoids from the adrenal glands, results in the mobilization of energy. This adaptive process enables an organism to cope with the stressor. However, chronic exposure to the glucocorticoids in times of prolonged stress can promote maladaptive behavioral and physiological outcomes, including changes in feeding behavior, weight gain, and metabolism. Mouse models have proven useful in helping us understand the mechanistic links between stress-related hormones and metabolic dysfunctions. One recognized model noninvasively exposes mice to chronic corticosterone (CORT) via their drinking water, which results in a phenotype resembling the metabolic syndrome, including marked weight gain, hyperleptinemia, and hyperinsulinemia. Unfortunately, these previous studies have only investigated the effects of chronic CORT exposure in adult males. However, given the differences in metabolic function between males and females and the alarming increase in adolescent obesity rates, the current study examined the somatic and metabolic effects of chronic oral CORT treatment in adolescent and adult male and female mice. Based on the different energetic demands of males and females, particularly before and after sexual maturation, we hypothesized that females would show greater CORT-induced changes than males and that these changes would be greater in adolescent animals compared to adults. To examine these hypotheses, we exposed male and female C57/BL6 mice to 0, 25, or 100 mg/ml of CORT in their drinking water between 30-58 or 70-98 days of age (n=6-8 per age, sex, and dose). Animals were weighed regularly throughout the study and numerous somatic and metabolic measures were taken at the end of the experiment. We found that the adult males and adolescent and adult females treated with 100 mg/ml of CORT gained significantly more weight than their control- or 25 mg/ml-treated counterparts. Moreover, in support of our hypotheses, we found that while adult males treated with the 100 mg/ml dose gained 17.4% more body weight than controls, adolescent and adult females gained 31.7% and 29%, respectively, more body weight than controls. These increases in body weight were paralleled by increases in their white adipose tissue (WAT), indicating the weight gain was in part driven by their increased adiposity. Notably, the adolescent males treated with either dose of CORT gained 1% less weight than their control counterparts, yet gained significantly more WAT than controls. Together these data indicate important sex- and age-dependent effects of chronic corticosterone exposure on somatic and metabolic variables. Additionally, these finding set the stage for further investigations into the mechanisms that may mediate these differential effects of glucocorticoids on metabolic dysfunction.
Title: Spatial Depictions and Event Recall in Toddlerhood

Student Researcher: Nicky Bernstein, Maddie Molot

Presenter: Nicky Bernstein

Mentor: Koleen McCrink

Abstract: Individuals who read and write from left-to-right show a preference to associate small numbers with the left side of space and large numbers with the right side of space. This left-to-right spatial organization extends beyond numbers wherein Westernized adults and children also organize non-ordinal sequences, events and narratives from left-to-right. Moreover, in Westernized cultures parents explicitly point and direct their infant’s attention from left-to-right when reading books with their child, and even when viewing non-ordinal pictures like an image of an animal or a basket of apples. Previous studies have demonstrated that children as young as 5 also spatially represent temporal and routine events in a left-to-right direction. Because parents readily orient their infant’s attention from left-to-right and because young children spontaneously impose left-to-right spatial structuring of events, the current study was designed to identify whether or not toddlers also show a preference for a left-to-right structuring of narrated events. Through a play-based task, 2- and 3-year-old toddlers were told a story about two farmers and the daily activities they did on their farm. One farmer began in the leftmost corner of the farm and performed his daily chores of collecting eggs from his chickens, brushing the manes of his horses and ending the day by playing with his dogs, which were located in the bottom right corner of the farm. Thus, throughout his day the farmer physically moved from left-to-right across the farm before going home for his nap. The other farmer performed her daily chores in a right-to-left manner, interacting with different animals across the same farm. Furthermore, for 3-year-olds there was an additional spatial structuring variable of linearity included: one farmer moved linearly across the farm and the other farmer moved non-linearly in a zigzagged pattern. As expected, 2-year-olds had more trouble recalling what the farmer did if she had moved from right-to-left on the farm as opposed to from left-to-right. For the 3-year-olds, linear material was equally recalled across both directions, left-to-right and right-to-left. Interestingly, the demonstration of a zigzagged path only hampered girls’, and not boys’, ability to recall narrated events. These findings show that even young toddlers prefer to receive and recall information in a culturally salient, linear fashion and provide further support for directing a toddler’s attention from left-to-right during instances of narration.
Title: Mapping Cells and their Connections in Networks of the Brain Master Clock

