UCSF Office of Career & Professional Development

TEACHING PACKAGE II:
Academic format with a teaching institution emphasis.

Contains: Cover Letter
CV
Teaching Philosophy
Research Statement

Office of Career & Professional Development

Pablo Picasso
Fantastic College
Bethesda, MD 20817

February 25, 0000

Dear Dr. Picasso:

I am writing to apply for the one-year Visiting Assistant Professor position in the area of behavioral neuroscience. I am currently working towards a PhD. in Neuroscience with Dr. Benjamina Spock at the University of California, San Francisco (UCSF). Currently writing the third of five chapters in my thesis, I expect to complete my dissertation by July 0000. A year at Fantastic College will provide an unparalleled opportunity to develop my skills as a teacher and mentor.

As my curriculum vitae illustrate, I have pursued every available opportunity to teach. I have assisted in the development and instruction of many courses relevant to those outlined in the job announcement including *Introductory Neuroscience, Brain and Behavior, Human Behavioral Biology,* and *the Biological Basis of Behavior*. For my service as a teaching assistant in *Introductory Neuroscience,* my students selected me for the Long Teaching Award. Yet my crowning achievement has been the development and direction of an upper level psychology course at San Francisco State University. There, I attempted to bridge psychological theories of motivation with the underlying neurobiology for a diverse group of students, many of whom had not taken a biology course since high school. In the classroom, I have three priorities: interdisciplinary content, interactive teaching strategies, and inquiry-based learning. By the end of the course my students could intelligently discuss a topic of their own choosing from this interdisciplinary perspective. Several students said that this was the first time they had seen the relevance of neuroscience as applied to behavior. Moreover, I discovered that not only could I successfully direct a course, but that I simply adored the process.

The theme of interdisciplinary academic pursuits is pervasive not only in my teaching, but in my research as well. I am equally comfortable discussing ideas with neuroscientists, psychologists, and molecular biologists since my research on the neural circuits underlying drug addiction has broad applications beyond the standard techniques I employ. In particular, I am interested in the limbic brain areas that contribute to drug relapse and other motivated behaviors. My work is immediately engaging and accessible to those new to research, and I have directly supervised several such individuals including a high school teacher and a first year graduate student who is now continuing in her pursuit of addiction research.

Finally, I am dedicated to enriching the lives of students outside the classroom. Through student government and committee work, I have advocated for better housing, graduate education, and student advising. Through ten years of service in outdoor education, I helped many young people gain leadership skills and self-confidence. Perhaps most importantly, I am committed to improving scientific education. In partnership with primary school teachers, I led 2 different after school programs and developed hands-on activities for a third. Currently, I am enrolled in the *Strategies in Gender Equitable Teaching* course at the University of California, Berkeley Extension. The position at Fantastic College is particularly appealing since it provides an opportunity for me to draw young people into science through personalized interactions in the classroom and laboratory.

In this cover letter, Rembrandt designs his 3 central paragraphs to clearly get across his 3 main points:
(1) he has a great deal of teaching experience, and evidence that he is good at it. The paragraph includes reference to teaching awards, student comments, and foreshadows his teaching philosophy.
(2) his research interests are interdisciplinary and collaborative, and a good fit for undergraduate research.
(3) he is dedicated to improving student life as well as learning, through multiple examples of teaching and service in community as well as university settings.

When writing your own cover letter, think of the 2-4 main themes that you want to get across to the search committee. Your cover letter is like an abstract: it summarizes who you are, your strengths, and what motivates you… Basically, this is a hook to get them to read the rest of your application.
The letter, therefore, should be a quick read—no more than 1-1.5 pages long.

As exemplified in these 2 sentences, words like "crowning" and "adored" set the tone for this letter. Be careful that the tone you set is what you intend.

