


The Neuroscience of Oneirology: Studying the Mysteries of the Brain

Simon Titone

Date of Graduation Review: March 16th, 2015

Date of Graduation: April 18th, 2015

Advisor Signature  Date 2/27/15

Student Signature Simon Titone Date 2-27-15

Many of the influences of my childhood came from the worlds that I enveloped myself in through books, and my active imagination was generated from the frequency at which I found myself in these new and exciting worlds. My initial genre of interest was fantasy, which provided the fertile ground for my imagination to grow. However, as I grew older my critical thinking skills and overbearingly logical mind made it more difficult to suspend my disbelief. As a result, I turned my attention to science fiction. The genre of Sci-Fi often sparks the imagination of scientists who later prove capable of making the seemingly unreal and impossible ideas presented in its content. My transition of interest from fantasy to sci-fi is well illustrated in the Arthur C. Clarke quote "any sufficiently advanced technology is indistinguishable from magic."

Though my inspirations for studying neuroscience are numerous, I will limit them to three. The easiest one to explain is the influence of my grandmother, who has a PhD in neuroscience and focuses on how youth develop language and writing skills. My grandparents are a strong influence in my life in a variety of ways, as I will later further detail.

My second main inspiration could be found in the works of two directors; Joss Whedon and Satoshi Kon. The television series *Dollhouse*, directed by Whedon, explores the philosophical and political implications of complete control over the human brain, and elucidates some of the potential nasty consequences of this control as well as the benefits, such as functional immortality. Satoshi Kon directed the 2006 film *Paprika*, which influences my interest in sleep and dreaming in several ways. The film proposes the idea of a device that can allow therapists to share dreams with patients, thus directing their recovery in a non-cognitive setting. The story provided me with a strong curiosity to learn more about how dreams function in relation to the waking psyche, and especially how they operate at the neurobiological level.

Third, the brain interests me because it is both a completely essential organ, and is the root of everything that makes humans interesting and unique. Every emotion, thought, and sensation can be traced back to the brain, and thus it appeared to be the most interesting thing to study, as well as the most important

one. What has interested me most in psychology is the theory of the “subconscious”, and the vast depth of information, activity, and personality that exist within it. Investigating this category of the mind through neuroscience seems to be the most interesting and revealing method of understanding this great unknown.

The perplexities of dreams interest me to no end. Sleep constitutes 1/3 of human lives, and the overwhelming majority of humans dream and can recall their dreams. However, we do not definitively know why dreams occur, or even fully understand the neural pathways activated during dreaming. Dream recall varies from person to person, and while some people rarely remember their dreams, others have extremely vivid dreams that can strongly affect their waking lives. I fall into the latter category, and as such my dreams tend to alter the way I think and live my life. As I previously mentioned, the film *Paprika* has inspired me to think of dreams as offering more than merely jumbled images but instead, as Freud suggested, a pathway to the unconscious mind. That being said, I aim to look at dreams through the lens of neuroscience, and would prefer to avoid speaking through the voice of psychoanalysis.

“The Neuroscience of Dreams” is not a major, track, or even a course offered in any university in America. My experience in the Johnston center has allowed and encouraged me to bring multiple disciplines into my education, and I am very grateful for that opportunity. Learning how to organize the classes that I take, and push myself hard enough while keeping a balance in my life has been a very useful skill that I would not have learned at another institution.

I am proud to have pushed myself in the field of hard science and accomplished much in classes such as neuroscience, organic chemistry, physiology, and more. I have complimented those courses with classes such as psychology, cross cultural psychology, science vs. pseudoscience, hard science soft culture, and my own independent studies more closely related to my field of interest. Philosophy is another field that has been important in helping discover and encompass my understanding of dreams, as well as human cognition and function. A class called “The Neuroscience of Human Consciousness” that I attended while studying abroad in Denmark was influential in my understanding of the field of consciousness, and

further prompted me to take the course "Philosophy of Mind" upon returning to Redlands.

