

# DANIEL HUMMER

DEPARTMENT OF PSYCHOLOGY, MOREHOUSE COLLEGE  
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## EDUCATION

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<b>PH.D.</b>	<b>BIOPSYCHOLOGY</b>	University of Michigan, Ann Arbor, MI	2006
		Thesis: <i>Development and Sexual Differentiation of the Circadian System of Octodon Degus</i> Advisor: Dr. Theresa Lee	
<b>B.A.</b>	<b>PSYCHOLOGY</b>	Greenville College, Greenville, IL	1997

## PROFESSIONAL EXPERIENCE

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<b>ASSISTANT PROFESSOR</b>	Morehouse College, Atlanta, GA Department of Psychology	2008-Present
<b>POST-DOCTORAL ASSOCIATE</b>	Georgia State University Department of Biology Mentor: Dr. Elliott Albers	2006-2008
<b>ASSOCIATE RESEARCH ANALYST</b>	Maritz Research, Inc., Maumee, OH Knowledge Integration Team	2000-2001

## RESEARCH EXPERIENCE

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<b>PRIMARY INVESTIGATOR</b>	Department of Psychology Morehouse College, Atlanta, GA	2008-Present
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*Neurobiology of Circadian Entrainment* – I combine *in vivo* pharmacology, *in situ* hybridization, and *in vitro* reporter gene tools to investigate the neurobiological mechanisms through which the endogenous circadian pacemaker entrains to light. I am currently testing the novel hypothesis that sustained neurochemical signaling within the suprachiasmatic nucleus (SCN) is critically important for the ability of light to phase shift the circadian pacemaker. This research will help us better understand the fundamental process by which mammalian species synchronize or *entrain* their biological rhythms to the light-dark cycle.

**POST-DOCTORAL ASSOCIATE** Mentor: Dr. Elliott Albers 2006-2008  
 Department of Biology  
 Georgia State University, Atlanta, GA

*Neurobiology of Circadian Entrainment* – I used *in vivo* pharmacology techniques to examine the role of glutamate and vasoactive intestinal polypeptide (VIP) signaling within the SCN on circadian phase resetting. I discovered that the NR2B subunit of the NMDA receptor plays an important role in light-induced phase shifts of the circadian pacemaker. Although my investigation into VIP signaling was inconclusive, this effort played a central role in shaping my current research aims regarding sustained neurochemical signaling in the SCN.

**GRADUATE RESEARCH ASSISTANT** Advisor: Dr. Theresa Lee 2001-2006  
 Department of Psychology  
 University of Michigan, Ann Arbor, MI

*Development and Sexual Differentiation of Brain and Behavior* - I investigated the neuroendocrine mechanisms mediating adolescent changes in, and sexual differentiation of, the circadian system. I combined behavioral, endocrine, neuroanatomical, and molecular approaches to investigate the sex difference in the free-running circadian period of *Octodon degus*.

**ASSOCIATE RESEARCH ANALYST** Knowledge Integration Team 2000-2001  
 Maritz Research, Inc., Maumee, OH

*Multivariate Statistical Analyses* – I used SAS<sup>®</sup> to conduct multivariate analyses of nationwide customer satisfaction data and identify areas in need of improvement. I advised automotive clients on strategies to improve dealer and brand performance via written reports, presentations, and personal consultation.

**GRADUATE RESEARCH ASSISTANT** Advisor: Dr. Jill Becker 1997-2000  
 Department of Psychology  
 University of Michigan, Ann Arbor, MI

*Behavioral Neuroendocrinology* – I investigated the effect of gonadal hormones both on amphetamine-stimulated dopamine release in the striatum and behavioral sensitization to cocaine. I combined excitotoxic lesions and microdialysis with HPLC to determine that estrogen acts directly on striatal neurons to modulate nigrostriatal dopamine activity. I conducted psychopharmacological experiments to determine that estrogen plays a critical role in a sex difference in the initial behavioral response to cocaine as well as behavioral sensitization to repeated cocaine administration.

