

**2015 CTI Seminar Descriptions
January 2015**

Exercise & the Brain

Barbara Lom, Biology, Davidson College

The benefits of physical activity on physical health have long been recognized. As examples, we know that exercise is good for the heart, for muscular strength and for preventing metabolic conditions. In recent years, however, the benefits of exercise have expanded. Neuroscientists, educators and clinicians have demonstrated that physical activity also benefits the brain. A large and rapidly expanding body of scientific literature now reveals that physical activity can also exert powerful effects on neurons, the brain and behavior throughout a person's lifespan. This CTI seminar will investigate ways physical activity influences the brain through molecular, cellular and behavioral perspectives. We will examine basic, clinical and applied research investigating how exercise may facilitate attention, memory and learning, with special attention to research relevant to K-12 students and educational practices. We will also consider how physical activity has been used as part of treatment plans for neurological conditions such as depression, anxiety, addiction and aging. Seminar Fellows will gain a deeper understanding brain function and development. They will explore neuroscience in contexts that are most meaningful to their own students, experiences, curricula and intellectual interests. For example, Fellows might develop curriculum units on a wide array of topics such as: how the brain makes new neurons in response to exercise, how physical fitness scores correlate with reading or math performance, how the body and mind are connected, or how the body's physiological responses to stress can be modulated by exercise. Other Fellows might develop more applied curriculum units that apply the knowledge from the neuroscience of exercise by strategically deploying movement to enhance learning in their classrooms.

Anchor book: *Spark: The Revolutionary New Science of Exercise and the Brain* by Ratey & Hagerman supplemented with readings from popular press and journal articles.

What Makes a Nation?

Shelley Rigger, East Asian Studies and Political Science, Davidson College

Humans have organized themselves into clans, kingdoms, tribes, empires and countless other forms. In recent centuries we have organized ourselves into nation-states. Today, almost no one lives beyond the reach of a national government. This seminar asks what constitutes a "nation," how nations are constructed, and how different types of nations hold together.

What makes a nation? Territory? Ancestry? Politics? Identity? Is nationhood rooted in primordial identities, or is it constructed by societies in the process of living together? We will explore this question through theories of nationhood and nationalism and examples from around the world. The seminar leader will provide theoretical readings for the early sessions, but the decision about what countries we want to look at as examples of nation-state formation will be made by the Fellows, based on their interests and the content of their curriculum units.

The seminar will introduce theories that explain how humans decide who is "in" and who is "out." We'll also look at how political institutions develop in conjunction with this "us and them" thinking. We'll look at psychology to get some ideas about how group identity and belonging work, as well as ideas from anthropology and history that seek to explain how nations and national identities develop. We all know that states use laws, institutions and ideologies to define and shape national identities and promote nationalism, but in this seminar we will also pay attention to the ways literature and the arts help to create and strengthen the nation.

We'll also spend some time thinking about what happens when a "nation" is not homogeneous. We'll look at how multi-ethnic countries create a sense of nationhood, how immigration both challenges and reinforces national identity, and how nations within nations negotiate complex identities. Finally, we will consider how ideas about nationhood and nationalism work (or don't work) today, when migration, immigration and globalization are huge trends pushing back against the traditional nation-state.

These links provide a sense of the theory we might read:

http://www.nationalismproject.org/books/g_h.htm

<https://nationalismstudies.wordpress.com/2013/10/30/eric-hobsbawm/>

<https://nationalismstudies.wordpress.com/2013/10/09/ernest-gellner-2/>
<https://nationalismstudies.wordpress.com/2012/10/15/anthony-d-smith/>
<https://nationalismstudies.wordpress.com/2012/10/24/benedict-anderson/>
http://books.google.com/books?id=8Jzkgbq2vYwC&lpg=PA111&ots=422Y6KJtj_&dq=social%20identity%20theory&lr&pg=PA111#v=onepage&q=social%20identity%20theory&f=false
<https://www.youtube.com/watch?v=ga4Zr7P25o0>

Origins of Language

Ron Lunsford, English, UNC Charlotte

When did humans first talk? As it turns out, this question may be inseparable from the question of why humans talk. Other questions soon follow: What is the relationship between language and thought? Do other species have language? These, and many other questions, were put on hiatus in 1866 when The Linguistic Society of Paris officially banned discussion of the subject of origins of language. What accounts for such a ban? In part, the ban could be blamed on the fact that the topic of language does not lend itself to direct physical evidence in the way that studies of the celestial bodies, earth, or even the human anatomy do. Where does one go to find records of how humans used language 10,000 years ago? 100,000 years ago? When the ban began to lose its grip on linguistic thinkers in the late twentieth century, researchers realized that they could not limit their investigations to one discipline: linguistics. Rather, they had to broaden their search to include work done in such fields as archaeology, psychology, and anthropology.

