ALPHA CHI
RECORDER

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On the cover

The cover photo honors the Arkansas Iota chapter at Lyon College, Batesville, Arkansas, which is the only two-time winner of the President's Cup (2007 and 2011) as Alpha Chi's outstanding chapter. The college's Lyon Business and Economics Building, which opened in 1993, has an auditorium, a computer lab, several classrooms and conference rooms, and faculty offices. Its clock tower houses the 24-bell Tower Campbell Carillon.

Living a Life of 'Intelligence'

An Interview with **Heather Triplett Biehl**

In the spring of 1989, Heather Triplett attended the Alpha Chi national convention in New Orleans and presented her senior research as a history major at Westminster College. Twenty-two years later, Heather Triplett Biehl made it to her second Alpha Chi convention, this time as recipient of the society's 2011 Distinguished Alumni Award, bringing with her a stellar record with the Central Intelligence Agency and a reputation as one of the nation's foremost authorities on counterterrorism.

Biehl worked for the CIA from 1989 to 1999, serving as a senior political analyst for the Office of Near East and South Asian Analysis and a senior Iraqi analyst, focusing on Iranian and counterterrorism issues, and receiving four awards for exceptional performance. In 2007 the deputy director of the CIA's counterterrorism center personally asked her to write the CIA's portion of the National Counterterrorism Implementation Plan. Her analysis was sent to the White House and was the CIA's blueprint for efforts through 2009.

In San Diego this March, Biehl captivated the convention audience with a speech that gave glimpses into her CIA work and focused on life lessons gained from "living a life of 'intelligence.'" Since leaving the CIA, Biehl has worked for two private companies, BAE Systems-Advanced Information Technologies and BBN Technologies, both of which support the country's intelligence operations. Married with two children, she is also a cellist with

the Merrimack Valley Philharmonic Orchestra and is an active volunteer in the Acton, Massachusetts, school district.

Biehl graciously agreed to this interview with the Recorder.

***Q**: Your alma mater, Westminster College, nominated you for this award. How did you get from Westminster to the CIA?*

***HEATHER BIEHL*:** In 1985 I graduated from the Jefferson City, Missouri, High School and made my way an *entire* 25 miles north to attend a small liberal arts college called Westminster. Westminster is a great college with the notable distinction of being the site where Winston Churchill gave his famous Iron Curtain speech. While I started the school expecting to be a pre-med major, in typical liberal arts fashion I walked out four years later, in 1989, with a history/poly sci degree and a job at the Central Intelligence Agency. Because, really, what else do you do with a history/poly sci degree? I wanted a grand adventure, and just the process of moving to Washington, D.C., seemed like a good start.

***Q**: Despite the stereotype, we know not everyone in the CIA is a spy. Tell us about the training a new CIA recruit receives.*

***HB*:** I entered a special competitive program at the CIA which provides paramilitary familiarization training, internships across the Intelligence and Defense Communities, and instruction in all four of the traditional CIA groups:

- Analytic—which would become my home component
- Operative—you know, the spies
- Scientists—aka, scientists and engineers like "Q" from the James Bond movies—and
- Logistics—the folks who make sure agents are protected and get overseas with all of their "stuff," and all the other professions necessary to keep a bunch of spooks operating effectively.

Over the next year, I found myself getting paid to jump out of helicopters, taking a course on how to build bombs, learning how to drive "defensively" in case I was ever being chased around a foreign country, and firing over 100 different kinds of firearms. This included a rocket-propelled grenade that I got to shoot at an old tank. Not your average company indoctrination… and I loved it.

***Q**: What was your primary responsibility in your years with the CIA?*

***HB*:** I eventually became a senior political analyst in the office of Near East and South Asian analysis. For the entire decade of the '90s, I reported on Iraq, addressed the U.N. Security Council members on a regular basis, ended up briefing kings and prime ministers, and as a senior member of the Iraqi analysis team prepared daily publications for the White House,



Photos by Bill Clemente

the State Department, and the Congress. I conducted in-person briefings with two Presidents, and after the horrors of 9/11, I helped write the blueprint for combating terrorism that was eventually adopted by the White House.

***Q**: You also married and juggled family and career.*

***HB*:** Yes, I met my husband, Bob, at the Agency. As a trained engineer, he spent over a decade making cool widgets and deploying with Special Forces teams on counterterrorism and hostage rescue teams. For years, he couldn't leave the Washington area as he had to be on constant standby to deploy. He won the Intelligence Commendation Medal for his work in 1990.

In late 1999 I was pregnant with my second child and living in the Boston area. Bob and I both felt that while we loved our exciting government service, it was perhaps time that we both had private jobs that would take us further out of harm's way. We have both found ways to still serve the U.S. intelligence community. We just do this now by helping create new technologies to help national security efforts.

Since 2003, I've worked with two companies that are filled with Ph.D.s from MIT who truly are rocket scientists, quantum physics experts, the world leaders in speech and language technologies, sensors, information assurance operatives, and more. It has been a liberal arts major's dream come true. I work with these geniuses to take new technologies into the intelligence community (we call it the IC) to solve continued hard problems.

We are most grateful, however, that we have managed to raise two great kids while maintaining exciting careers. My son, Alexander, is an avid musician and formed a rock band called Contents Under Pressure with other junior high students. My daughter, Sophie, is in grade school and is ready to rule the universe!

***Q**: Your convention speech in San Diego focused on lessons you learned from what you called your CIA "war stories." How do such lessons apply to success in any job?*

***HB*:** I thought it was important to share the lessons because they reflect just how rewarding it is when you find yourself "changing the world," or at least your part of it. You might think that having a career in the Intelligence Community makes it easy to come up with examples of success. But it really comes down to the same thing in *any* job. To live a life of intelligence—pun intended—no matter your chosen profession, you must find and practice your passion, understand the needs of yourself and others, and work harder than you imagined possible.

***Q**: One of the stories you told was about when you discovered what it means to be an expert. It made a powerful impression on the young people in the audience who are at about the age you were when you learned this lesson.*

***HB*:** Before I went to Washington, I had the notion that folks who worked in the IC or who made U.S. foreign policy were brilliant and somehow anointed with a magical power of understanding the right thing to say or do. It *is* true that we have amazing and creative public servants who work tirelessly to try to "do the right thing." It just never occurred to me that *I* could become one of those experts just by doing my job day in and day out.

My first training rotation inside an analytic component landed me in the East European section on the Romanian desk. The senior analyst there had worked this account for twenty years, but in the summer of 1990 following the fall of the dictator Ceausescu, she had to leave to take care of her ill mother. This left me, at 23 years old and on my first assignment, to cover the first democratic election of a new Romanian leader and to make the call if these elections were "free and fair" by U.S. standards.

Biehl with outgoing National Council president Clark Youngblood, who presented the Distinguished Alumni plaque. Photo by Bill Clemente

I spent three months reading all of the information from the field and collaborated with other agencies. I literally slept on a cot at the office to stay on top of the fast-paced and ever- changing situation. I was hooked! I could not imagine doing anything more exciting in my life. At the critical moment, I wrote a paper stating that the elections were *not*, in fact, free or fair.

The next day, the head of the East European office returned from monitoring the elections in person and called me in to question my analysis. He said he personally had not seen any indication of my claim that the interim government had kept people away from the polls and intimidated opposition candidates. He listened to my recitation of the evidence, my consideration of the various hypotheses, and an estimation of what information we lacked to give the full picture. He finally said "good job" and then bundled me into a car to go brief "some guy" at the State Department.

My first clue that something was up should have been that I was put into a chauffeured car (that rarely happens … you usually have to schlep yourself downtown, find parking, and hope you can run fast enough to make your meeting). Then I was taken to a very nice office at the State Department and introduced to the head of the Eastern European section. He wanted me to justify my conclusions, give solid evidence to back up my analysis, and point out what I didn't know that might affect that bottom line. At the end of two hours, he smiled, put his feet up on the desk, and said, "I hope you realize you just cost the new Romanian government $195 million in U.S. government aid and support."

I stared at him and said the first thing that came to my mind, which was the brilliant "Are you sure? I'm just a kid from mid-Missouri. Don't you want to ask your experts?" He laughed and said, "I think you *are* the expert. You've memorized every cable you've read, you did hours of homework on Romanian history to understand the nuances of their speeches, you considered every hypothesis I can think of, and you made a case for why our inevitable information gaps would not fundamentally change the bottom line. *Hard work and preparation is all any expert really is.*"

I learned several lessons that day:

- First, if you work hard and do your best to be prepared, *you* can be the expert. Even if you are a 23-year-old first assignment geek from mid-Missouri.
- Second, make sure you carefully think about every situation *and* about the possible alternatives to yours or others' actions. This way, you can give your listener the best, most complete, and most informed answer possible.
- Third, always do your homework about whom you are talking to, what they will want to know, and what they need in order to look good for their boss! You can't lose by helping others succeed.