**UNDERGRADUATE RESEARCH ASSISTANT** Advisor: Dr. Philipp Kraemer 1996  
 Department of Psychology  
 University of Kentucky, Lexington, KY

**UNDERGRADUATE RESEARCH ASSISTANT** Advisor: Dr. Robert Almli 1996  
 School of Medicine  
 Washington University, St Louis, MO

## SKILLS

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**BEHAVIORAL ANALYSES** (e.g., activity rhythms, resident-intruder paradigm, mating behavior, conditioned place preference, operant conditioning, Morris water maze)

**BIOLUMINESCENCE** (slice culture)

**GONADECTOMY**

**HPLC**

**IMMUNOHISTOCHEMISTRY**

**IN SITU HYBRIDIZATION**

**IN VIVO MICRODIALYSIS**

**IN VIVO MICROINJECTIONS**

**MULTIVARIATE STATISTICAL ANALYSES** (SAS, SPSS, STATVIEW)

**RIA**

**PCR**

**STEREOTAXIC SURGERY**

## SERVICE EXPERIENCE

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<b>COMMITTEE MEMBER</b>	Education Committee Division of Science and Mathematics Morehouse College	2013-present
<b>COMMITTEE MEMBER CHAIR</b> (2013-present) <b>SECRETARY</b> (2012-2013)	Committee on Faculty Research Morehouse College	2011-present
<b>COMMITTEE MEMBER</b>	Ad-hoc Departmental Committees (e.g., search committees, strategic planning, student writing, departmental policies (academic honesty, course repetition, etc.)	2009-present
<b>COMMITTEE MEMBER AND CHAIR</b>	Senior Thesis Committee (Biology) Tony Larkin “The Role of Sustained GABA Neuro- transmission in Circadian Entrainment”	2013
<b>AD-HOC REVIEWER</b>	Brains, Behavior, and Evolution Hormones and Behavior Physiology and Behavior Psychopharmacology	2009-present

<b>AD-HOC REVIEWER (cont.)</b>	Wiley-Blackwell (publisher)	
	National Science Foundation	
<b>FACULTY ADVISOR</b>	Psychology Student Association Morehouse College	2008-present
<b>EDUCATIONAL OUTREACH</b>	Guest Speaker: <i>Mystery Diagnosis – What Head Injuries Teach Us About the Brain</i> Woodland Middle School, East Point, GA	2009, 2011
	Coordinator, Student Outreach Opportunity Center for the Visually Impaired, Atlanta, GA	2009-2010
	Science Advisory Team and Volunteer BrainsRule! Neuroscience Exposition, Zoo Atlanta	2007-2008
	Guest Speaker: <i>The Functional Brain</i> Booker T. Washington High School, Atlanta, GA	2008
	Guest Speaker: <i>Circadian Rhythms, Sleep, and Sobriety</i> Martin Luther King, Jr. High School, Lithonia, GA	2007
	Guest Speaker: <i>Introduction to Physiological Psychology</i> Saline High School, Saline, MI	2005
<b>VOLUNTEER JUDGE</b>	Annual SAEOPP McNair Research Conference Atlanta, GA	2012
	Southeast Neuroscience Conference St. Augustine, FL	2011
	Dr. John H. Hopps, Jr. Defense Research Training Symposium Morehouse College	2009-present
	Frederick E. Mapp Symposium Morehouse College	2009-2010
<b>LIAISON (GSU CAMPUS)</b>	Emerging Leaders Network Georgia Bio, Atlanta, GA	2008
<b>COORDINATOR</b>	Neuroendocrinology Journal Club Georgia State University, Atlanta, GA	2006
<b>DEPARTMENTAL ASSOCIATE</b>	Department of Psychology University of Michigan, Ann Arbor, MI	2003-2004

<b>STUDENT REPRESENTATIVE TO THE GRADUATE COMMITTEE</b>	Department of Psychology University of Michigan, Ann Arbor, MI	2003-2004
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<b>STUDENT REPRESENTATIVE TO THE GRADUATE COUNCIL</b>	Department of Psychology University of Michigan, Ann Arbor, MI	2001-2002
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## TEACHING EXPERIENCE

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<b>FULL-TIME FACULTY MEMBER</b>	Morehouse College, Atlanta, GA <i>Mind &amp; Brain (BIO123/PSY123)</i> <i>Neurobiology (BIO317)</i> <i>Intro to Psychology as a Social Science (PSY101)</i> <i>Intro to Psychology as a Natural Science (PSY102)</i> <i>Learning &amp; Memory Lab (PSY372L)</i> <i>Psychobiology (PSY460)</i> <i>Psychobiology Lab (PSY461)</i>	2008-present
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<b>GRADUATE STUDENT INSTRUCTOR</b>	University of Michigan, Ann Arbor, MI Department of Psychology <i>Introduction to Biopsychology</i> <i>Research Methods</i>	1999-2000 2003-2004
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<b>ACADEMIC TUTOR</b>	Academic Enrichment Center Greenville College, Greenville, IL	1995-1997
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<b>UNDERGRADUATE RESEARCH MENTOR</b>	Behavioral Neuroscience Laboratory Morehouse College, Atlanta, GA	2008-present
	Department of Biology Georgia State University, Atlanta, GA	2006-2008
	<i>Undergraduate Research Opportunity Program</i> Department of Psychology University of Michigan, Ann Arbor, MI	2001-2006