I designed much of my freshman and sophomore years in Johnston to give myself an opportunity to explore a variety of classes to see what interested me most. My interest in Japanese culture and language prompted me to take introductory Japanese, and a deep-rooted interest in folk tales and mythology attracted me to the "Cabinet of Spells" course, where I cultivated the literature-centered side of myself. Tim Seiber's "Hard Science, Soft Culture" course allowed me to analyze and interrogate the line between literature and science, and in many ways influenced my later course decisions.

My time in Johnston has promoted not only my educational growth, but my personal growth as well. Through the process of community building I have learned how to communicate better with my peers and the administration, how to organize events and convince people to attend them, and how to act as a manager to a small business. While I have made mistakes during my time as community intern and Night Time Java manager, these positions have taught me just as much as my classes have, and given me valuable skills that can be applied to jobs after college.

Just as important as my successes in Johnston are my rejections and failures. My initial goals for my Johnston career were to be involved in the Proudian Honors program, and to work as a community assistant. While I was not accepted into either of these positions, I learned lessons that were just as valuable as ones I may have gained if I were accepted. Initially after being not chosen as a CA (especially the second time), it was difficult to not feel isolated or even unappreciated in the community. Over time however, I realized that the position was only a title, and if I wanted to make a difference in the community I could do so just as much as a CA would. The most interesting lesson that Johnston has taught me is that you don't need to act within the set ways that a system has established to make a difference in the community around you.

Another important piece of college career is my involvement in the brotherhood of RYG. Civil rights activism has been important in my life, both for personal and family based reasons. My experience as a queer person has driven me

to care more deeply about LGBTQIA rights, and through my understanding there I have gained empathy towards other marginalized groups. My grandfather works as a civil rights photographer, and both his and my grandmother's involvement in the civil rights movement has inspired me even further to care about those who are oppressed in this country and around the world. RYG has given me a venue to connect with people who are similarly inspired to fight against injustices and oppression, as well as a network of individuals all around America and the world whom I can reach out to for aid, inspiration, and experiential wisdom.

My study abroad experience is something that I had been looking forward to since before I knew where I was going to attend college. In fact, I questioned the study abroad program of every school I applied to, and chose Johnston partially due to the emphasis it placed on the study abroad experience. Though I knew I wanted to go abroad, the exact destination was uncertain until rather soon before I was slated to leave. I had traveled to Spain when I was 14, and while it was a period of extreme independence and growth, I decided I would forgo furthering my Spanish skills for the purposes of exploring something new. I had narrowed my choices to Australia or Denmark, selected for the strong neuroscience classes in the programs I had investigated. I decided on the Danish Institute of Study abroad because it was very well organized, and allowed me the opportunity to travel to other countries in Europe.

My class choices in DIS furthered both the breadth and depth of my education, and formulated a more cohesive idea of what I actually was interested in studying and researching. Two of my classes (Neuroplasticity and The Neuroscience of Human Consciousness) directly related to my depth and furthered my knowledge of neuroscience, while another two (The Social Brain and Cross Cultural Psychology) bordered between depth and breadth, but also both furthered my immersion into Danish culture. My fifth class (Nordic Mythology) also allowed me to better understand Danish culture, and was a harkening back to my original sophomore contract that had included elements of religious studies.

My living situation was wonderful, and likely allowed me more cultural immersion than any other program I could participated in while abroad. I lived in a

Danish Folkehøjskole, which was an experience similar to Johnston in a lot of ways. The Danish Folkehøjskole system allows Danish students who have graduated from high school to be a part of an education that does not give grades, and encourages students to learn for the sake of learning. Folkehøjskoles are often themed, and I attended the international Folkehøjskole, which had in residence people from 22 different countries, and 6 continents. I was exposed to more cultural influence than would have been available elsewhere, and I am very grateful for that. While in Denmark I was also lucky enough to meet people in the Copenhagen queer community, and through a LGBTQ meeting group organized through DIS, I was able to meet some really wonderful people. My experience abroad was very prolific both to my personal and educational development, and has taught me that traveling is likely to be an important part of my life in the years to come.