I have always envisioned my future self as a professor at a small liberal arts college. I celebrate the philosophy of a liberal arts education in everything I do. College should kickoff a lifetime of intellectual growth, not simply provide career training or mass instruction for 500 students packed into a lecture hall. Although my educational training has been centered at large institutions, I have consistently sought out the smaller, more intimate communities within them, and I am highly experienced as a facilitator in small group settings. I am thrilled to apply for this unique position because my mission perfectly matches that of Fantastic College: to encourage students to find their passions and to develop into independent thinkers and future world leaders.

I have enclosed my curriculum vitae, a statement of teaching interests, a statement of research interests, a letter of reference from Joan Sutherland (other letters have been sent directly from Benjimina Spock and Marie Curie), and a copy of the article I recently submitted to *Nature*. I would be happy to forward a full teaching portfolio, syllabi for past and proposed courses, or other additional materials at your convenience. I look forward to hearing from the committee and wish you the best of luck in selecting the ideal candidate.

Thank you for your consideration,

Rembrandt van Rijn
1234 Scientist Avenue
San Francisco, CA 94114
TEL: (415) 123-4567
FAX: (415) 765-4321
rvr@mail.edu

Rembrandt uses this paragraph to explicitly indicate the sincerity of his interest in being a faculty member at a liberal arts college.

By including a copy of the submitted article, Rembrandt can demonstrate that the article is indeed a significant scientific contribution, and not just a filler to make the CV look good.

Rembrandt van Rijn

1234 Scientist Avenue
San Francisco, CA 94114
(415) 476-1234 (W) (415) 123-4567 (Cell)
rvr@ucsf.edu

Education

September 0000 to Present — **University of California, San Francisco, CA**
Ph.D. in Neuroscience, expected in July 0000.

September 0000 to June 0000 — **University of California, Berkeley, CA**
MS, Neuroscience.

September 0000 to June 0000 — **Columbia University, NYC**
MA, Psychology.

September 0000 to June 0000 — **Columbia University, NYC**
BA in Biology. Graduated with Honors. GPA: 3.8.

University Teaching Experience

January 0000 to June 0000 — **Dept. of Psychology, University of San Francisco, San Francisco, CA**
Instructor for the upper division course, Self, with 150 students. Developed and directed a course investigating motivation and emotion from a psychological and physiological perspective. Lectured, recruited guest speakers, supervised one teaching assistant, advised students, wrote exams, and oversaw group project.

January 0000 to March 0000 — **Dept. of Physiology, University of California, San Francisco, CA**
Teaching Assistant for the first year pharmacy course, *Introductory Neuroscience*. Led discussion, laboratory, and review sessions to clarify basic neurobiological principles. Designed laboratory demonstrations to illustrate course concepts.

March 0000 to June 0000 — **Dept. of Psychiatry, University of California, San Francisco, CA**
Discussion Leader in the introductory psychiatry course, Brain and Behavior. Led discussion sessions integrating concepts in neuroscience and behavioral sciences.

March 0000 to June 0000 — **Dept. of Biology, Columbia University, NY**
Teaching Assistant for the upper division biology course, *Human Behavioral Biology.* Led two discussion sessions elucidating the contributions of ethology, genetics, endocrinology, and neuroscience to the understanding of human behavior.

June 0000 to September 0000 — **Dept. of Psychology, Columbia University, NY**
Assistant to the Chair of the Human Biology Department. Designed course materials for the undergraduate courses: *Brain and Behavior, Biological Basis of Behavior,* and *The Human Organism.* Materials for *Brain and Behavior* were newly designed and continue to be used by the department.

Community Teaching Experience

October 0000 to present — **Triad, San Francisco, CA**
Scientist in an innovative program to engage girls in scientific inquiry. Participation includes sponsoring a bimonthly science club for middle school girls and extensive training on teaching pedagogy and gender equity in the classroom.

Throughtout his CV, Rembrandt consistently lists dates on the left side, and separates them from content with a vertical line. This makes it very easy to skim the document for content, without being distracted by less important dates.

Often lab phone numbers don't allow the caller to leave a message. Here, the cell phone number allows this via voice mail.