## HONORS AND AWARDS

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<b>TRAVEL AWARD</b>	Southeast Neuroscience Conference, Columbia, SC.	2013
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<b>TRAVEL AWARD</b>	Annual Meeting for the Society for Research on Biological Rhythms, Whistler, B.C.	2004
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<b>PREDOCTORAL RESEARCH FELLOWSHIP</b>	Reproductive Sciences Program University of Michigan, Ann Arbor, MI	2004
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<b>TRAVEL AWARD</b>	Conference on Neural Control of Behavior University of California at Los Angeles	2004
<b>DISSERTATION THESIS GRANT</b>	Department of Psychology University of Michigan, Ann Arbor, MI	2003
<b>PREDOCTORAL RESEARCH FELLOWSHIP</b>	National Science Foundation	1998
<b>MAGNA CUM LAUDE</b>	Greenville College, Greenville, IL	1997
<b>OUTSTANDING SENIOR STUDENT</b>	Psychology Department Greenville College, Greenville, IL	1997

## MEMBERSHIPS IN PROFESSIONAL SOCIETIES

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Center for Behavioral Neuroscience  
Society for Neuroscience

## FUNDING

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**PI**, UNCF Henry C. McBay Research Grant, “The Role of Sustained Changes in SCN Neural Activity in Circadian Entrainment,” 9/1/13-8/31/14, Total Award = \$12,000.

**PI**, Morehouse College Junior Faculty Course Release Time Grant, “Sustained GABA and Clock Gene Expression in the SCN: An Experimental Research Project Promoting Undergraduate Neuroscience Research,” Fall 2012.

**PI**, National Science Foundation Research Initiation Grant (IOS-1022050), “RIG: Role of sustained GABA in light-induced phase shifts of the circadian pacemaker,” 2010, Total Award = \$199,957.

**Co-PI**, Center for Behavioral Neuroscience Venture Grant (ELO20-84), “Molecular mechanisms mediating social modulation of circadian rhythmicity,” 2008, Total Award = \$27,823.

## PUBLICATIONS

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**Hummer, D.L.**, Mahoney, M., and Lee, T.M. (*in prep*). Postnatal development of gonadal hormone receptor expression in the suprachiasmatic nucleus in diurnal, *Octodon degus*.

**Hummer, D.L.**, Ehlen, J.C., Walker, C.A., Pamplin, J.R., Larkin, T.E., and Albers, H.E. (*in prep*). Sustained activation of GABA<sub>A</sub> receptors in the SCN is necessary and sufficient for light-induced phase delays of the circadian clock.

**Hummer, D.L.**, Peckham, E.M., and Lee, T.M. (2012). Estradiol acts during a post-pubertal sensitive period to shorten free-running circadian period in male *Octodon degus*. *European Journal of Neuroscience*, *36*, 3051-3058.

Ehlen, J.C., **Hummer, D.L.**, Paul, K.N., and Albers, H.E. (2010). GABA involvement in the circadian regulation of sleep. In J.M. Monti et al. (Eds.). *GABA and Sleep* (pp303-324). Basel, CH: Springer.

Vosko, A.M., Hagenauer, M.H., **Hummer, D.L.**, and Lee, T.M. (2009). Period gene expression in the diurnal degu (*Octodon degus*) differs from the nocturnal laboratory rat (*Rattus norvegicus*). *American Journal of Physiology*, *296*(2), R353-61.

Wang, L.M., Schroeder, A., Loh, D., Smith, D., Lin, K., Han, J.H., Michel, S., **Hummer, D.L.**, Ehlen, J.C., Albers, H.E., and Colwell, C.S. (2008). Role for the NR2B subunit of the N-methyl-D-aspartate receptor in mediating light input to the circadian system. *European Journal of Neuroscience*, *27*, 1771-1779.

**Hummer, D.L.**, Jechura, T.J., Mahoney, M.M. & Lee, T.M. (2007). Gonadal hormone effects on entrained and free-running circadian activity rhythms in the developing diurnal rodent *Octodon degus*. *American Journal of Physiology*, *292*, R586-R597.

Lee, T.M., **Hummer, D.L.**, Jechura, T.J., and Mahoney, M.M. (2004). Pubertal development of sex differences in circadian function: An animal model. *Annals of the New York Academy of Sciences*, *1021*, 262-275.

Becker, J.B., Molenda, H., and **Hummer, D.L.** (2001). Gender differences in the behavioral responses to cocaine and amphetamine – Implications for mechanisms mediating gender differences in drug abuse. *Annals of the New York Academy of Sciences*, *937*, 172-187.