Student Researchers: Erica Mezias, Malini Riddle,

Additional Contributors: Joe LeSauter, Duncan Foley

Presenters: Erica Mezias, Malini Riddle

Mentor: Rae Silver

Abstract: Understanding the neural networks associated with specific brain functions is a challenge. The brain’s master clock, located in the suprachiasmatic nucleus (SCN), and made up of ~20,000 “clock cells”, presents an ideal system for exploring the relationship of cellular/molecular events to inter-connections among cells, and how these networks sustain the body’s daily rhythms. At the intracellular level, rhythmicity is produced by feedback loops involving daily rhythms in expression of “clock” genes and associated proteins. To determine whether all SCN cells are identical or unique in their intracellular/molecular clocks, we designed programs to assess protein expression levels over days, over time of day, and in location of individual cells within the nucleus, using Mathematica. Our novel approach to analyzing neural networks has yielded evidence of regional specialization in clock protein expression. The results point to cellular specialization of individual clock cells as a basis for information encoding in SCN networks.
Title: Experience and Empathy: How Individuals with Special Needs Help Camp Counselors

Student Researcher & Presenter: Sarah C. Immerman

Mentor: Lisa Son

Abstract: Most of the research investigating cognitive processes within special needs populations focuses on those individuals themselves or those close to them such as family members. In the current research, we shift the focus to caregivers working with individuals with special needs. Specifically, we are interested in how levels of empathy in the caregiver are impacted by the experience of intensively working with individuals with a range of disabilities. Counselors working with those with developmental, physical, and intellectual disabilities attending an overnight camp over the course of 7 weeks were surveyed. At the start of the camp period, the counselors were given a pre-test, which included the Interpersonal Reactivity Index (IRI) and the Empathy Quotient (EQ), both measuring empathy broadly. At the end of camp, a post-test was administered. The results showed several intriguing and complex patterns, including an unexpected interaction between self-reported patience and levels of personal distress.
Title: Pubertal- and Sex-Dependent Changes in the Hormonal Concentration of the Pituitary and Adrenal Glands

Student Researcher & Presenter: Ravenna Patel

Mentor: Russell Romeo

Abstract: Studies have indicated that adolescent exposure to stress is a potent environmental factor that contributes to the onset of psychological and physiological disorders in adulthood. However, the mechanisms by which stress mediates these dysfunctions are not well understood. Periadolescent animals display greater stress-induced hypothalamic-pituitary-adrenal (HPA) axis responses than adults, which may contribute to these vulnerabilities. Specifically, adrenocorticotropin hormone (ACTH) and corticosterone (CORT) responses remain elevated for twice as long in prepubertal compared to adult animals. The factors that contribute to these pubertal differences in stress reactivity remain unclear. As developmental changes in the hormonal content of the pituitary and adrenal glands could play a role in these pubertal shifts in stress-induced hormonal output, we tested the hypothesis that male and female rats have higher ACTH and CORT concentrations in the pituitary and adrenal glands, respectively, prior to puberty. Thus, in the current experiment we measured plasma and glandular ACTH and CORT content in prepubertal (30 days of age) and adult (70 days of age) male and female rats under baseline conditions (n=6 per age and sex). We found that despite similar circulating levels of plasma ACTH in all groups, prepubertal animals had greater ACTH concentrations (pg/mg protein) in the pituitary gland compared to the adults, independent of sex. Similarly, for CORT we found no differences in circulating plasma levels of CORT, but prepubertal animals had greater adrenal CORT concentrations (ng/mg protein) compared to adults. Moreover, we found that adult males had the lowest concentration of adrenal CORT, indicating both an effect of age and sex on adrenal CORT concentrations. Thus, our data support the hypothesis that the greater stress-induced hormonal output prior to puberty is accompanied by greater hormonal concentrations of ACTH and CORT in the pituitary and adrenals glands, respectively, in prepubertal animals. We are currently investigating whether there are pubertal- and sex-dependent differences in the pathways responsible for synthesizing these hormones and whether their regulation is differentially affected by stress. Importantly, studying the pubertal maturation of pituitary and adrenal function will not only contribute to our basic understanding of how adolescence affects the functioning of this key endocrine axis, but may also shed light on the developmental vulnerabilities associated with puberty.
**Title:** Media’s Effect on Body Image and Socio-Cultural Attitudes Towards Appearance