Here, Rembrandt used bold to highlight the department and institution. The title of Rembrandt's positions (which imply his level of independence in each), or the title of the courses, are likely to be more important to the search committee. This being said, it is easy to find his position titles, as they are the first words in the description in every case. Consider using bold, italics, or underline to highlight them.

Rembrandt gave concise descriptions of what he did in each teaching experience. Where necessary (eg. Triad), he also briefly described what the associated program itself was.

Remember to write your name and page number on every page, either in a header or footer.

The title Rembrandt uses here is "Scientist". It may have been more useful to the search committee to use a descriptive title such as "Scientist Teaching Partner." Be aware of lingo familiar to you at UCSF but unfamiliar to others.

August 0000

Drug Abuse Research Teams, NIDA, Sacramento, CA
Summer instructor and scientific consultant for an innovative state-wide program that funds original drug abuse research projects at the high school level.

June 0000 to June 0000

Science and Health Education Partnership, San Francisco, CA
Scientist for the Links Program, a partnership between University researchers and public school teachers. Participated in 2 weeks of workshops on science education and curriculum development. Developed and implemented a science improvement plan for Aptos Middle School through monthly classroom visits.

August 0000 to August 0000

Fort Miley Adventure Ropes, San Francisco State University, CA
Leader on a challenge course for non-profit groups in the Bay Area, such as women's organizations, homeless shelters, and local YMCAs. Facilitated outdoor educational experiences with the goal of building self-esteem and community.

October 0000 to March 0000

Mission Science Workshop, City College, San Francisco, CA
Volunteer and scientific consultant at an after-school science workshop for elementary school girls. Developed hands-on science activities and exhibits.

September 0000 to June 0000

Challenge Learning Center, Mountain View, CA
Facilitator in an outdoor educational program for youth-at-risk. Trained high school students in leadership and team building skills, enabling them to staff challenge courses for their peers who are at risk for drug abuse or dropping out of school.

If you have teaching experience through SEP, indicate that you worked collaboratively with a science teacher (if you did so). This demonstrates to the search committee that you can work as a team member (and that you had mentorship through the experience).

Research Experience

June 0000 to present

Neuroscience Program, University of California, San Francisco, CA
Doctoral thesis research conducted with Dr. Benjamina Spock. Pioneered behavioral and electrophysiological experiments investigating the neural mechanisms underlying relapse to drug-seeking triggered by environmental cues. Resulted in 3 publications to be submitted to *The Journal of Neuroscience, Nature*, and *Psychopharmacology*.

June 0000 to present

The Wheeler Center for the Neurobiology of Addiction , San Francisco, CA
Member of a unique scientific community of clinicians and basic scientists trying to understand the neural underpinnings of drug abuse.

January 0000 to June 0000

Dept. of Biology, Columbia University, NY
Masters' thesis research conducted with Dr. Chinua Achebe. Investigated Sudden Infant Death Syndrome (SIDS) by studying the effect of environmental risk factors for SIDS on sleep development in neonatal rats.

March 0000 to June 0000

Dept. of Psychology, Columbia University, NY
Honors' thesis research conducted with Dr. Georgia O'Keeffe. Coordinated experiments analyzing the effects of stress on social behavior and on the morphology of GnRH releasing neurons in the African cichlid fish, *H. burtoni.*

For each experience, Rembrandt describes accomplishments in research—contributions to the field, and papers published. As a minimum, provide a brief description or title for each project.

Mentoring Experience

Mentoring is highly valued in many academic settings, and is a great section to include in a CV.

January 0000 to April 0000

Neuroscience Program, University of California, San Francisco, CA
Supervisor for Sandra Day O'Connor, a first year graduate student. Mentored Ms. O'Connor through a project that explored the role of dopamine in cue-induced relapse.

June 0000 to August 0000

University of California Students' Association, Oakland, CA
Vice Chair for a non-profit student organization that represents all 170,000 University of California students. Supervised the orgainization's six full time staff persons, including hiring, evaluation, disciplinary, and firing procedures.

