

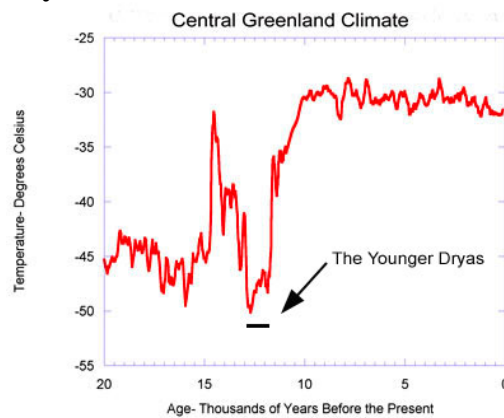
## Paradigm Shifts: New Views on Abrupt Climate Change



**The Ocean "Conveyor Belt"**



**The Younger Dryas flower**



### **Welcome to the Adventure!**

This seminar will explore some big but connected ideas: changes of the human mind and in earth's climate. We'll focus especially on how to think about how and why abrupt changes occur, and the relationship between human conceptual change and climate change. We will study climates of the ancient past, the present, and speculate about our future.

This seminar purposefully juxtaposes ideas that don't seem connected at first glance! We'll be talking about ideas that apply to nature (climate) and humans (mind change). Climate and the human mind are both complex systems that require a fundamentally different approach compared to the simple systems studied in the past by scientists. You will constantly be crossing boundaries between natural science and social science, studying both human and nonhuman abrupt change. This kind of interdisciplinary work is fun, playful, exploratory, creative, integrative, and synthetic. It is also necessarily unpredictable, as everyone makes connections in different ways. Make a conscious effort to connect and integrate ideas from different areas of understanding, and listen to others who are doing the same. The more risks we each take to explore new ideas and their connections together, the more we will all learn together.

Please keep an open mind and be ready to think hard about your own beliefs. It's quite likely that each of us will experience mind changes of our own this term.

## Paradigm Shift Dyad Link: The Mind-Brain Seminar

*Dyad: An interpersonal encounter between two groups*

Our seminar will be studying an ongoing paradigm shift in climate science regarding how fast the global climate can change. A second first-year seminar, IDSC100-02 (Prof. Larry Wichlinski, Psychology), will be studying an ongoing paradigm shift in neuroscience regarding the mind-brain relationship. That seminar meets during our class time in the adjacent classroom. Periodically, our seminars will jointly meet, read, and discuss readings about: changes that occur in social settings (social epidemics), paradigm shifts in scientific communities, and human mind changes in individuals and societies.

You will have a chance to connect in several ways to the students in the mind-brain seminar. We will have joint classes, as noted above. We will also use at least one class to teach each other about what we are learning about climate change and the mind-brain relationship, with an eye toward making new connections and understandings. You may have a chance to do a final project with a student in the other seminar (details TBA later).

### Dyad Instructors

Main instructor: Prof. Trish Ferrett, x 4408, Mudd 189, [tferrett@Carleton.edu](mailto:tferrett@Carleton.edu)  
<http://www.acad.carleton.edu/curricular/CHEM/faculty/tferrett/index.htm>

Other dyad instructor: Prof. Larry Wichlinski, x 4377, Olin 123, [lwichlin@carleton.edu](mailto:lwichlin@carleton.edu)  
<http://apps.carleton.edu/curricular/psyc/faculty/>

Dana Kraus, senior Biology major, x 7723, [dkraus@carleton.edu](mailto:dkraus@carleton.edu)  
Dana is the student co-author of some of our class activities on abrupt climate change. She will attend class and be available to help you in the course, especially with writing assignments. Listen for more details on how you can fruitfully interact with Dana.

### Seminar Learning Goals

- ✚ To practice keeping an **open mind** to new ideas and the possibility that you might change your own mind as you learn.
- ✚ To practice **connecting ideas** from different disciplines and perspectives (integrative and interdisciplinary learning).
- ✚ To learn the basic characteristics of **complex systems** that require an interdisciplinary approach (we'll do the human mind and earth's climate).
- ✚ To get a better sense for **how science works**, and how science knowledge is created.
- ✚ To think about the **differences between knowledge and belief**, and the symbiosis and tension we all experience everyday in living with both.
- ✚ To maintain a **critical and analytical stance** as we examine new ideas and things we know well from personal and life experiences: our own ideas and our climate.

## Map of Our Course

This plan is tentative, as any adventure involves the unexpected. We may adjust as the course and our learning unfolds. References to likely readings are noted (see ref numbers at end of syllabus). Listen in class for detailed reading, data, and writing assignments throughout the term.