This broad interdisciplinary approach to the study of language origins provides a natural point of contact between the information on origins we will be examining in this seminar and the individual studies participants might undertake. A music teacher might explore the evolutionary connections between human language and music; a philosophy teacher might explore connections between human language and thought, or between human reasoning and language; a mathematics teacher might explore connections between mathematics and human language; a sociology teacher might explore issues of culture and human language; a psychology teacher might investigate modern research into how language “works” in the brain. A writing teacher might examine relationships between oral and written language, with an eye to pedagogical implications for the teaching of writing; a biologist might explore connections between human language and language of other species.

As we shall see, the interdisciplinary nature of this study, which makes it what some have called the “hardest problem in science,” also makes it among the most interesting.

Fundamentals of Mathematics: Problem Solving and Process Standards

Harold Reiter, Mathematics and Statistics, UNC Charlotte

“For more than a decade, research studies of mathematics education in high-performing countries have concluded that mathematics education in the United States must become substantially more focused and coherent in order to improve mathematics achievement in this country. To deliver on this promise, the Common Core mathematics standards are designed to address the problem of a curriculum that is ‘a mile wide and an inch deep.’” See <http://www.corestandards.org/Math/>.

There are two types of standards, Content Standards and Process Standards. The Content Standards comprise a checklist by grade of topics that should be learned. The Process Standards is a list that describes varieties of expertise that mathematics educators at all levels should seek to develop in their students: [MP1](#) Make sense of problems and persevere in solving them; [MP2](#) Reason abstractly and quantitatively; [MP3](#) Construct viable arguments and critique the reasoning of others; [MP4](#) Model with mathematics; [MP5](#) Use appropriate tools strategically; [MP6](#) Attend to precision; [MP7](#) Look for and make use of structure; and [MP8](#) Look for and express regularity in repeated reasoning.

This seminar aims to help participants feel comfortable with and develop ideas that enable students to embrace these ideas. We start with some very fundamental ideas: whole numbers, fractions, and decimals. We’ll spend some time building with wooden cubes and ZomeTools, and counting various configurations of these structures. We’ll work lots of puzzles including KenKen and Some Cubes and see how they help students to embrace the process standards above.

Each Fellow will get to present a topic to the group after which we’ll discuss which standards were addressed, and how others might have been included. Above all, we’ll pay attention to MP1. Problem solving is a giant part of mathematics, and learning to persevere is a part of learning mathematics that students can take with them for the rest of their lives.

Peace Education: Psychological Factors That Endorse War

Rick Gay, Educational Studies, Davidson College

Admittedly, most Americans would prefer to live in an era of peace, instead of an era of war. Why then, when confronted with the possibility of war, do so many Americans thoroughly embrace and support it? For example, one recent opinion poll reveals that 28 percent of Americans believe President Obama made a mistake when he withdrew forces from Iraq.

During this seminar on peace education, we will confront the love/hate relationship most Americans have with war by examining psychological factors that surface in public school classrooms and serve to endorse war. In *Peace Education: How We Come to Love and Hate War* (2012), educational philosopher Nel Noddings identifies six factors that promote war: patriotism, hatred, masculinity and the warrior, the female reaction to war, religious extremism, and the search for existential meaning. In our readings and discussions, we will examine all six factors in detail and posit ways to incorporate the exploration/critiquing of these issues in our classrooms.

Literature and history courses invite the study of selections from the *Iliad*, the World War I poetry of Rupert Brooke and Wilfred Owen, and the recent poetry of Brian Turner in *Here, Bullet*. Mathematics instructors might pose problems such as “How many schools could be built for the price of one heavy bomber?” Or, they might be interested in the writings of famous mathematician and philosopher Bertrand Russell. Music classes might study martial music, the role of the bugle in military operations or counterculture protest music. Physical education teachers could explore the connections between sports and warfare. Photography from the Spanish Civil War and World War I could be introduced in art courses, along with poster art from the World War II era. And, of course, science courses invite many ethical questions relating to the development of weaponry.

Nel Noddings hopes, as I do, that opening such discussions “will encourage more people to oppose war,” or at least think more critically about it.

Integrating Concepts in Life Science

Malcolm Campbell and Chris Paradise, Biology, Davidson College

The definition of insanity is doing the same thing and expecting a different outcome. For years, many instructors have been teaching the same way in hopes that our students would somehow show dramatically different outcomes. Producing the outcomes you want from your students will require a different approach and we can help you develop your first module that will change the way your students experience science or math classes. We have been working for several years on a new approach to teaching introductory biology, which translates easily to AP Biology and other science and math courses.