This experience sounds more supervisory than mentoring.
It may be more appropriately placed under "University Service".

June 0000 to June 0000

Science and Health Education Partnership, San Francisco, CA
Mentored a middle school science teacher through an 8 week research project studying cues that trigger relapse to drug- and food-seeking. Our results were presented at the International Narcotics Research Conference in 0000.

August 0000 to February 0000

Academic Decathalon, School of the Arts, San Francisco, CA
Science coach for a high school academic decathalon team. Met with 5 students on a biweekly basis.

September 0000 to June 0000

Office of Residential Education, Columbia University, NY
Resident Assistant in a 280 resident dormitory. Established a system of student support and counseling in order to stimulate discourse and create a community.

University Service

March 0000 to present

Curriculum Committee, University of California, San Francisco, CA
Student representative on the departmental committee responsible for curriculum development and educational policy.

October 0000 to present

Mission Bay Housing Committee, University of California, San Francisco, CA
Student representative on the campus-wide committee responsible for the design and development of student housing at the future Mission Bay campus.

September 0000 to present

Graduate Student Association, University of California, San Francisco, CA
Director of External Affairs for the UCSF Graduate Students' Association. Worked on policy issues including enhancing faculty-student mentoring, increasing student housing, extending student advising to include non-academic careers, and revitalization of the University's teaching mission.

December 0000 to present

Commission on the Growth and Support of Graduate Education, University of California Office of the President, Oakland, CA
Student representative on a University-wide task force responsible for planning the long-term growth and financing of public graduate education throughout California.

Awards, Grants, and Training

Fall 0000 to present

Strategies in Gender Equitable Teaching, University of California, Berkeley Extension.

August 0000

Cellular Biology of Addiction, Cold Spring Harbor, NY.

February 0000

Long Teaching Award for outstanding teaching in the School of Pharmacy, University of California, San Francisco. Selected by the pharamcy students who said: "No Teaching-Assistant has ever made understanding material such a mission. For all his time, effort, dedication and enthusiasm, we honor him and hope that teaching is somewhere in his future."

August 0000 to present

Predoctoral Training Consortium in Affective Science, three-year, merit based fellowship, National Science Foundation. Participation includes advanced seminars on emotion and motivation, hands-on training with psychological and neurobiological techniques, private tutorials, and professional development.

June 0000

Graduate Opportunity Fellowship, one-year, merit based fellowship, University of California, San Francisco.

June 0000

Firestone Medal for excellence in undergraduate research, Columbia University.

May 0000

Undergraduate Research Opportunities, Chope Fund Major Grant for honors research, Columbia University.

This description includes the mentee's end result/accomplishment, which is a reflection of successful mentorship.

Note that each description is quantitatively specific (# students, length of time, frequency of meetings, etc.). This should be done in Teaching Experience descriptions as well.

Rembrandt listed his teaching-focused service (ie, work on a curriculum committee) first, since this is most relevant to the position he's applying for.
Since all of these experiences are on-going , it is okay for the Curriculum Committee experience to be pulled out of reverse-chronological order.

Be consistent with your use of bold and italics.
If you want to highlight a particular award (ex, teaching award), okay to bold it.
Here, it seems that Rembrandt used italics to set apart *courses* from awards. Perhaps it's best to simply have a separate section for "Additional Training."

Hold on to your teaching evaluations! It's great if you can include a direct quote from your students.

Rembrandt provided a very brief description of each award (criteria and/or the award itself).

Publications are often listed at the end of a CV (the reference list being the last page). Here, the heading "Publications" is at the top of this page, making it easy to find when flipping through the CV.