**Student Researcher & Presenter:** Tiffany Kontoyiannis

**Mentor:** Sumati Gupta

**Abstract:** Media images impact females’ perceptions of body image and influences both their concepts of body type norms, which can potentially lead to unhealthy eating behaviors and eating disorders (Borzekowski et al., 2011; Harrison, 2006). In order to evaluate how media effects body image, one can look at socio-cultural attitudes towards appearance, which includes an individual’s internalization of the body “norms,” awareness of their own body image and the pressure they feel to comply to the body type that media projects (Thompson, et al., 2003). The present study tested the hypothesis that females’ views on socio-cultural attitudes towards appearance is negatively influenced when primed with physically fit models. This study utilized a 2 (image of physically fit models vs. image of average female body type models) x 1 (female participants) between subject’s design. 138 female participants ranging from ages 18-26 (M= 22.55, SD=.86) participated in this study. After priming participants with an image of the models or the control variable, participants were asked to take the EAT questionnaire and socio-cultural attitudes towards appearance questionnaire (SATAQ). The results of the EAT and SATAQ subscales were also analyzed in a one-way between subject’s ANOVA. The results failed to support the hypothesis. The one-way between subject’s ANOVA indicated that the SATAQ scores and EAT scores were not significant. Based on this study's findings, future studies can further explore how media influences female body image.
Title: The Effect of Extramusical Information on Emotions Evoked by Music

Student Researcher & Presenter: Alice May

Mentor: Robert Remez

Abstract: Musical form and language alike create impressions of emotional valence in a listener. What happens when music and language are presented simultaneously to a listener? Recent research implies that narratives presented concurrently with musical samples can influence the listener’s perceived emotional connotation of the music, suggesting that contextual information can enhance the emotional effects of music. In this study, normal-hearing participants listened to 35 s clips of instrumental music taken from soundtracks, pop and classical music over a range of emotions. A separate group of English speakers read brief, emotionally-toned narratives produced for this experiment. A third group listened to the music while reading narratives of matching emotional connotation, and a fourth group listened to the music while reading narratives of differing emotion connotation. All samples were verified as expressing a specific emotional tone, and were selected based on the average emotional rating attached to each sample from a pilot study. In each condition, the emotional connotation was measured directly using a self-report method through a seven-point Likert scale. Analysis compared self-reported emotional rating to measure the impact of narratives on music for a range of emotions. Implications for an account of musical emotion will be discussed.
Title: Spatial Structuring: The Benefit of Linear Sequences