Our approach focuses on big concepts and is data-driven. Students work with results from scientific studies to learn important skills of critical thinking, data interpretation, and quantitative reasoning skills. We emphasize the core concepts of biology, the process of doing science (including data analysis and experimental design), the applications of mathematics to biology, and the relationship between science and society. These characteristics parallel the redesigned AP Biology curriculum but would fit with other science classes, too. Although the approach was developed to accompany an introductory biology text we authored (*Integrating Concepts in Biology* (ICB)), the approach could be adapted to fit with any of the sciences.

The seminar would be useful to science and math teachers, but those interested in the interplay of science and society or the development of critical thinking skills may also be interested. K-5 teachers could explore creative ways of producing age-appropriate, data-driven modules that works synergistically with the inherent curiosity of their students. Middle and high school teachers may want to develop units for challenging concepts or topics. We have dozens of case studies that you could adapt or we can help you develop your own case study on a different topic. The topics that we discuss and use in the seminar will be shaped by the Fellows via an online, pre-seminar survey. We will work closely with Fellows to help focus their ideas and energies on a topic for their curriculum units. Both Seminar Leaders have years of experience of producing new curriculum modules and we will work with you to produce modules that fit your educational goals and your students.

Africa: Moving Beyond Popular Culture

Beth Whitaker, Political Science, UNC Charlotte

Most Americans’ impressions of Africa are strongly influenced by portrayals in popular culture, including Hollywood movies, bestselling books, videos on social media, and the activism of celebrities around selected causes. Such efforts have raised awareness about important issues in Africa and renewed interest in a continent

that has long been marginalized. Even so, portrayals of Africa in popular culture often are over-simplified, formulaic and paternalistic, reinforcing stereotypes about a continent and its people that can undermine genuine efforts to resolve ongoing problems.

This seminar will explore the history and politics of Africa by moving beyond popular culture and examining alternative representations of the continent, mainly from Africans themselves. We will use Binyanvanga Wainaina's "How to Write about Africa" to start a discussion about the portrayal of Africa in popular culture. Examining a collection of children's books and viewing clips from movies like "Blood Diamond," "Hotel Rwanda" and "Kony 2012," we will critique the dominant narratives that are perpetuated by such works. Over the summer, we will read books and watch movies by African authors and directors such as Ngugi wa Th'iongo, Ousmane Sembène, Chinua Achebe and Mariama Ba to examine alternative perspectives of Africa. In the fall, we will explore topics such as corruption, political violence, ethnicity, gender issues and public health (including HIV/AIDS and Ebola).

We will compare and contrast the representations of these topics in popular culture to those in alternative works and supplement our readings with academic articles. Instead of dismissing popular movies and books entirely, particularly given their widespread availability, we will discuss how to use them in the classroom despite their shortcomings. This seminar may appeal most to social studies, English, foreign language and elementary teachers, but our discussion of breaking down stereotypes about other cultures is also relevant to disciplines like art, music, health and science. In short, there are many topics that can be explored through a seminar on Africa.

Supernatural Figures in Theatre, Film, and the Brain

Mark Pizzato, Theatre, UNC Charlotte

This seminar explores connections between our physical brain, the internal theatres it stages, and specific spirit characters in drama and film—through theories and evidence from psychoanalysis and neuroscience. After considering those theories, we will apply them to prehistoric cave paintings, Aeschylus' *Oresteia* (an ancient Greek trilogy), Zeami's *Matsukaze* (a medieval Japanese Noh play), Shakespeare's *Hamlet*, Thornton Wilder's *Our Town*, and various films of these Shakespeare and Wilder plays, plus another recent film, *The Others*, by Alejandro Amenabar. Along the way, we'll investigate how the idea of Self can be illusory, how we're often performing for a ghostly Other, and how young people (in the plays listed above) are haunted by parental and peer influences, as their own identities take shape.

Depending on the interests of seminar Fellows, there might be more of a focus on inner/outer theatres regarding neuroscience discoveries, or on the plays, or on various films (selected by Fellows from the ghost, god, angel, devil, vampire, werewolf, or lab-created beast-people genres). Alternative plays to those listed above might be: Euripides' *The Bacchae* (with a devilish theatre god), short medieval mystery plays (with God, angels and devils), Shakespeare's *The Tempest* (with spirits and beastly people), Ionesco's *Rhinoceros* (with people turning into such animals), Shaffer's *Equus* (with a modern boy worshiping a horse god), or *Journey to the West* (based on an ancient Chinese story of a Buddhist pilgrimage involving a monkey king, pig-man and fish monster).

The developmental (and evolutionary) stages of the brain's inner theatre might be a key to our explorations, regarding the various ages of students that we teach, along with the cultural reflections in the plays and films. How do our basic brain structures, which we share with humans in earlier (pre)historical periods, set up certain conflicts within and between us, involving order and freedom, language and movement, masculine and feminine, rational and emotional elements? How does knowing about the brain's inner theatre and our culture's outer theatres increase our awareness of unconscious, impulsive tendencies toward conflicts, fantasies and projections, through "catharsis" in the classroom?