Q*: From watching movies and reading espionage novels, most of us have the stereotype that people in the Intelligence Community operate in a culture of lies and deception and therefore have at best a dubious ethical sense. How does an individual of good conscience survive in such an environment?*

HB**:** You can imagine that there were many times when my husband and I had to deeply examine the ethics of what our job required. The last thing we wanted to do was to go to work one day, and end up testifying to Congress the next! Trust me: having to testify about your analysis is plenty scary enough.

There are always black and white cases where your moral code will lead you to the right answer. It's not always so clear that you're getting near the ethical boundaries, however. In the IC, it is quite simply required that you deal with some bad guys, as these are the ones who have the information you need to keep the nation from harm. Likewise, when you live overseas, the customs and moral values often differ from your own. My husband was always faced with the chance that he might have to take another's life to save his own or those of the hostages he was rescuing. We both had the opportunity—untaken, I assure you—to financially benefit in questionable ways as we handled large amounts of money.

Understanding the need to check and double check your motives and your actions is imperative. This is true even if it means you have to put your continued employment at risk. Fortunately, Bob and I both had great bosses and leaders around us who deeply believed that doing right was just as important as doing well.

***Q**: Who in your life had the greatest influence on the development of your moral compass?*

***HB*:** It would have to be my parents. As an example, I like to tell a story about my father. At age 30, Dad found himself finally moving up the old corporate ladder after marrying young, starting a family, and having to drop out of college. He was the manager at a company and quickly became the head of the business office. The night of his promotion, my mother also let us know that we'd have a new little one appearing the following winter.

Delegates from Westminster College, Biehl's alma mater, celebrate her award. Photo by Bill Clemente

Unfortunately, my father's boss turned out to be a loser. The next day, he pulled Dad aside and told him that he realized my father would soon discover that he was cooking the books. He offered my Dad a substantial share of the ill-gotten profit if he would keep his mouth shut and go along with the activities.

My father walked away from his job that day. The consequences were harsh. He spent the next six months living above my uncle's auto repair shop two hours away and pumping gas six days a week in order to keep our home and feed my family. My mother had to raise a 10-year-old and a 6-year-old by herself while she waited for her third child to arrive. It took my Dad six months to find another job and be able to move back home. But he took the course that he knew was right and stayed true to who he wanted to be.

***Q**: What advice would you offer to Alpha Chi students on this matter of ethical integrity?*

***HB*:** I would say that right now is probably the most important time in your life to think about—even write down—those basic, fundamental truths you hope to maintain as you move out to practice the academic passions you've followed in college. Look back at your list often, adjust as necessary, and work your way through the inevitable grey areas as honestly as you can. Truly, this is one of the best ways to live the "intelligent" life that we all aspire to.

***Q**: Speaking of emotionally difficult decisions, no one at the convention will forget your story about the food test at the dinner in Japan. Please tell it again.*

***HB*:** During my career, I've traveled and worked in over thirty countries, primarily in the Middle East and Europe. However, in 1995 I found myself on a very interesting two-week trip

outside Tokyo as part of a small U.S. delegation meeting with a large Japanese government contingent. We were participating in an Intelligence exchange about the Middle East, and in particular were trying to get the Japanese government to sign a document to back the United States on a new approach to dealing with Iraq's refusal to abide by U.N. sanctions.

A senior manager of the CIA headed the U.S. delegation, and I worked closely with him to explain to the Japanese why the U.S. felt so strongly that we needed their support. Day after day we conducted business while he pestered the Japanese for their signature. We got to the last evening without the paper in hand.

Now, as the only female member in the entire gathering, I got the dubious honor of sitting at right hand of the Japanese army colonel who was our host and who also guided us through a different ceremonial dinner each night. As a result, my comrades could pass up all the raw and weird food, but I felt obligated to try a bit of everything. (A reminder here: I grew up in mid-Missouri. Not a lot of sushi bars back there to prepare me for this occasion.)

As the dinner hour came to close that final night, my boss became quite irritated and sulked about the Japanese intransigence. The Colonel just smiled and said he was saving a "special treat" for us honored guests. Soon the lights dimmed and six women in spectacular ceremonial garb carried in a very large decorative bowl, eight jars of special sake, and a large basket that seemed to be squirming.

They placed the bowl in front of the Colonel, poured the sake in, and then uncovered the basket. Inside was the largest bug I had ever seen. Its body segment was at least 18 inches long, and its head and tail added another foot to the length. They dropped the giant cockroach-looking creature into the bowl, where it essentially almost drowned in the sake as it became numb. Then the Colonel took the bug out, flipped it on its back, opened up the stomach, and scooped out the insides.

The Colonel then handed the "treat" to my boss and told him that as the most senior guest, it was his responsibility to accept this great gift and demonstrate that the U.S. honored Japanese friendship. Then, said the Colonel, he would sign the paper of support we were requesting.

My boss looked at the mess and grew very pale. He said he couldn't accept this gift and clearly balked at eating the "delicacy." I stared at him, not believing that he'd let the chance to cement the deal pass us by. The whole trip and a very important U.S. policy interest hung in the balance, and he couldn't "man up"? Then he looked at me and blurted, "She'll do it."

The Colonel looked at me and said, "In Japan, we teach that a boss should never pass a job to his underling that he cannot do himself. Heather, what do you think the underling's role should be in a case like this?" I smiled and said, "Sir, I believe that the underling should do her best to make her host know how much she and her entourage appreciate the hospitality and courage shown to them. She should accept the honor and gift for her boss—but expect that the boss will repay her with a nice hefty bonus for doing *his* job."

The Colonel roared with laughter. I wish he had also just signed the paper. But I had to eat that bug! Honestly, I haven't had sushi since!

***Q**: And the moral of the story?*

***HB*:** I said there were three. First, sometimes service, in this case to country, really is more important than your sensibilities. Second, the fact that your boss is a wuss doesn't mean you have to be. Third, doing the right thing is, in fact, better than taking the easy way out.

Well, also a fourth lesson, actually: Bugs really don't taste good.

***Q**: You've described your intelligence work—both with the CIA and private firms—as a liberal arts major's dream. As education assessment specialists would ask, what "knowledge, skills, and dispositions" did you develop in college that have contributed to your professional success?*

***HB*:** I entered college as a pre-med major, sure that I would graduate and go to medical school. While I remain fascinated by the human body and the medical sciences, I allowed myself to explore multiple academic areas at Westminster. By my sophomore year, it was clear that my true passion was in history and international relations. Even today, twenty-two years after graduation, I'm a news junkie and can't wait to analyze and predict what might happen in various countries. I feel fortunate that I was able to build a career around this passion.

There are basic important skills, however, that I consistently see shared among all the superstars I have had the chance to work with:

- One—and I preach this to my kids—in every spare moment you have, you'd better have a book in your hand! Reading broadly across all types of fiction, non-fiction, trade publications, etc., is *the* number one factor in most success stories. My husband often teases me that I must have graduated from the "Hunter College of Obscure Knowledge" when I come up with odd bits of trivia. However, it makes me able to communicate with bosses and co-workers and brings new views to the table.
- Two, learn to learn. By this, I mean make sure you keep yourself open to new discoveries, interesting tidbits, and the newest thought in your field. Even if you "become the expert," you always have plenty more to learn.
- Third, always be willing to take a chance. I had plenty of doubt as I morphed from CIA analyst to private company executive. However, taking the previous two points to heart, I knew that I needed to continue to expand my horizons even as I worked for that job-family life balance.

***Q**: Although your career in the intelligence community is a demanding one, you find time for other civic involvement. Tell us about some of your interests and why you are passionate about them.*

***HB*:** I've been very involved in my children's schools and in trying to re-work state-level funding fairly across all of Massachusetts. I served as head of the PTO at my children's grade school. The parents there would give over $100,000 a year in order to keep aides in every classroom and give special programs in the arts their due. I also continue to play the cello, which I began in an elementary school program in Missouri thirty-five years ago.