Student Researchers: Emily Playfair, Hannah Dunn

Presenter: Emily Playfair

Mentor: Koleen McCrink

Abstract: Due to predispositions in neurological architecture and to culture-specific experiences, individuals linearly organize ordered sequences along a spatial continuum from smallest to largest, first to last and beginning to end. These asymmetrical spatial biases are present as early as infancy and are either strengthened in nature across the lifespan or remodeled to conform to cultural frameworks as individuals adapt to their surroundings. For example, adults and children in Westernized cultures implement and extend left-to-right spatial-ordinal biases when conceptualizing non-numerical information such as temporal events in a day; horizontally positioning breakfast on the left side of space, lunch in the middle and dinner somewhere to the right. However, Israeli speakers organize the same temporal events from right-to-left in accordance with their written language. These spatial-ordinal associations enable individuals to better conceptualize actions and events into meaningful representations that can be more readily encoded and later recalled. But how might linear presentation of instruction facilitate a child’s accurate encoding and replication of a learned novel task? To investigate the impact of directionally rich instruction, 4- and 5-year-old children were taught how to construct three different electrical circuits one proceeding from left-to-right, one from right-to-left and one non-linearly. Because of left-to-right spatial-ordinal biases, children should show the greatest learning advantage in the left-to-right circuit construction trials. Children did more accurately recall sequence and order of construction (e.g., “when” information) in the left-to-right condition. However, contrary to initial predictions, children more accurately replicated spatial content and location (“what” and “where”) in the right-to-left condition. These findings further highlight the preferred bias to encode and recall ordinal information from left-to-right, but shed new light on potential pedagogical implications of modeling spatial construction tasks from right-to-left.
Abstract: We are living in a “Digital Age,” where technology has become exponentially more pervasive. This digital world is not exclusive to adults, as toddlers and young children are exposed to and have access to many forms of technology. Parents may become faced with dilemmas about how to healthily incorporate technology and “screen time” into their toddlers’ lives. There has been research and literature that has indicated the developmental benefits of traditional forms of play—pretend play, exploring outdoors, working on puzzles, and arts and crafts. There has been less research and understanding, however, on the developmental impact of technology. Without concrete empirical findings or extensive literature, parents often rely on their own personal opinions to make decisions about how to best regulate technology within their children’s lives. Therefore, the present study investigated what parents see as the benefits of play in contrast with their views of the benefits and disadvantages of incorporating technology and screen time into their children’s play and development. The participants were the parents (mothers and fathers) of 32 children enrolled in a year-long program at the Barnard Center for Toddler Development. Participants completed a 34-item, online questionnaire after providing informed consent. Qualitative coding revealed that parents described emotional, social, cognitive and physical benefits of play. On the other hand, parental descriptions of play involving technology included more limited benefits and a range of emotional, social, cognitive, and physical disadvantages. Gaining insight into parents’ viewpoints on this issue can both contribute to our understanding of toddler development within the context of a digital world and can inform future studies. Comparing parents’ opinions of technology with their opinions of traditional forms of play sheds light on the reasons behind parental choices about their toddlers’ use of technology.
Title: Network Organization of the Mouse Brain Clock and the Role of the Peptidergic Timekeeper Vasoactive Intestinal Polypeptide

Student Researchers: Shruti Varadarajan, Rashi Jain, Mary Tajiri, Qanetha Ahmed

Additional Contributor: Joseph LeSauter

Presenter: Shruti Varadarajan

Mentor: Rae Silver

Abstract: The suprachiasmatic nucleus (SCN) is a cluster of neurons in the anterior hypothalamus of the brain, which serves as a master clock in control of the 24-hour cycle of the body known as the circadian rhythm. A network of many neuropeptides, some of which have been well studied, regulates this rhythm. Vasoactive Intestinal Polypeptide (VIP), a core neuropeptide, is known to synchronize the cellular clocks that make up the SCN. A second neuropeptide Gastrin Releasing Peptide can also synchronize these clocks, but only acutely. In the absence of signals from VIP, GRP cannot sustain the synchrony for a longer term. Thus, VIP is a critical neuropeptide of the SCN necessary for co-ordination among these circadian clocks known as oscillators. This study aimed at comparing peptidergic connections and their expression in wildtype and VIP knock out (KO) mouse SCN to understand how cells communicate with each other and the effects of the absence of VIP in the SCN. Using double and triple label immunocytochemistry the connections between the following peptidergic cells were studied: Gastrin Releasing Peptide (GRP), CalRetenin (CALR) and met-enkephalin (ENK) and Arginine Vasopressin (AVP, ongoing). The results show that in WT mice more than 70% of CALR cells receive ≥ 3 contact fibers from ENK and GRP while their reciprocal connections were lesser. In VIP KO mice, the connections between GRP or ENK onto CALR-containing cells showed no detectable alteration in comparison to the corresponding connections in wildtype mice. In addition, a surprising finding indicates that AVP expression is significantly reduced in the SCN of VIP KO mice, but not in another region containing AVP cells – namely the paraventricular nucleus. In conclusion, a high percent of peptide cells residing in the shell of the SCN appear to receive ≥ 3 appositions from fibers of cells that reside in the SCN core in wildtype mice while no significant changes have been noted in mice lacking VIP. However, the connection from VIP-containing cells is critical for normal SCN vasopressin expression. These findings establish VIP as a key coordinator indeed of peptidergic expression of the cellular circuitry underlying the circadian rhythm in the SCN.
Title: Human-Centered Design for Food Logging in Eating Disorders