## MEETING ABSTRACTS AND PRESENTATIONS

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**Hummer, D.L.** (2013). The good, the bad, and the ugly: Life at a 4-year liberal arts institution. Invited panelist – Professional development workshop at the *Annual Meeting of the Society for Behavioral Neuroscience* (Atlanta, GA)

**Hummer, D.L.** (2013). The role of sustained events within the SCN in photic entrainment. Invited platform presentation at the *4<sup>th</sup> Annual Southeast Neuroscience Consortium (SENC) Meeting* (Columbia, SC).

**Hummer, D.L.** (2012). Sustained signals and circadian timekeeping. Invited Lecture – *Center for the Integrative Study of Animal Behavior, Indiana University* (Bloomington, IN).

**Hummer, D.L.** (2011). Sustained activation of GABA<sub>A</sub> receptors in the SCN is necessary and sufficient to produce light-induced phase delays of the circadian clock. Oral presentation at the *Annual Meeting of the Society for Neuroscience* (Washington D.C.)

**Hummer, D.L.** (2011). Telling time with GABA: Sustained signaling and circadian entrainment. Invited Lecture – *Applied Physiology Department, Georgia Institute of Technology* (Atlanta, GA).

**Hummer, D.L.** (2011). GABA and circadian entrainment. Oral presentation at the *Division of Science and Mathematics Dinner Seminar Series* (Morehouse College, Atlanta, GA).

**Hummer, D.L.** (2008). Sex, drugs, and the circadian clock. Oral presentation at the *Biology Seminar Series* (Morehouse College, Atlanta, GA).

Hagenauer, M.H., **Hummer, D.L.** Sutton, B., and Lee, T.M. (2007). Sensitivity of the circadian clock to light changes during puberty in the nocturnal rat and the diurnal *Octodon Degus*. *Society for Neuroscience Meeting Abstracts, San Diego, Society for Neuroscience* ([http://www.sfn.org/am2007/index.cfm?pagename=call\\_for\\_abstracts](http://www.sfn.org/am2007/index.cfm?pagename=call_for_abstracts)).

**Hummer, D.L.** and Lee, T.M. (2006). Estradiol acts during a post-pubertal sensitive period to masculinize the free-running period of *Octodon degus*. Annual Meeting for the *Society for Behavioral Neuroendocrinology* (Pittsburgh, PA).

**Hummer, D.L.** (2006). Development and sexual differentiation of circadian period in *Octodon degus*. Oral presentation in the Research Seminar Series, *Reproductive Sciences Program, University of Michigan* (Ann Arbor, MI).

**Hummer, D.L.** and Lee, T.M. (2005). Post-pubertal sexual differentiation of the endogenous circadian pacemaker in *Octodon degus*. Anita Payne Lectureship and Poster Day (Ann Arbor, MI).

**Hummer, D.L.** and Lee, T.M. (2004). A change in gonadal hormone receptor expression in the SCN is related to a developmental change in tau. Oral presentation at the Biennial Meeting of the *Society for Research on Biological Rhythms* (Whistler, B.C.).

**Hummer, D.L.**, Bhatnagar, S., and Lee, T.M. (2003). A phase shift of the light cycle but not chronic restraint disrupts estrous cycles of rats. Annual Meeting for the *Society for Behavioral Neuroendocrinology* (Cincinnati, OH).

Jechura, T., Stimpson, C., **Hummer, D.**, and Lee, T. (2002). Role of gonadal hormones in the development of a sex difference in free-running circadian rhythms in *Octodon degus*. Biennial Meeting of the *Society for Research on Biological Rhythms* (Amelia Island, FL).

**Hummer, D.L.**, Mitchum, R.-D., Molenda, H.A., and Becker, J.B. (2000) Sex differences and influences of gonadal hormones on behavioral sensitization to cocaine in rats. *Society for Neuroscience Abstracts*, 26, 143.5.

**Hummer, D.L.** and Becker, J.B. (1999). Estrogen has different effects on amphetamine (AMPH)-induced striatal dopamine depending on rat strain. *Society for Neuroscience Abstracts*, 25, 951.

**Hummer, D.L.** (1999). Site of estrogen action in modulating amphetamine-stimulated dopamine release in striatum. Oral presentation at the Biopsychology Colloquium Series, Psychology Department, University of Michigan (Ann Arbor, MI).



**Hummer, D.L.** and Becker, J.B. (1998). Does estrogen act directly on intrinsic neurons to enhance striatal dopamine release in vivo? *Society for Neuroscience Abstracts*, 24, 1849.