Sharing a moment with Sophie at the banquet. Photo by Bill Clemente

***Q**: You're apparently the first Distinguished Alumni Award winner to have attended a national Alpha Chi convention as a student. What do you remember about that convention in New Orleans in 1989?*

***HB*:** I had such a lovely time in New Orleans. I presented a portion of my senior history thesis, which dealt with Churchill's decisions to prevent the immigration of Jews to Palestine before World War II. My parents happened to be in New Orleans at the same time for another conference, so they got to see my presentation. I appreciated the questions I received from the other attendees and the wide variety of topics to explore.

I also had the chance to eat alligator there… maybe that prepared me for the raw bugs later in life! There was also a Navy ship in port, and I got to sit in a helicopter for the first time while touring the vessel.

***Q**: It was neat to see that you brought your young daughter with you to this convention.*

***HB*:** Sophie, who is 11, joined me on the trip to see just how "cool" it is to be a college student. She had a hard time deciding which of the student presentations to see, as she is interested in history, law, veterinary science, poetry, and being the scientist in the future who proves the existence of dark matter. I'm sure she'll find herself at the Alpha Chi convention of 2021 under her own power!

Seriously Green

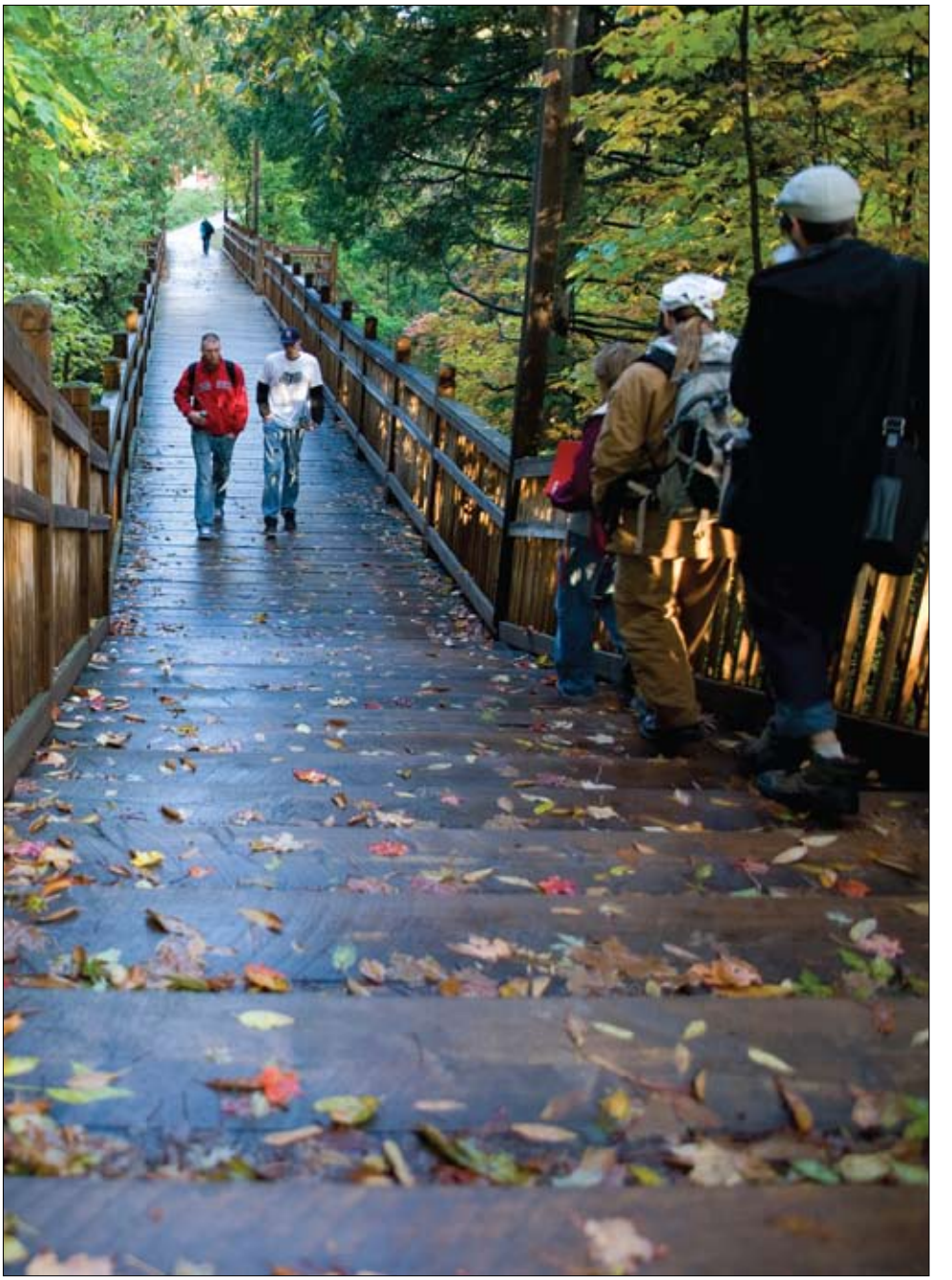
A small college with a big reputation, Northland College has made its mark as one of the most environmentally conscious institutions in the country. The college's sustainability ethos influences institutional policies, curricula, student programming, and even research, in which the faculty sponsor of the Wisconsin Beta chapter is a campus leader.

By **Ed Morales and Danielle Kaeding**

Summers in Ashland, Wisconsin, are the kind one may see depicted in a Norman Rockwell painting. Flower baskets of blushing petunias adorn lampposts on the city's historic Main Street. People pad lazily along as they window shop, pausing in the shade of brownstone buildings. Sailboats pepper the sandy southern shoreline of the Chequamegon Bay on Lake Superior. But on this June day, David Hunsicker is tucked away in the chemistry wing at Ashland's Northland College—working.

Hunsicker, recent Northland graduate and Alpha Chi member, is spending his days in the research lab of the Larson-Juhl Center for Science and the Environment. He is conducting experiments aimed at developing new biorenewable polymers to create biodegradable plastics.

This is the fifth in a series of articles about distinctive programs or projects at Alpha Chi colleges and universities. Ed Morales and Danielle Kaeding are Northland staff writers.



Northland students make their way across Bay City Creek on Wheeler Bridge, which connects the main campus with the college's science center and environmental institute.

All photos courtesy of Northland College

"Polymers in a rough analogy are like a long [molecular] chain, so we're taking these chain links and trying to make a long chain," Hunsicker explains as if the process of manipulating chemicals from biorenewable sources were really that simple.

Biorenewable plastics are derived from plant sources such as corn. Historically, production of biorenewable plastics has been too costly to compete with more traditional petroleum-derived plastics. However, the rising cost of oil has generated renewed interest in plastics that can be derived from sources other than fossil fuels.

"There are a lot of drawbacks with traditional plastics and traditional polymers," says Hunsicker.

Emerging research is suggesting that many may actually have health hazards associated with them, such as the recent bisphenol-A (BPA) scare. At the same time, alternatives to petroleum-derived plastics have arrived in the marketplace. Polylactic acid, which is derived from plants and marketed under the trade name NatureWorks® or Ingeo,® is one form of biorenewable plastic now used in clear coffeehouse to-go cups or clamshell to-go food packaging.

In the lab, Hunsicker is making new chemical reactions happen. However, the real chemistry occurred several years ago when Northland College first caught his eye. At the time, Hunsicker was serving in the U.S. Coast Guard and stationed in Sturgeon Bay, Wisconsin.

PRECISE MEASUREMENTS — David Hunsicker, Alphi Chi member and recent Northland College graduate, works in the lab to advance research on new polymers to be used in the creation of biodegradable plastics. The process is anything but simple and often entails the use of nitrous oxide. Experiments are typically conducted behind a guard screen to protect researchers from volatile chemicals that may become combustible if anything goes wrong with the process.

"Northland was right what I was looking for—sort of a smaller college with a unique mission," he says.

Faculty-led research

Now, Hunsicker works with Ivy League-educated chemist Dr. Nick Robertson. Robertson joined the faculty of Northland College in 2009 as an assistant professor of chemistry and is spearheading their research on biorenewable plastics.

"Pretty much everything our society uses is derived from oil," Robertson says. "But using oil comes with a lot of baggage. Whatever your political stance may be, you can find a problem with fossil fuels."

In January 2011, Robertson assumed the role of Northland's Alpha Chi faculty sponsor, following the departure of longtime advisor and associate professor of biology Jim Paruk. In May, Robertson and his students delved into biorenewable plastics research at Northland—a project he imagines will come to represent a significant portion of his life's work.