Various statistics say that most likely the career that I will hold later in life does not yet exist, which is a sentiment that both terrifies and excites me. My primary goal upon graduating is to continue learning. While I aim to turn the path of my learning away from an academic setting for a year or so, I still look to always be improving my base of knowledge, both about my field of interest but also about myself. The next step of my career goals would be to find employment at a sleep study center, where I can learn more about electroencephalography (EEG) interpretation and sleep, and get a basis of knowledge upon which I can construct further research. Ideally I will find connections between dream activity and cognitive function that will allow for alleviation of (or at least a different way of looking at) PTSD, Schizophrenia, Bipolar disorder, and even everyday stress. I am grateful for the opportunity I have been provided this year in developing my own pilot study using an EEG device. Since there is no class on EEG use, and the neuroscience course only goes over the technology briefly, I have been provided with a valuable opportunity to yet again direct my own learning and education. I look forward to the many opportunities that my experience at Johnston and the University of Redlands has unlocked, and for the appreciation of community that it has fostered in me.

Course Listings

By Chronological Order:

| Semester | Course Title | Course Number | Credit Number |
|-------------|--------------------------------------|---------------|---------------|
| Fall 2011 | Next Stop: the Twilight Zone | FS-100 39 | 4 Credits |
| Fall 2011 | Straight | JNST-000J 01 | 4 Credits |
| Fall 2011 | 1st Year Modern Japanese | JPNS-101 02 | 4 Credits |
| Fall 2011 | Clarinet | MUAP-115 01 | 1 Credit |
| Fall 2011 | Intro to Psychology | PSYC-100 04 | 4 Credits |
| Spring 2012 | Cabinet of Spells: Myth/Folk/Lit | JNST-000N 01 | 4 Credits |
| Spring 2012 | Hard Science, Soft Culture | JNST-000P 01 | 4 Credits |
| Spring 2012 | GYST: The Class | JNST-000U 01 | 2 Credits |
| Spring 2012 | Consciousness: What is it good for? | JNST-000V 01 | 4 Credits |
| Spring 2012 | Clarinet | MUAP-115 01 | 1 Credit |
| Spring 2012 | Introduction to Voice | MUSI-124 01 | 1 Credit |
| May 2012 | The Neuroscience of Meditation | BIOL-160 01 | 3 Credits |
| Fall 2012 | Human Differences As Gen. Poss | JNST-000J 01 | 4 Credits |
| Fall 2012 | Principles of Biology | BIOL-133 | 4 Credits |
| Fall 2012 | GYST | JNST-000M | 2 Credits |
| Fall 2012 | Buffalo Writing Collective | JNST-076 IS | 2 Credits |
| Fall 2012 | Clarinet | MUAP-115 | 1 Credit |
| Fall 2012 | Science Vs. Pseudoscience | SOAN-261 | 4 Credits |
| Spring 2013 | Principles of Biology | BIOL-131 | 4 Credits |
| Spring 2013 | Science Fiction: Film and Television | JNST-000H | 4 Credits |
| Spring 2013 | Dream Science | JNST-077 IS | 4 Credits |
| Spring 2013 | Clarinet | MUAP-115 | 1 Credit |
| May 2013 | Make It Work | JNST-000C | 3 Credits |
| Fall 2013 | Cross Cultural Psychology | SPRO-300 | 3 Credits |
| Fall 2013 | Neuroplasticity | SPRO-301 | 3 Credits |
| Fall 2013 | Neuroscience of Human Consciousness | SPRO-302 | 3 Credits |
| Fall 2013 | Nordic Mythology | SPRO-303 | 3 Credits |