Publications

Van Rijn, R, Pavola, A, Washington, G, Rousseau, JJ (0000) Dopamine-dependent accumbens neuron firing drives reward-seeking behavior. *Nature.* XX:XX (submitted)

Van Rijn, R and Rousseau, JJ (0000) Basolateral amygdala lesions abolish stimulus-controlled responding for cocaine and disrupt cue-induced reinstatement. *Journal of Neuroscience.* XX:XX (in preparation)

Van Rijn, R and Diderot, D (0000) Operant discriminative stimuli, not classically conditioned stimuli, reinstates food-seeking. *Psychopharmacology*. XX:XX (in preparation)

Van Rijn, R, Diderot, D, Shaw, G.B, and Pavolva, A (0000) Modulation of sleep through ambient temperature increase and sleep deprivation in the neonatal rat. *Soc. Neurosci. Abstracts.*

Thatcher, M, **Van Rijn, R**, Shaw ,BG, and Pavolva, A (0000) Stimulation of adenosinergic A1 receptors enhance non-REM sleep slow wave activity in neonatal rats. *Soc. Neurosci. Abstracts.*

Consider listing articles submitted or in preparation under a separate sub-heading. This avoids the impression that the CV is "padded" by listing these as publications.

Unless an article is already in press, do not list the name of the journal using standard bibliography formatting. Instead, write "(in preparation, to be submitted to *Psychopharmacology)*."

Interests

Bee-keeping, dancing (swing, Argentine tango, and ballroom), astronomy, sea kayaking, and reading fiction.

This section is optional, but has the advantage of showing that the applicant is an interesting person.

<u>Other sections that can be included in a CV:</u>
- References (typically these are listed as the last full sheet of you CV)
- Invited Talks and Poster Presentations
- Professional Memberships
- Patents
- Journals Refereed
- Languages Written and Spoken

Statement of Teaching Interests
Rembrandt van Rijn

Teaching Philosophy

First and foremost, I am an advocate of the passionate, curious mind. All humans, and many animals, are innately equipped to be endlessly exploratory, to ask questions, and to be fascinated by the world and other minds around them. My ultimate goal is to foster students' passions and curiosity.

I have found that the best way for me to encourage such curiosity and enthusiasm is to root my classroom in inquiry-based learning. Students tend to learn fundamental concepts better when they know they will soon be asked to apply them to problems they find important and relevant. I structure my courses with challenging and interesting questions right from the beginning of the semester, and try to infuse my students with a desire to know more, to realize that one answered question leads to many others, and with the analytical tools they need to satisfy their curiosity. My role in the inquiry classroom resembles my experience as an outdoor education leader: a facilitator and guide in a challenging adventure designed to foster collaboration, discourse, and discovery.

Achieving these objectives requires making the students active participants as much as possible. On a simple level, this involves developing inquiry-based activities to stimulate their curiosity while guiding them through the scientific process. For example, my students gain first-hand experience with Pavlovian conditioning by training a reflex in honeybees through pairing sugar and odor presentations. Students then test the hypothesis that training trials separated by longer intervals produces better retention than "cramming" training sessions into a short period of time. Since its inception, I have taken this hugely popular activity to four grade schools, two college psychology classes and a workshop for K-12 teachers. Active participation in my classroom is not limited to inquiry-based activities but can be applied to facts customarily learned by rote. For instance, in teaching the most didactic part of neuroscience -- neuroanatomy -- I devised handouts with blank space surrounding diagrams where the names and functions of different brain areas would normally be specified. We filled in the handouts together as a class. I never told them the correct answer; each label was debated until everyone agreed or until someone looked it up in their notes. Later, I found this to be an ideal way to review information about cellular pathways, sensory transduction, and synaptic transmission. When students can draw and debate an idea, in addition to reading and hearing about it, they retain the information longer and can conceptualize the material for use in new contexts.

Teaching through inquiry and active participation is a tall order. Many students emerge from high school lulled by studying just facts and quizzed through multiple choice testing. Some come to college with expectations that a neat career path will be laid out for them, and that they must only connect the dots in order to graduate and start their chosen career. But, I want my students to be independent thinkers and pioneers when they graduate. By emphasizing both the importance and the pleasure of asking -- then striving to answer -- scientific questions, I hope to foster a thirst for knowledge that extends beyond the classroom. If I can help a student who has always hated science classes to find rewards in asking questions and in acquiring the analytical tools to answer those questions, then I have met my goals. Ideally, I hope to awaken a passion for lifelong learning in my students.