Robertson works closely with a small team of undergraduate student researchers to advance the study. He darts between chemistry labs, supervising procedures and offering technical guidance and support. While he provides the vision for the study and determines its ultimate direction, Robertson emphasizes the role of students in his research.

"The ultimate goal is to probe how the molecular structure impacts polymer properties and how it's affected by bio-derived chemicals," he says. "The end goal of the research is noble, but the more important goal is to educate students."

Brian Dauphinais is a senior studying chemistry with a focus in polymer research. Student researchers are attempting to create new polymers from biorenewable sources, such as sugars from plants. The polymers will then be examined to test the durability and effectiveness of their chemical chains.

"A lot of people don't get [chemistry] and I get it," Dauphinais says, smiling. "You find something you're good at it and you tend to enjoy it more, I guess."

He's hoping to continue with his education in polymer research, engineering or water purification after he finishes his senior year at Northland College. He has yet to apply to any grad schools, but Dauphinais is looking into programs at the University of Minnesota and University of Massachusetts at Amherst. One benefit of graduate studies in the natural sciences or engineering is that students can frequently get their tuition covered as well as health insurance and a cost-of-living stipend.

Receiving assistance from professors with research is also much less difficult, adds Dauphinais. Studying polymer research at a small private college has afforded him a more personal interaction with instructors. If he has any questions about the process, Robertson is ready to clarify or help him with the research.

"It's nice that Nick is so available," Dauphinais says.

"Students being involved is not critical to the [progress of the] research," notes Robertson, "But, having them involved [and at the center of the project] is critical to their overall education."

Robertson says the encouragement of advisors throughout his education played a major role in his decision to pursue a career at a small liberal arts and sciences college. He says that being involved in research as an undergraduate at the University of Wisconsin–Eau Claire

was a major contributor to his development as both a scientist and a professor. Robertson follows a philosophy of education known as collaborative research, which emphasizes the relationship between the professor and the student.

"A major advantage of smaller colleges [like Northland] is that faculty can be solely focused on the undergraduates," says Robertson. "If, as a student, you can contribute to a manuscript or take part in a presentation at a national conference, you can greatly increase your odds of getting into a top tier graduate school."

Dr. Nick Robertson

Robertson acknowledges that Northland's modest research facilities are unable to compete directly with the multi-million-dollar projects being developed at large state universities. Regardless, he hopes that his research into biorenewable plastics will be able to contribute something meaningful to the academic understanding of the materials.

Robertson says that research into biorenewable plastics is still in its infancy. The burgeoning industry, he says, will have to overcome tremendous obstacles in the coming years if it is to be economically viable. Presently, there is little financial incentive to shift from fossil fuel-derived polymers to biorenewable plastics. While fossil fuel production has had a century to be developed and refined, research into biorenewable plastics is just getting off the ground.

"The oil industry is extraordinarily efficient," he says. "And [biorenewable plastics] are expensive by comparison."

Heritage of environmental education

The research by Robertson and his students echoes and complements an institutional bias toward sustainability and environmental education that has been in the making for more than forty years. Founded in 1892 as the North Wisconsin Academy, Northland College was established to serve the pioneer population of northwestern Wisconsin's frontier. After several years serving the region's youth, the Academy developed a higher education program. The Academy transformed into Northland College, graduating its first class of nine students

four years later.

The college town of Ashland lies along the southern edge of Lake Superior and the Chequamegon Bay. Northland has long attracted a particular breed of student to its tree-filled campus as it is surrounded by nearly a million acres of public land, including the Chequamegon-Nicolet National Forest and the Apostle Islands National Lakeshore. The close proximity of the college to abundant natural resources has led to a natural symbiosis between the school and a deep study of the environment.

That study of the environment led to the creation of the Sigurd Olson Environmental Institute (SOEI), the research and outreach arm of the college. Olson, one of America's pre-eminent nature writers and conservationists, was born and raised in Ashland, maintaining ties to the region until his passing in 1982. Several notable conservationists including Olson and Earth Day founder and Wisconsin State Senator Gaylord Nelson attended the institute's founding ceremony in 1973. Today, the SOEI champions sustainable development, wildlife preservation, and environmental remediation.

The founding of the SOEI precipitated a swift move to adopt an environmental mission. Just two years after founding the SOEI, the college formally adopted an environmental mission, becoming among the first in the nation to explicitly emphasize the connection between liberal arts and the environment.

Northland College expanded that connection in 2007 when it joined more than 150 college and university presidents in signing the American College and University Presidents' Climate Commitment. The commitment is the brainchild of a consortium of college presidents and environmental advocacy organizations and is billed as a comprehensive framework for addressing issues presented by climate instability. Today, the commitment boasts more than 650 signatories.

Library renovation project

In 2009 the college began planning an extensive renovation to the historic Dexter Library, the first major campus construction since the college signed on to the Presidents' Climate Commitment. As specified under the agreement, new campus construction would be expected to qualify for Leadership in Environmental Engineering and Design (LEED) Silver certification. LEED certification, developed in 1998 by the United States Green Building Council, is the world's leading green building certification system. Structures that receive LEED certification have been designed and constructed using strategies aimed at improving energy efficiency, carbon dioxide emissions, and stewardship of resources involved in their construction.

In the case of the Dexter renovation, the college pushed for the more stringent LEED Gold certification. Under these guidelines, Northland would be required to ensure that surplus materials from the construction process are recycled or repurposed elsewhere, lessening the impact on landfills. In pursuit of this certification, roofing rubber removed from the library during the renovation was reused elsewhere on campus, including Northland's Mino Aki Community Garden, where sections of the material were repurposed as a door to the garden's hoop house.

What was once as an inefficient, energy-intensive building is now a sleek example of what can be achieved in green construction. Today, thirty geothermal wells provide enough

heat to the library to ensure that the building never requires the use of its traditional boiler system. Storm water runoff is managed by a natively landscaped bioswale, mitigating the volume and impact of runoff from the building's roof. A 14-kilowatt group of solar panels, installed by students during a May-term solar power course, supplies electricity to the library and reduces the building's power consumption.

"We designed a renovation that tops the charts in terms of energy performance," said Alex Haecker, senior associate at Meyer, Scherer and Rockcastle, the firm that led the renovation project. "Simple moves, such as new windows, energy-saving lights, and thick roof insulation, were coupled with a geothermal well field for heating and cooling the building and a photovoltaic solar array system to provide up to 25 percent of the electrical load on site."

The library's renovation marked the latest evolution of Northland's pursuit of sustainable building design, but the college is by no means a stranger to green construction. The Wendy and Malcom McLean Environmental Living and Learning Center (MELLC), built in 1998, served as an early model for green design before the development of the LEED rating system. The MELLC features both solar power and heating, a wind turbine, composting toilets and furniture made from recycled milk cartons, among other green elements. The building also features a sophisticated system of sensors and displays that allow students to monitor energy use inside the residence and sheds light on just how much energy is being generated by the solar panels.

A culture of student initiatives

College-wide initiatives like the renovation of the Dexter Library are paralleled by a robust culture of student-driven initiatives. Student workers tend to the campus compost system, a network of buckets stashed around campus that funnel organic waste into a large Earth Tub composter. Finished compost is often used in the Mino Aki Community Garden, which itself is managed by students. In addition, Northland offers gardening space to community members and provides fresh produce to the campus cafeteria and Northland's new student orientation program. Students also staff the campus Reuse Room, a free-to-use space that encourages students to exchange clothing, books, and other material goods, diverting unwanted items that might otherwise end up in landfills.

Northland's student-driven sustainability initiatives enjoy a tremendous track record of success. During the fall 2010 semester, more than 2,500 pounds of food waste from the cafeteria, dorms, and offices were diverted from landfills and into the composting system. Last semester, nearly 900 pounds of goods were cycled through the Reuse Room. The fall student orientation program, known as Outdoor Orientation, is supplied exclusively with fresh produce from the campus community gardens.

"A lot of students haven't really been in a garden before and so they're a little bit lost," says Emily Schlager, student and community gardens coordinator. "It's really cool because they get to see exactly where their food is coming from. Food is such an important part of sustainability, and food production is one of the areas that typically has a large carbon footprint. By growing food locally, we're minimizing our impact on the environment."