Student Researcher & Presenter: Amrita Doshi

Mentor: Sumati Gupta

Abstract: Behavioral Intervention Technologies, which apply behavioral and psychological strategies through technology, have been increasingly used for eating disorder management for activities such as self-monitoring, food journaling, and meal tracking. Using human-centered design principles, this study focuses on the user experience of food journaling or meal tracking interfaces in mobile applications. The methods were developed to provide research about language, color and visual design, users’ daily behavioral patterns, and motivations aimed at decreasing cognitive load and improving adherence. Participants were eight college students or recent college graduates who had or currently have an eating disorder. They were given an anonymous, online survey which consisted of a qualitative questionnaire and card sorting exercise, and was followed by the EAT-26. The questionnaire revealed insights about participants’ previous experiences with food logging with or without digital applications, perceived challenges and benefits of food tracking, daily behaviors, daily eating patterns, and motivations for recovery. Through the card-sorting exercise, participants’ expressed preferences for visual design and language in digital interventions. Overall, a series of recommendations were made to improve the design of food logging screens in future eating disorder management intervention technologies. Some examples include increasing the speed of logging, providing notifications to users, digitally replacing the therapist-client relationship, focusing on self-reflection, using language that harbors positive associations, and designing a simple as well as customizable user interface.
Title: Social Contextual Conditions: How the Chilly Classroom Climate Still Affects Classroom Behaviors and Academic Success

Student Researcher & Presenter: Stephanie Weiner

Mentor: Sue Sacks

Abstract: A reexamination of behavioral dynamics in the classroom indicates the continued devaluation of women despite advancements in equality of education and society over the past several decades. A questionnaire was administered to students in two required first-year English college classes to assess individual motivation, academic success, oral participation, and overall attitude. One class included all cis-gendered female students (n=13), and the other class included both cis-gendered female and male students (n=11; 6 females and 5 males). Intrinsic motivation is theorized as a predictive factor of academic success, perhaps less so for women. Results indicate that this theory only remains true in classes that have a “chilly climate” due to subtle behaviors and the social contextual conditions that contribute to the devaluation of women in education.
Title: Pubertal Changes in the Number of Noradrenergic Neurons in the A2 Region of the Nucleus Tractus Solitarius in Male Rats: Implications for Pubertal Changes in Hormonal Stress Reactivity

Student Researcher & Presenter: Laurie Pham

Mentor: Russ Romeo

Abstract: Though adolescence is a time in development associated with many gains in neurobehavioral function, it is also a significant period of developmental vulnerability, marked by an increased risk of physiological and psychological disorders, such as anxiety, depression, drug abuse, and obesity. Recent human and animal studies indicate that pubertal exposure to stress is a particularly relevant environmental factor that contributes to these morbidities, yet the mechanisms through which stress mediates the increase in these dysfunctions is not understood. Notably, puberty is marked by significant changes in hormonal stress reactivity, which may contribute to these vulnerabilities. Studies have shown that periadolescent animals display greater stress-induced hypothalamic-pituitary-adrenal (HPA) axis responses than adults. Specifically, adrenocorticotropic hormone (ACTH) and corticosterone (CORT) responses remain elevated for twice as long in prepubertal compared to adult rats. Pubertal changes in hormonal stress reactivity are also paralleled by differential patterns of neuronal activation in the paraventricular nucleus of the hypothalamus (PVN), a critical integrator of information from limbic, hypothalamic, and brainstem regions that coordinates the HPA response. In particular, our previous work has shown greater levels of neural activation in the PVN in prepubertal compared to adult animals. Overall, these data suggest that the changes in stress reactivity observed in developing animals may in part reflect maturational changes in the excitatory afferents to the PVN. To test this possibility, we examined potential pubertal-related changes in the number of noradrenergic neurons in the nucleus tractus solitarius (NTS), the major noradrenergic excitatory afferent to the PVN. Specifically, we measured the number of neurons containing the marker of noradrenergic synthesis, dopamine-b-hydroxylase (DbH), in the A2 region of the NTS in prepubertal (30 days of age) and adult (70 days of age) male rats (n=5 per age). We found prepubertal animals had significantly more DbH-positive cells in the A2 region than adults, suggesting greater noradrenergic input to the PVN prior to puberty. We propose, therefore, that the greater hormonal stress reactivity noted in prepubertal compared adult animals may in part be mediated by pubertal changes in the excitatory noradrenergic input to the PVN. Future studies will need to further parse out the involvement of brain areas outside of the PVN to these age-related changes in HPA function and whether these changes contribute to the heightened vulnerability to stressors often observed during adolescence.