Brief first paragraph establishes a unifying theme for the rest of the philosophy.

If you use pedagogical buzz-words such as "inquiry-based learning" (or even if you don't!), be sure to back it up with examples of what you do in the classroom.

It's best if the examples you cite come from your past experience in the classroom. However, it is also fine to talk about what you will do in the future.

Rembrandt ties these examples to how they improve student learning.

This "Growth" section is not typical for a Statement of Teaching Philosophy. However, some job announcements ask for additional sections like this (which could have been the case for Rembrandt).

In any case, feel free to create sections of your own within your philosophy, to get across the points you want to make. There are no set rules for a Statement of Teaching Philosophy!

Growth

At Fantastic College, I hope to find colleagues who will add new, innovative strategies to my toolbox, and who will provide me with critical feedback on my teaching. I want to take the idea of interdisciplinary case studies from the San Francisco State *Motivation* course and create *Introduction to Behavioral Biology*. I would spend the first third of the class exploring the perspectives and assumptions of the many disciplines that inform our study of behavior: ethology, cognitive psychology, molecular biology, endocrinology, neuroscience, etc. In the second third, we would explore case studies such as reward-seeking, anxiety, and sexual behavior. Finally, the students, in teams of 3 or 4, would teach their classmates about a case study that interests them. I would work closely with each team before their presentation and incorporate their material into the final exam. A similar course awakened my passion for neuroscience. I hope that others may discover their passions through something I stimulate in them.

My vision of a laboratory course in behavioral neuroscience would not only provide hands-on experience with the techniques used in the field but also provide experience with developing a research proposal and with data interpretation. Each week would begin with a 1 hour "journal club" where major concepts in behavioral neuroscience would be explained through sample scientific articles. The goal of these sessions would be to identify the scientific question, assess how the researchers answered that question, and then postulate directions to take this line of research in the future. Later in the week, a 3 hour laboratory session would provide hands-on exposure to one of the techniques discussed in the article. By the end of the class, students would be familiar with the major tools of behavioral neuroscience: quantitative behavioral analysis, psychopharmacology, neuroanatomy, targeted brain manipulations, and electrophysiology. Midway through the course, students would write a two page research proposal based on a "journal club" discussion or on an original experiment idea. The take-home final exam would provide the introduction, methods, and results sections of a manuscript; the student would be charged with writing the discussion. While my goals are ambitious, students should already have a basic foundation in research methodology through the prerequisite Psychology 200. Familiarity with techniques alone is not enough to become an intelligent consumer and producer of scientific research; experience with the *process* of scientific inquiry is required.

Finally, I would love to collaborate with Alcoholics Anonymous, Narcotics Anonymous, and/or the Fantastic College Alcohol and Drug Awareness Project to develop an advanced seminar course, *the Neurobiology of Addiction*, focusing on the biological and social aspects of addiction. The course would be divided into five sections, each covering the history and pharmacology of a different class of drug: stimulants, opiates, nicotine, alcohol, and hallucinogens. Most importantly, each section would begin with a patient interview or a discussion with a clinician to put a human face on the disorder. I believe it is critical to associate the suffering of real people with the promise of scientific research that may one day help bring relief.

Statement of Research Interests
Rembrandt van Rijn

I found my passion during my freshman year at Columbia University when two pairs of primate skulls were presented to my human biology class. One pair looked identical (species A); the other two looked drastically different from one another (species B). In species A, whose males and females bond for life and equally share child-rearing responsibilities, evolution selects for similar physiological structure, down to the level of individual neurons and genes, resulting in equivalent skull shape and size. In species B, where the males aggressively compete for social and reproductive dominance, the sexes diverge biologically, resulting in a dramatic sexual dimorphism. Before this lecture, I had known that the brain drove behavior, but I did not imagine that the consequences of our behavioral choices might affect our physiology in return. While staring at those skulls and letting my thoughts drift over possible implications, I reached the conclusion that our behavioral choices and experiences permanently modify the brain through actions on neurons, genes, and hormones.