Evidence of Northland's push toward sustainability can be found throughout its campus from projects focused on food systems to programs addressing fossil-fuel-free transportation, such as the Northland College Bike Shoppe. Founded in the late 1990s by a group of stu-

STUDENTS DOING THEIR PART— Emily Schlager, student coordinator of the community gardens, trims the stem from a squash while harvesting food for the campus cafeteria and new student orientation activities. Below, Rodney Claiborne works on a bike at the campus Bike Shoppe.

dents driven to reinvent community on campus, the Bike Shoppe today is a hub of student activity and community collaboration. Funded and managed by students, the Bike Shoppe provides bicycle repair services, maintenance classes, and a robust bike rental program—all at no cost to the community. Onlineuniversities.com recognized Northland College as the fourth most bike-friendly campus in 2011 due in part to the programs housed at the Bike Shoppe.

The Northland College Student Association (NCSA) lends its support to many of the student-led sustainability initiatives on campus. In terms of student governments, NCSA holds a fairly unique status as an organization that is both financially and administratively separate from the college. The separation enables the organization to levy student fees that fund student organizations and special projects, including the Renewable Energy Fund (REF). Managed entirely by students, the REF annually contributes more than $40,000 to campus

sustainability initiatives each year. Past projects have included funding a geothermal heating installation, developing solar hot water systems, and purchasing a Toyota Prius for the Office of Admissions.

Cool, green accolades

The college's efforts to develop campus-wide sustainability initiatives have led to numerous accolades and recognition from national publications, including awards from the Association for the Advancement of Sustainability in Higher Education, the Sierra Club, and the Sustainability Endowments Institute. The College was named to *Sierra Magazine*'s 2011 "Cool School" list, which recognizes leading colleges and universities for their efforts to stop global warming and operate sustainably. In a November 2010 article, *Forbes* magazine recognized Northland as one of "America's Greenest Colleges and Universities." Article author Brian Winfield wrote, "[F]or the last 39 years Northland College in Ashland, Wis., has given its liberal arts curriculum an environmental twist. Students can enroll in courses of study focused on sustainable agriculture, man's connections with nature, or the Lake Superior watershed (which includes a one-month trip around the watershed itself)."

Northland's integrated approach to sustainability reflects the institution's liberal arts heart. Students at Northland are invited to explore the institution's unique Connections program — a series of distinctive block-based curricula that encourage students to explore the relationships among the liberal arts, the environment, and the future of our planet and society. A Northland education is deeply rooted in developing a broad understanding of the nexus of the humanities and the sciences. Students can tie applied environmentalism into their undergraduate careers regardless of their fields of study.

Back in the chemistry lab, Nick Robertson credits Northland's integrated approach to education and sustainability with developing students who are able to think critically and understand their place in the larger world.

"Students here have a broad understanding of environmental issues. Often times they're looking to answer the question, 'How does this relate?'" he says. "They have a very applied focus."

While he is modest about Northland's role in the larger research community, he emphasizes that the point of involving students in his research is education.

"When I was an undergrad, I had no idea what scientific research was about. My [initial] impression of research was a high school research paper, but academic research couldn't be farther from that," he says. "[As a result of student-faculty collaborative research,] some of my peers … decided that research wasn't for them and went on to medical school or into another field. Regardless of what career path our students take, research experience will help them develop a close relationship with their advisors and help them develop their critical thinking skills."

As summer winds down, Robertson hopes to publish their initial findings in fall 2011. Students, he says, will continue to play a significant role in developing the manuscript and any related presentations.

The Birth of Science

By **Demetris Nicolaides**

Introduction

About 2,600 years ago the ancient Greeks had a magnificent intellectual awakening. "Suddenly" the popular but mythological world view was questioned, rethought, and changed. Nature was no longer a chaos where the phenomena were random, unpredictable, incomprehensible, and attributed to the supernatural through myths, superstition, and decisions of capricious gods. On the contrary, nature was a cosmos: a well-structured, organized, ordered, harmonious, beautiful, self-contained whole where the phenomena were natural, obeying intrinsic laws that could be discovered and understood. This new way of thinking, ascribing naturalistic causes to all phenomena of nature, gave birth to science.

But what led to the intellectual transition from mythology to science in ancient Greece? These factors are generally accepted as having created conditions for such a transition:

1. Geographic: Locally, a landscape of natural boundaries—mountains separating cities and the sea separating islands—helped in the formation of relatively isolated city-states and promoted intellectual diversity. Diverse ideas were ultimately shared and improved when

people moved and interacted. Globally, the crossroads location of Greece exposed its people to ideas of other great civilizations from Europe, Asia, and Africa. Moreover, Greece's long coastline and many surrounding islands resulted in the establishment of coastal and island cities and made Greeks seafaring people. But their sea adventures aided them in demythologizing the phenomena of nature and stimulated them in conceiving rationalistic explanations.

2. Economic: Commoners became technologically inventive to better their lives. And even though technology is not science, rather the application of science, technology can lead to abstract theorization about how it can be improved and consequently the discovery of laws of nature upon which technology is based. On the other end of the economic spectrum, well-to-do people used their leisure to philosophize and theorize.

3. Religious: Contrary to hierarchy, which imposes dogmatic thinking, restricts inquiry, and impedes progress, religious freedom in Greece allowed for contemplation of diverse views and created a potential for betterment.

4. Political: Social freedom and democracy prompted free debates on just about everything, resulting in the conception and exchange of new and improved ideas.

Because these factors have been contemplated extensively in the literature (Burnet; Gregory; Kirk et al.; Lloyd; Russell; Sagan; Schrödinger, *Nature*), my focus in this article will be on two influences that have not been sufficiently appreciated.

The first influence is the Greek language. The superior communicative nature of ancient Greek helped in the conception and diffusion of knowledge in the most efficient way possible. While the first alphabet was Phoenician, the first true alphabet which contained vowels was the Greek. With this innovation Greek became the first easily read and written language of the world, and the facility of written Greek became significant in the evolution of ideas and the birth of science.

The facility of written Greek became significant in the evolution of ideas and the birth of science.

The second influence is simply the force of intellectual habits. I will argue that the good habit of practicing science by the first natural philosophers, 6th and 5th century B.C. Greeks who first explained the phenomena of nature in terms of naturalistic causes, imposed an epistemological kind of natural selection by promoting intellectually favorable environments where learning science could continue and new scientists could thrive and become abundant, contributing to the rise of the scientific outlook at the expense of the mythological one.

Language

What first interested me in investigating the language factor was a brief statement by Noble Prize laureate and 20th century philosopher Bertrand Russell: "The Greeks, borrow-

ing from the Phoenicians, altered the alphabet to suit their language, and made the important innovation of adding vowels instead of having only consonants. There can be no doubt that the acquisition of this convenient method of writing greatly hastened the rise of Greek civilization" (10). Although the Greek language is usually not regarded as a factor that created favorable conditions for the birth of science, I will argue that its influence was subtle but profound and thus cannot be overlooked.

I will lay the groundwork, in the next two subsections, by contemplating the general effectiveness of language in human survival and intellectual evolution.

The Sound of the Fittest

From the family tree of biological evolution the more anthropomorphic primates (the hominids, species which are more human than ape) are a family of species whose first member is believed to have evolved some 7 million years ago. Its two most recent members, who are relevant to our consideration of the effect of language on both our physical survival as well as our intellectual evolution, are *Homo neanderthals* and we, *Homo sapiens*, evolutionary cousins in that we share a direct common genetic ancestor. Both species are thought to have evolved only about 200,000 years ago, with Neanderthals preceding. So at one time the two cousin species shared the earth and possibly interacted.

Neanderthals are our closest genetic relative. Physically, in some very general terms, the two species were not that different. Neanderthals were short and stocky with a more elongated skull, and *Homo sapiens* were taller and thinner with our characteristic high dome skull. Furthermore, because the two cousin species share several brain similarities, it has been speculated that they were of comparable intelligence. This hypothesis, however, is the subject of current contention.

With such general similarities, both species would have been expected to survive, but only *Homo sapiens* managed. Unfortunately, between 25,000 to 30,000 years ago, Neanderthals became extinct. The theories for their extinction vary and are hotly debated. The cause might be just one or a combination of several, such as climate change or an isolated existence in clans, which might have resulted in limited exchange of ideas and thus a slower rate of intellectual progress than needed for surviving life's constantly changing challenges.