Week 1 Sept. 13, 15	<b>Tipping points in social epidemics &amp; climate systems</b> Intro to Abrupt Climate Change Readings: Books by Gladwell (1) and Alley (2)
Week 2 Sept. 20, 22	<b>Tipping points in social epidemics &amp; climate systems</b> Paleoclimate data and proxies: abrupt events of the past Readings: Gladwell (1), Alley (2, 8), other articles
Week 3 Sept. 27, 29	<b>Paradigm shifts in science &amp; climate</b> The Younger Dryas event: Why did the climate tip? Readings: Kuhn (3) and maybe other articles
Week 4 Oct. 4, 6	<b>Paradigm shifts in science</b> Readings: Kuhn (3) and maybe other article
Week 5 Oct. 11, 13	<b>Integrating our understanding of paradigm shifts</b> Paradigm shifts in science, climate, and neuroscience
Week 6 Oct. 18, 20	<b>The Maya Collapse &amp; why societies make bad decisions</b> Readings: Maya article (6) and Diamond (5)
Week 7 Oct. 25, 27	<b>Changing Minds &amp; Our Future</b> What's up in the North Atlantic? Changing one's own and other people's minds Readings: Gardner (4), Alley (2), other articles
Week 8 Nov. 1, 3	<b>Changing Minds &amp; Our Future</b> Changing one's own and other people's minds Readings: Gardner (4)
Week 9 Nov. 8, 10	<b>Integration &amp; Project Week (TBA)</b>
Week 10 Nov. 15	<b>Final project activity &amp; closure</b> (Final projects details TBA in week 2 or 3)

## Primary Books, Readings, & Media

Purchase at our bookstore:

1. Malcolm Gladwell, *The Tipping Point. How Little Things Can Make a Big Difference* (2000). We'll read almost all of book early in the course.
2. Richard B. Alley, *The Two-Mile Time Machine. Ice Cores, Abrupt Climate Change, and Our Future* (2000). We'll read most of this book, in chunks spread across the course, as topics arise.
3. Thomas Kuhn, *The Structure of Scientific Revolutions*, 3<sup>rd</sup> ed. (1996, original in 1962). We'll read most of this, but with a focus on connecting it to our learning about abrupt climate change.
4. Howard Gardner. *The Art and Science of Changing Our Own and Other People's Minds* (2004). We'll probably read Chpts. 1-3, 6, and 8-10.

Possible readings and media, to be provided by instructor:

5. Jared Diamond, *Collapse. How Societies Choose to Fail or Succeed* (2005). Prologue (5-point framework), Chpt. 5 (Maya Collapse), and Chpt.14 (why societies make bad decisions).
6. Larry C. Peterson and Gerald H. Haug, "Climate and the Collapse of Maya Civilization", *American Scientist*, Vol. 93, July 2005, pp. 322-329.
7. Spencer Weart, "The Discovery of Rapid Climate Change", *Physics Today*, Aug. 2003, pp. 30-36.
8. Richard Alley, Abrupt Climate Change, *Scientific American*, Nov. 2004, pp. 62-69.
9. Activities from a new module on Abrupt Climate Change. Authored by Trish Ferrett, Britta Veitenheimer ('04), and Dana Kraus ('06).
10. Selected readings from: *Abrupt Climate Change, Inevitable Surprises* (NRC, 2002). National Academies Press.
11. Selected readings from: John Cox, *Climate Crash. Abrupt Climate Change and What It Means for Our Future* (2005).
12. Film: "The Day after Tomorrow" starring Dennis Quaid.

## **Expectations**

**The classroom experience.** Our seminar will be mostly discussion and activity-based, though your instructors will lecture on a need-to-know basis as well. Get in the habit of taking notes on your reading. Bring questions to class that you think warrant further discussion with the group. The goal of our discussion will be to learn from each other, so prepare to listen well to others and respond to their ideas respectfully and in a way that moves our learning forward. There will be times when you have a specific responsibility in class, probably with a partner.

Above all, let's try to see our discussions as a way to explore and connect ideas to deepen our understanding. Ideas do not need to be well-formed to be valuable for group's learning. You are invited to put forth young ideas so the group can learn by sharpening them together. Your instructors will do this often as well!

**Course writing.** Writing will serve several purposes in this course, including:

- Brief informal writing to help you clarify, summarize, and digest the readings to prepare for class discussion (quite informal)
- Writing to explore your own beliefs and understanding (more formal)
- Writing that aims for significant integration between ideas (more formal)
- Final project writing (the most formal, with cited sources)

Your instructor will try to be clear about how each writing assignment is evaluated. Some will be graded. Others will be collected, read, and you will receive credit for doing the assignment. You may have a chance to revise one assignment. *In order to pass the course, you must submit adequate work for all writing assignments.*

**Attending class.** You are expected to attend class unless you are ill or facing a personal or family crisis. If you need to miss a class and you know it, please talk to your instructor in advance to make arrangements.