Every behavioral choice is governed by neural circuits underlying memory, emotion and motivation. These circuits are immensely complex and can be very difficult to study. Drugs of abuse offer a unique tool with which to study these circuits because they profoundly alter behavioral choices in both humans and animals. Human addicts pursue drugs despite a myriad of negative consequences. Animals allowed to freely administer cocaine will do so to the exclusion of food and water, often to the point of death. Because the pharmacological and neural targets of addictive drugs are known, one can use drugs to pinpoint, and then to manipulate, the neural circuits underlying behavioral choice. Moreover, the role of environment and experience can be readily studied by carefully manipulating environmental cues and contexts during drug seeking. Drug-associated cues, like a crack pipe or one's drug dealer, can elicit intense psychological cravings and can trigger relapse in humans and animals alike, even after prolonged periods of abstinence. The formation of these powerful associations between cues and drugs initiates a cascade of biological changes that are often argued to be the fundamental difference between addicts and the rest of the population. Reversing these associations through pharmacological treatments may be the best method to treat addiction.

At the time I joined the laboratory of Dr. Benjimina Spock, current animal models of relapse had failed to trigger the compulsive drug seeking found in human addicts upon exposure to drug-associated cues. The standard animal model presents a classically conditioned cue at the time of drug delivery. Each time a rat pushes a lever, a conditioned stimulus (CS) and intravenous drug are simultaneously delivered. Yet one study found the appearance of the CS triggered drug seeking on only the first of three trials. Independent studies could not even replicate these modest findings. However, cues can be associated with drugs in many ways. Rather than using the standard paradigm, I trained my animals such that if and only if a discriminative stimulus (DS) was present, would a lever press be rewarded with drug. In the absence of the DS, drug could not be obtained. Where the CS is presented concomitantly with drug-intake and predicts drug delivery, the DS precedes drug-intake and predicts drug availability. After weeks of abstinence, a single presentation of the DS immediately triggers robust drug seeking. The effect persists without decrement over multiple days of testing. Thus, I successfully established a new animal model of relapse that more closely mirrors human relapse. Using this model, I identified a critical piece of the neural circuitry driving DS triggered relapse -- the amygdala. Rats with lesions of the amygdala no longer relapse after exposure to the DS.

These experiments led me to consider the role of a neuromodulator, dopamine, in guiding behaviors driven by a DS. For decades, dopamine was equated with reward or pleasure because it is released after exposure to a wide variety of rewarding events, including sexual partners, food, and drugs of abuse. More recently, several researchers raised the hypothesis that dopamine is required to motivate a behavioral response to a salient environmental cue. I recognized that my behavioral task could directly test this "motivational salience" hypothesis. If dopamine is truly required for a cue to trigger a behavioral response, not only should dopamine blockers disrupt the ability of animals to respond to the DS, dopamine disruption should abolish the activity of neurons that are excited by a DS.

As I pondered these questions, a postdoctoral fellow, Chinua Achebe, joined our laboratory. Her expertise in monitoring the activity of neurons with electro physiology and mine with behavioral neuroscience allowed us to devise productive experiments together. We combined microinjections of pharmacological agents into specific brain areas with electrophysiological recordings of neurons in awake, behaving animals. We found that dopamine proved essential for neurons in a target region of the amygdala, the nucleus accumbens, to increase their activity after DS presentations, and for these DSs to drive lever pressing. This experiment provides the first direct physiological evidence in support of the motivational salience hypothesis. The fruit of our collaboration has been submitted as an article to Nature. Moreover, our experiment established the great advantages of a collaborative, interdisciplinary approach to behavioral neuroscience research, and I am eager to continue my work in this direction through a wider range of collaborations.

My future research….(This part should entail one or two paragraphs about your future research as well as what part you intend to conduct at the institution you are applying to.)