One theory of extinction relevant to our discussion on the importance of language in survival is Neanderthal-human competition (Diamond). Such competition might have, however, been destined to be unequal biologically. For through a mutation (a purely chance change in the genome, the hereditary substance) *Homo sapiens* were accidentally gifted by nature with the anatomy of a more efficient larynx that could produce a richer variety of sounds, creating therefore the potential to develop a relatively more advanced language than that of Neanderthals. This must have aided in the general survival of *Homo sapiens*. But some experts hypothesize that in a more specific way, this also might have been a contributing factor in our survival at the expense and general extinction of Neanderthals, by giving us a competitive advantage. It is probable that a better language enabled *Homo sapiens* to communicate essential survival skills such as hunting and gathering, making and refining tools, finding shelter, making friends, living together in extended social groups, forming alliances, trading, and generally learning from each other.

Consequently, *Homo sapiens* developed a better understanding of the world around them

and achieved an intellectual edge over their cousins the Neanderthals in all aspects of their competition. But during the early competitive environment of predators, limited resources, and in general a nature where survival was of the fittest, such intellectual advantage achieved through language skills (regardless of how primitive initially) made a difference between life and death. Thus, this theory holds, *Homo sapiens* secured their survival by overpowering and driving their own cousins to extinction.

Language is a useful skill, possibly the most powerful of humankind, not only in the struggle to survive, but also in our efforts to thrive and live fully. Language controls the flow of information and creates the potential for knowledge. But how rapidly does intellect evolve with the influence of language, especially an evolving language?

Biological vs. Intellectual Evolution

The effectiveness of language can be appreciated further by comparing the time required for the extremely slow biological evolution of the anthropomorphic family of species with that of the immeasurably faster intellectual evolution of the only species that managed it, *Homo sapiens*, and trying to explain the reason for such huge time difference.

Specifically, on the one hand the biological evolution of this family describes a 7-million-year process (from its first member species, the *sahelanthropus*, believed to have evolved about 7 million years ago, to its last and only extant member, *Homo sapiens*, who evolved about 200,000 years ago), but on the other hand the incredible intellectual evolution of this entire anthropomorphic family is due exclusively to the achievements of just this last member species. And depending on what might be regarded as advanced knowledge, such evolution can be condensed to an unbelievably small time interval. It could be 30,000 years (since splendid art was painted on cave walls by Ice Age cave dwellers); or 10,000 years (since the end of the last glacial period, which roughly coincided with the transition from the lifestyle of hunter-gatherer to farmer and consequently the beginning of urbanization, or of civilization); or 5,000 years (since the beginning of written history when Sumerians in Mesopotamia invented the first type of writing in the world at 3100 BC); or 2,600 years (since the birth of science in ancient Greece); or 500 years (since the rebirth of science during the end of Renaissance); or 300 years (since the Industrial Revolution); or, even more impressively, a mere few decades (since the discovery of the computer)!

To emphasize the unprecedentedly rapid cultural and intellectual evolution of the last few decades, I recall a comment by Isaac Asimov concerning the conclusion of his *Chronology of the World:* that, while his initial intention was to write the entire history of the world, from the Big Bang to the date his book would be completed (a some 15-billion-year period), he was finally forced to conclude it with the events of 1945 instead of 1989, the book's completion date, falling short of his initial goal by a mere forty-four years. And the reason was, he explained, that the changes brought about by the evolving human culture between 1945 and 1989 were so many, rapid, and universal that to be effectively described would require their own book as extensive as the *Chronology of the World*!

I concur with Asimov's assessment and base my understanding on the evolving notion of language itself. For from the simple sounds and symbolic cave art of the distant past, to the rich languages, modern mathematical symbols, and sophisticated electronic communications of the present, language has evolved to diversified and creative new modes that allow

for better conception, dissemination, and improvement of knowledge and consequently transforming our species intellectually faster than ever before.

More precisely, with time and as a consequence of advances in mathematics, science, and technology, the notion of language has been broadened. Mathematics has added a versatile variation in symbolic and quantitative communication, science has enhanced our imagination and invented naturalistic and rational interpretations of nature, and technology, mainly after the invention of computers (especially their interconnection via the sociologically revolutionary Internet), has enriched communication through myriad modes, including ones that affect all people of this planet and potentially intelligent beings of other star systems. For, traveling at the speed of light, a radio signal transmitted from the Arecibo Observatory in Puerto Rico in 1974 has as its destination the globular cluster M13, a group of some 300,000 stars in the constellation of Hercules 25,000 light years away from us. The signal's coded information about us can be easily decoded if intercepted by an intelligent alien life form.

Such is the power of language: it is a skill for rapid and extraordinary intellectual bursts!

For millennia, the idea of language has included more than gestures and sounds. Knowledge can be recorded many different ways and in places other than the human brain. Thus while we no longer need to remember everything, everything can still be remembered because the knowledge of the past is readily available and therefore accelerates the rate of progress. One can learn the accumulated knowledge of millennia by simply reading a book!

And all these because we were anatomically able to speak sounds, instinctively curious to develop them into coherent language, and intellectually successful in habitually passing on such great skill to our offspring. And such is the power of language: it is a skill for rapid and extraordinary intellectual bursts! Unquestionably language has been aiding in the advancement of science. But did it aid in its birth?

Ancient Greek Language and the Birth of Science

The evolution of the Greek language has been a huge topic for scholarly research. While I admit ignorance on such an immense linguistic field, I also know the generally accepted facts about Greek's extraordinary richness, such as a plentiful vocabulary, thorough and rigorous grammar, diverse phonology, and successful orthography, all of which contribute to the language's highly expressive and communicative nature. This distinct nature leads me to contemplate the connection of the language and the birth of science. But first some history.

Spoken since at least 2000 B.C. and written since at least 1400 B.C. (not yet with the Greek alphabet, which evolved a few centuries later), Greek is one of the world's oldest recorded living languages and the longest documented from the Indo-European family of

languages. Phoenicians invented their alphabet around 1050 B.C. Modeled after that, the first true alphabet containing vowels was invented by the Greeks around 8th century B.C. It was rapidly diffused throughout ancient Greece. With this innovation Greek became the first most easily read and written language of the world. This is so because alphabets are phonetic: each different sound of a language can be represented with a unique symbol and thereafter symbols can be combined to write and sound all the words of the language. Therefore, with an alphabet every language can be written and read relatively easily. In contrast, a pictographic writing system, in which a picture represents a word or phrase, is more complex. The success of the Greek alphabet is also indicated by the fact that after some 3,000 years, Greek is still written with the same letters that served as a basis for the Latin letters, and which, in turn, have been the basis of several modern languages. While Greek has been evolving, its overall identity has been basically preserved. Greek has remained relatively the same language until today, a rather rare but not accidental linguistic phenomenon.

Because of its simplicity, the Greek alphabet assisted in making the good habit of literacy accessible to all in ancient Greece. By 5th century B.C. every male citizen was expected to know how to read and write. Such widespread literacy undoubtedly accelerated progress. In contrast, the complexity of some other cultures' writing systems, often combined with their hierarchical political systems, made writing the nearly exclusive privilege of priests and professional scribes and not the populace, a situation arguably unfavorable for developing science. Greek literature begins with Homer's monumental epic poems *The Iliad* and *The Odyssey*, dated by consensus from around 8th century B.C. However, their surviving present form is at latest from 6th century B.C., the century when Greek philosophy science and mathematics began. From around 7th century B.C. are Hesiod's poems *Works and Days* and *Theogony*. All four works were significant in youth education.

These chronological facts indicate that Greek's relatively early growing richness was present by the time of the birth of science in early 6th century B.C. This evidence, together with the fact that Homer was from Ionia, which was also the birthplace of the first scientists (the natural philosophers Thales, Anaximander, Anaximenes, Xenophanes, Heraclitus, and Pythagoras), proves that science was born at a place and time where language was already advanced enough to aid the evolving scientists in the clear articulation of their theories.

This is a significant conclusion, for it links directly the positive influence that the ancient Greek language had on the birth of science. Greek had equipped the early philosophers with the skills for conceiving and formulating their abstract thoughts, clearly expressing their minds, and efficiently converting their raw intelligence to systematic, rational, transferable, and debatable knowledge. Without such productively expressive language, their scientific theories would have remained unrefined, perhaps not even conceived in the first place.

A poor language reduces not only the ability to express oneself but also the potential to learn from others, for if neither we nor others can think and communicate clearly, we can neither influence nor be influenced. And the poorer the speech and writing acquisition are, the more inadequate the cognitive process becomes.