Becker, J.B., Rudick, C.N., Jenkins, W.J., and **Hummer, D.L.** (1998). Dopamine in dialysate during pacing of sexual behavior: Stimulus or response? *Society for Neuroscience Abstracts*, 24, 356.

## STUDENT PRESENTATIONS

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Larkin, T.E., Dhanraj, D.R., and **Hummer, D.L.** (2013). Sustained activation of GABA-A receptors and NMDA receptors in the SCN produce similar phase-shifting effects at dusk but opposite phase-shifting effects at dawn. Poster presentation at the 8<sup>th</sup> *Annual Symposium for Young Neuroscientists & Professors of the Southeast (SYNAPSE)* (Columbia, SC).

Larkin, T.E., Pennyman, E.K., Delisser, P.D., Walker, C.A., Albers, H.E., and **Hummer, D.L.** (2012). Sustained GABA signaling in the SCN does not mimic the effect of light on the circadian clock at dawn. Poster presentation at the *Annual Meeting of the Society for Neuroscience* (New Orleans, L.A.).

Pennyman, E.K., Walker, C.A., Larkin, T.E., Delisser, P.D., and **Hummer, D.L.**, (2012). The effect of sustained GABA agonist administration during late subjective night on circadian phase. Oral presentation at the *SAEOPP McNair/SSS Scholars Research Conference* (Atlanta, GA).

Larkin, T.E., Walker, C.A., Delisser, P.D., and **Hummer, D.L.** (2012). Sustained activation of extra-synaptic GABA<sub>A</sub> receptors in the SCN does not underlie the ability of light to phase shift the circadian clock at dawn. Oral presentation at the 15<sup>th</sup> *Annual AUC Psychology Research Day* (Morehouse College, Atlanta, GA).

Larkin, T.E., Walker, C.A., Albers, H.E., and **Hummer, D.L.** (2012). Sustained GABA signaling several hours after light exposure is not necessary to produce light-like phase shifts. Poster presentation at the *Morehouse Innovation Expo 2012* (Morehouse College, Atlanta, GA).

Pennyman, E.K., **Hummer, D.L.**, Walker, C.A., Larkin, T.E., and Delisser, P.D. (2011). The effect of sustained GABA<sub>B</sub> agonist administration during late subjective night on circadian phase. Poster presentation at the *Annual Biomedical Research Conference for Minority Students* (St. Louis, MO).

Dhanraj, D., Pamplin, J.R., Ehlen, J.C., Albers, H.E., and **Hummer, D.L.** (2011). Sustained activation of GABA<sub>A</sub> receptors in the suprachiasmatic nucleus produces light-like phase shifts of the circadian clock. Poster presentation at the 14<sup>th</sup> *Annual AUC Psychology Research Day* (Morehouse College, Atlanta, GA).

Larkin, T.E., Walker, C.A., Pamplin, J.R., Dhanraj, D., Delisser, P.D., Ehlen, J.C., Albers, H.E., and **Hummer, D.L.** (2011). A sustained GABAergic signal is required for light to entrain the circadian clock. Poster presentation at the 2<sup>nd</sup> *Annual Southeast Neuroscience Consortium (SENC) Meeting* (St. Augustine, FL).

Walker, C.A., Pamplin, J.R., Ehlen, J.C., Albers, H.E., and **Hummer, D.L.** (2011). The effects of GABA in light induced phase shifts of circadian rhythms. Poster presentation at the 2<sup>nd</sup> *Annual Southeast Neuroscience Consortium (SENC) Meeting* (St. Augustine, FL).

Walker, C. and **Hummer, D.L.** (2010). GABA regulates light-induced phase shifts of the circadian clock. Oral presentation at the *Annual Biomedical Research Conference for Minority Students* (Charlotte, NC).

Carter, J. and **Hummer, D.L.** (2010). Developmental changes in the circadian rhythm in wheel running activity during adolescence in mice. Poster presentation at the *13<sup>th</sup> Annual AUC Psychology Research Day* (April 13, Clark Atlanta University).

Pamplin, J.R., Ehlen, J.C., Albers, H.E., and **Hummer, D.L.** (2010). The role of gamma-aminobutyric acid (GABA) in phase shifting the endogenous circadian clock. Poster presentation at *The 2<sup>nd</sup> Division of Science and Mathematics Interdisciplinary Conference* (April 6, Morehouse College).

## PROFESSIONAL REFERENCES

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### **Dr. Elliott Albers**

Professor, Departments of Biology and Psychology  
Director, Center for Behavioral Neuroscience  
Georgia State University  
P.O. Box 3966  
Atlanta, GA 30302-3966  
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