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|-------------|----------------------------|-----------|-----------|
| Fall 2013 | The Social Brain | SPRO-304 | 3 Credits |
| Spring 2014 | Neuroscience | BIOL-326 | 4 Credits |
| Spring 2014 | Clarinet | MUAP-115 | 1 Credit |
| Spring 2014 | Statistical Methods | PSYC-250 | 4 Credits |
| Spring 2014 | Human Sexuality | PSYC-352 | 4 Credits |
| Spring 2014 | Hellenistic Greek | REL-242 | 2 Credits |
| May 2014 | Make It Work | JNST-000E | 3 Credits |
| Fall 2014 | Research Topics in Biology | BIOL-460 | 3 Credits |
| Fall 2014 | Organic Chemistry | CHEM-231 | 4 Credits |
| Fall 2014 | Senior Workshop | JNST-000A | 1 Credit |
| Fall 2014 | Clarinet | MUAP-115 | 1 Credit |
| Fall 2014 | Philosophy of Mind | PHIL-340 | 4 Credits |
| Spring 2015 | Human Physiology | BIOL-344 | 4 Credits |
| Spring 2015 | Research Topics in Biology | BIOL-460 | 3 Credits |
| Spring 2015 | Organic Chemistry | CHEM-232 | 4 Credits |
| Spring 2015 | Clarinet | MUAP-115 | 1 Credit |
| Spring 2015 | Getting High, Staying High | REL-260 | 4 Credits |
| May 2015 | Compassion | REL-250 | 3 Credits |

Total Projected Credits: 134

Total Projected GPA: 3.46

Depth:

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|-------------|--------------------------------|-----------------|-----------|
| Fall 2011 | Intro to Psychology | PSYC-100 04 | 4 Credits |
| Spring 2012 | Hard Science, Soft Culture | JNST-000P 01 | 4 Credits |
| May 2012 | The Neuroscience of Meditation | BIOL-160 01 | 3 Credits |
| Fall 2012 | Principles of Biology | BIOL-133 | 4 Credits |
| Fall 2012 | Science Vs. Pseudoscience | SOAN-261 | 4 Credits |
| Spring | Principles of Biology | BIOL-131 | 4 Credits |

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|-------------|-------------------------------------|-------------|-----------|
| 2013 | | | |
| Spring 2013 | Dream Science | JNST-077 IS | 4 Credits |
| Fall 2013 | Cross Cultural Psychology | SPRO-300 | 3 Credits |
| Fall 2013 | Neuroplasticity | SPRO-301 | 3 Credits |
| Fall 2013 | Neuroscience of Human Consciousness | SPRO-302 | 3 Credits |
| Fall 2013 | The Social Brain | SPRO-304 | 3 Credits |
| Spring 2014 | Neuroscience | BIOL-326 | 4 Credits |
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| Spring 2015 | Organic Chemistry | CHEM-232 | 4 Credits |

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|-------------|-------------------------------------|--------------|-----------|
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| Fall 2011 | Straight | JNST-000J 01 | 4 Credits |
| Fall 2011 | 1st Year Modern Japanese | JPNS-101 02 | 4 Credits |
| Fall 2011 | Clarinet | MUAP-115 01 | 1 Credit |
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| Spring 2012 | GYST: The Class | JNST-000U 01 | 2 Credits |
| Spring 2012 | Consciousness: What is it good for? | JNST-000V 01 | 4 Credits |
| Spring 2012 | Clarinet | MUAP-115 01 | 1 Credit |
| Spring 2012 | Introduction to Voice | MUSI-124 01 | 1 Credit |
| Fall 2012 | Human Differences As Gen. Poss | JNST-000J 01 | 4 Credits |
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| Fall 2012 | Buffalo Writing Collective | JNST-076 IS | 2 Credits |
| Fall 2012 | Clarinet | MUAP-115 | 1 Credit |
| Spring 2013 | Science Fiction: Film and Television | JNST-000H | 4 Credits |
| Spring 2013 | Clarinet | MUAP-115 | 1 Credit |
| May 2013 | Make It Work | JNST-000C | 3 Credits |
| Fall 2013 | Nordic Mythology | SPRO-303 | 3 Credits |
| Spring 2014 | Clarinet | MUAP-115 | 1 Credit |
| Spring 2014 | Human Sexuality | PSYC-352 | 4 Credits |
| Spring 2014 | Hellenistic Greek | REL-242 | 2 Credits |
| May 2014 | Make It Work | JNST-000E | 3 Credits |
| Fall 2014 | Senior Workshop | JNST-000A | 1 Credit |
| Fall 2014 | Clarinet | MUAP-115 | 1 Credit |
| Spring 2015 | Clarinet | MUAP-115 | 1 Credit |
| Spring 2015 | Getting High, Staying High | REL-260 | 4 Credits |
| May 2015 | Compassion | REL-250 | 3 Credits |