It seems no accident, hence, that Greek language had been maturing roughly simultaneously with Greek thought in philosophy, science, and mathematics. For the sounds and symbols of a communicative language could create clearer thoughts, which could then refine further the language in a continuous interactive cycle of evolution of both. But mathematics is also a form of language, particularly the language of science. So while by language we usually

mean the communication in terms of sounds and written words, mathematics has empowered such notion tremendously by utilizing numbers, equations, complex diagrams, and abstract concepts. Mathematics develops abstract thinking and quantifies science. In turn, science enhances technology, which in turn enhances both science and mathematics, in a mutually productive process. Now since mathematics adds a valuable extension to the definition of language, can we find yet another link between language (specifically the mathematical) and the birth of science?

During the rise of Greek civilization, science and mathematics were driving each other and evolving simultaneously. The first natural philosophers were both scientists and mathematicians. Bertrand Russell has said, "The preeminence of the Greeks appears more clearly in mathematics and astronomy than in anything else" (208). Mathematics was a skill which enabled them to conceptualize and rationalize their scientific theories more easily, but equally important, their unprecedented physical intuition concerning the workings of nature aided them in advancing mathematics, and thus language.

The first natural philosopher, Thales (approx. 624-545 B.C.) was also a geometer. After him, the Pythagoreans were superb mathematicians and the first to implement the mathematical analysis of nature, a practice of vital significance in modern theoretical physics. Physicist and Noble Prize laureate Erwin Schrödinger argues that what guided Democritus (the last of pre-Socratics, 460-370 B.C.) in conceiving his atomic theory of matter was his deep insight of mathematics (*Nature,* 84). In fact, the most enduring discoveries from Greek science of antiquity were by natural philosophers who were also accomplished mathematicians.

The mathematical knowledge as a common characteristic among the pre-Socratics seems to indicate that science could not have been born by persons who did not know the language of mathematics. This is yet another conclusion which links directly the positive influence of the ancient Greek language, which in its broader definition includes mathematics, with the birth of science. Without a doubt, the clear conception and coherent expression of complex ideas were made easier by the communicative nature of the prolific ancient Greek language.

Habits

A combination of factors aided in the emergence of the first natural philosophers and in the transition from mythology to science. This unfolding new knowledge gradually advanced, spread, and grew popular, respectable, and practically valuable but also abstractly meaningful and satisfying. Among the Greeks generally, seeking knowledge became a way of life, a scientific habit that characterized the culture. And even though acquired properties such as knowledge and skills are not biologically inherited, habits (such as practicing science) and behaviors (such as a desire to advance the scientific outlook) associated with such properties are transmittable culturally through teaching and can still change the environment in complex and subtle ways. And in turn, through the process of natural selection from biological evolution, the environment can influence a species by controlling the direction of its evolution.

Specifically, the good habit of the first natural philosophers to practice science imposed an epistemological kind of natural selection by promoting scientifically favorable environments where learning could take place and new scientists could exist, thrive, and become abundant, contributing therefore to the constant development of the scientific outlook at the expense of the mythological one.

But since my goal is to explain the critical role that habits play in our intellectual evolution from the point of view of biological evolution, first I need to discuss further the notion of natural selection imposed by a habit.

Imposed Natural Selection

The process of biological evolution of the species begins with a mutation (a random alteration in the genome that can result in a new hereditary characteristic) and continues with the mechanism of natural selection (which says that inheritable characteristics that are also environmentally favorable become more common in successive generations). Natural selection can proceed as a consequence of a variety of environmental influences such as chronic periods of coldness, hotness, dryness, wetness, the eruption of a super volcano, changes in atmospheric composition, an asteroid-Earth collision, radiation from the Sun, or a supernova explosion.

But natural selection can also be imposed by the habits of a species; after all, species are part of nature and their actions affect it. In this case, if some members of a species already have or develop an inheritable trait (a mutation) that is favorable to a kind of environment created by a habit, either their own or another species', then they will be naturally selected. This means that these members will begin growing up more easily, prospering, adapting, preferentially reproducing, and becoming more abundant in such environment that is friendly to their rare trait. Assuming the habit persists, in time the species will gradually evolve to the point that most of its members possess the genetic trait favorable to the environment created by the habit. Following are two specific examples:

Natural selection can also be imposed by the habits of a species.

1. Microbes: While on the one hand a moderate use of antibiotics can be beneficial to our survival by killing myriad common harmful microbes, on the other hand a habit of thoughtless overuse of antibiotics can promote the evolution of rare but more harmful microbes that are resistant to the antibiotics we use. Natural selection, in this case imposed by the habit of overuse of antibiotics, can make common population characteristics rare (common microbes killed in myriads) and rare ones common (mutant microbes resistant to our antibiotics).

In the microbes example, the habits of one species, humans, can impose natural selection onto another species, microbes. The example below shows that the habits of a species can impose natural selection onto itself.

2. Birds: With the desirable genetic trait of wings, birds avoided many predators only when they began habitually using their wings for flying and building their nests high up in trees. Such habit imposed natural selection by creating an environment that selected and promoted even further the evolution of birds that could fly the best. With time these skilled high fliers became more abundant, while birds that could not fly proficiently became rarer.

The mythological world-view was once popular and the scientific rare, but since the birth of science their status has been gradually reversing, a fact that is contributing to the overall intellectual evolution of the human species. This observation brings me to a hypothesis, to be introduced in detail in the subsection below, that the good habit of doing science imposes an epistemological kind of natural selection that gradually selects people with scientific and, in general, intellectual tendencies. Such a habit not only secured the safe birth of science during the critical early stages 2,600 years ago but also has since then been contributing to the overall evolution of the scientific outlook at the expense of the mythological.

Erwin Schrödinger in his *Mind and Matter* gives a detailed analysis of (a) how behavior in general influences natural selection and thus the process of biological evolution and (b) how our invaluable characteristic of intelligence allows us to conceive and implement incalculable choices and so both our behavior and consequently our evolution depend on us, at least to a certain degree. Thus, he argues, our evolution does not depend solely on chance mutations. This is an encouraging but also challenging prospect. Based on these two points, he speculates on the potential of intellectual degeneration in our species. Below I will focus on an analysis exploring the opposite: how practicing science habitually has imposed an epistemological natural selection and has been influencing positively the evolution of the human intellect. (This is not to say, of course, that it could not influence it negatively).

Habits Influence Evolution

Since habits can impose natural selection and cause biological evolution, they can also cause intellectual evolution, for our organ of intelligence, the human brain, is just one of many body organs known in biology to have been evolving. So good human habits can cause a biological evolution of the brain and consequently create the potential for intellectual evolution. Just as birds that could fly the best were selected in the environment where flying became a bird habit, it is not unreasonable to suppose that the developing good habits of the pre-Socratics to understand nature scientifically instead of mythologically imposed natural selection by creating favorable environments for new scientists to flourish, multiply, and evolve. In short, the good habit of doing science set up an epistemological environment where the scientific man, in general the intellectual man, is favored and thus naturally selected.

Specifically, several good habits of pre-Socratics—people who were keenly observant, curious, skeptical, investigative, unconventional, open-minded, free-spirited, innovative, rational, passionate, eager to speak and write and debate, truly scientific, and generally epistemological (interested in knowledge of diverse fields)—have been inherited by succeeding generations, from their place to another, from the few to the many, from then to now, from ancient Greece to the rest of the world, and seem to have been imposing an epistemological kind of natural selection by promoting scientifically favorable environments.

These good habits have therefore contributed systematically to the formation of an ever-improving scientific world-view at the expense of the mythological one, and consequently advancing our overall intellectual evolution. For truly epistemological individuals have found such environments intellectually appealing, rewarding, welcoming, and increasingly more adaptational, so much so that today's humans have evolved to become intellectually superior to our ancestors, in fact to any other species known. Hence the kind of environment set up by the good habit of learning (or flying in the bird example) favors, through imposed natural

selection, the increase of those interested in learning (or flying).

A Good Genetic Trait and a Good Habit

So, having an environmentally desirable genetic trait (for example, a larynx, a complex brain, legs, wings) from which a good habit can develop (language, learning, walking, flying) is only one required element in the struggle for survival. Using the trait systematically and habitually is the second required element. For only then can the trait influence the environment via imposed natural selection so that the members who have it can be naturally selected even further and consequently increase their chances for survival and betterment by becoming environmentally fitter. In the evolution of birds, for example, those that did not take up the good habit of flying, despite their anatomic ability to do so, generally have less chance to survive attacks by predators. On the other hand, the expert fliers that use their wings proficiently flourish. Varieties that are not environmentally favorable (such as birds who despite having wings are not using them) can become rare and perhaps extinct. But even if they do manage, not following good habits makes their existence much more vulnerable.

Extending the logic of the bird example into the realm of humans and their intellectual habits, we see that a greater chance to flourish belongs to those who use their brains intelligently and try to develop good learning habits, such as attending school, in order to keep up with new challenges and opportunities of a changing environment. In this bird-human analogy there is, however, an important difference in favor of humans. We have a far greater level of intelligence. We have a choice of how to behave, and since behavior influences evolution, we too contribute significantly to our own evolution. Specifically, through chance mutations we were endowed by nature with the raw intelligence of an anatomically complex brain, but what also plays a critical role in its development is our conscious choice of using it productively. Again, I assert that practicing science habitually has imposed an epistemological kind of natural selection, changed the intellectual environment, and allowed us to realize our potential to live up to our name and become truly *sapiens*: wise. Starting around the 6th century B.C., science, philosophy, and mathematics were gradually becoming a way of life in ancient Greece, increasingly systematic and habitual, not just for a few individuals in a few places, especially in the education of the young, creating therefore a better chance for this way of life to be passed on to next generations and to people in new places. Since then, because learning science has gradually become a significant skill in life, the numbers of those with the mythological world-view have been decreasing while those with the scientific have been multiplying. This development is comparable to the declining numbers of the rarer birds who cannot fly proficiently and the growing numbers of the numerous expert high fliers who flourish in an environment where flying became an important skill for survival.

Practicing Science Habitually

The notion of a habit was very crucial in the development of Greek civilization. For there is absolutely no reason to believe that, before or after the Greeks and independently of them, others in the world would have not conceived a scientific idea about nature or a mathematical demonstration of some theorem. In fact, the proof of my opinion is that all kinds of people from all over the world do, or can learn to do, science and mathematics. But

if something profound like practicing science had not happened habitually, such good skill would have not spread and perhaps soon would have vanished without significant effect on society. But evolutions occur when a phenomenon leaves a mark on the environment. A significant reason for the rise of Greek civilization was that philosophy, science, mathematics, and the love of free thinking—and consequently democracy, which aided in the preservation and continuation of the good habit of practicing science—all evolved into a good habit that has been influencing the world ever since.

Hence, it must be acknowledged that in addition to a variety of a more commonly understood factors, an important element in the intellectual transition from mythology to science in ancient Greece was that the Greeks pursued their new ideas in a systematic, persistent, and habitual manner. And in their explanations of how nature works, the pre-Socratics applied exclusively the scientific outlook for all phenomena of nature. For them every phenomenon had a natural cause; thus supernatural interventions were ruled out. This is the reason we speak of a scientific birth in Greece around the 6th century B.C. Had they explained some phenomena naturalistically but others supernaturally, this birth of science would not have occurred. From the Greeks the scientific outlook spread and today is a way of life and a culture, a human culture.

Conclusion

Geography, economics, religion, politics, language, and the practice of good habits all appear to have an interwoven and critical role in the creation of favorable conditions for the rise of Greek civilization and the birth of science. However, it is likely that even these do not tell the whole story. For example, I believe that any effort to understand the rise of a civilization is probably incomplete without also an attempt to understand the idiosyncrasies of the people who caused such rise. But that is a subject for another time.

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Demetris Nicolaides is a professor of physics and sponsor of the New Jersey Beta chapter at Bloomfield College.

Teaching's 'Aha!' Moments

In May we invited chapter sponsors, friends, and other faculty at Alpha Chi colleges and universities to submit short personal essays for this regular feature of the Alumni Issue. This year's topic called for memories of teaching:

> As teachers, we have our share of frustrations, the chief of which may be dealing with students who could succeed but don't try. But we keep teaching because of the students who do try, again and again, and finally get it. So why don't we share some of these little triumphs as a way of encouraging one another? Write a brief description of one of your breakthrough moments. You might describe a skill you were teaching, the methods you were using to help students master it, the difficulty one or more of the students faced, and the big "Aha!" moment where one student tried "one more time" and finally got it. Or you might describe a point of view you were trying to get students to understand, the resistance you met from a student who absolutely refused even to consider it, and finally the sign you got that the student had finally grasped it (whether or not he/she'd accepted it). Such moments come in many forms. Share one of yours!

The essays that follow illustrate at least two truths all teachers know—that teachers learn from students too and that breakthroughs in student understanding come on their own timetable. Some arrive like a flash (or at least like a fluorescent bulb sputtering into light), others take root slowly and bloom over a semester's span, and occasionally an "Aha!" is postponed until long after teacher and student have gone their separate ways.

The Joey story

Joey came to class three weeks late, and I resented this newcomer. I hadn't been teaching long as a graduate associate, but I knew that this career was the one for me. I worked well with students and expected a lot.

However, there he was—a big kid carrying a big satchel. Frowning, he sat in the front row and tossed his bag down. I knew the look—a football player. I asked him why he'd arrived late. He said he'd already been in two English classes. "The teachers and I didn't get along, so I transferred again." I had to get the upper hand: "Students have already written an essay. Bring one next time." He nodded and dozed off. Great…a real loser.

Joey turned in an essay—late. With disdain, I took it, and he sat down with crossed arms. I thought about that stereotypical "football player" image and agreed. I told Joey to come to my office later to get his essay, which I knew would contain many errors.

After class, I read the essay, but there was a problem. It was flawless. This guy couldn't have written this paper—he'd plagiarized. I couldn't wait until he arrived. He sat in a chair near my desk, and I told him his essay was too perfect to be his. He didn't look bothered. I asked if his mother or girlfriend had written it. He was nonplussed: "No. It's mine." I said that a first essay couldn't be that good, but I got no rise from him in the face of an accusation of plagiarism. I thought I'd rattle his cage and told him to write another essay in sixty minutes. He'd prove that he could write well. I expected a paragraph full of errors.

Soon, Joey sauntered back and sat down. He tossed the essay, and I grabbed it. Again, there was no need for a red pen. This kid was a genius. I looked at him and apologized for the things I'd said and thought. I told him I'd never had such a wonderful writer and that he had a special talent and that I'd look forward to his work and was happy to have a student with his ability. Joey beamed.

Joey never again came to class late, and he'd write essays, not for grades, but just to write. His mother called to ask what I'd done as Joey said he liked college and English. That Christmas he gave me a wooden box with a teddy bear on top. Twenty-seven years later, it sits on my desk, so Joey is always with me.

I might have been Joey's "teacher," but he taught me to treat each student the same and expect the best and never to believe stereotypes. In thirty-four years in the classroom, some of my best students have been athletes. Not every student is a Joey, but I believe there's one in each classroom. If there isn't, there's always next semester.

Sara Jane Richter
Dean, School of Liberal Arts, Sponsor
Oklahoma Zeta, Oklahoma Panhandle State University

Working with dyslexic readers

A teacher makes the difference for Trisha, a girl with dyslexia in the popular children's book *Thank You, Mr. Falker*. Trisha wants to read but she cannot. She is teased by classmates and lacks any self-confidence, which is often the case with struggling readers. In her autobiographical story, Patricia Polacco is a child who experiences frustrations as letters fail to make sense. In the fifth grade, a teacher named Mr. Falker recognizes Trisha's academic problem and takes the time to help her uncover the magic of reading. Polacco's story ends well because she learned to read and became a well-known author of children's books. How did Falker make a difference? How does the classroom teacher make a difference?

The first step in helping a child like Trisha is to recognize the characteristics of dyslexia. Even though dyslexia is the most researched learning disability, it is misunderstood by the general population. Many children and adults I speak with think of dyslexia as a disability where students see letters and words backwards. Since Polacco's story, science has uncovered many mysteries behind the dyslexic mind. The International Dyslexia Association (IDA) adopted the following formal definition of dyslexia in 2002:

> Dyslexia is a specific learning disability that is neurological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge.

In *Overcoming Dyslexia* (2004), Sally Shaywitz notes that the problems associated with dyslexia are due to an underlying deficit in the sound component of language that makes it difficult for readers to connect letters and sounds in order to decode. This difficulty has been scientifically confirmed through brain imagery studies, which show physical differences in the way the brain of a dyslexic person develops and functions. The reading difficulties have nothing to do with vision. It is also important to note that dyslexia is not due to either lack of intelligence or desire to learn; many people who are dyslexic are of average to above average intelligence. Many dyslexic children, however, become discouraged and do not feel as smart as their peers.

Approximately 15 to 20 percent of the nation's population have some of the symptoms of dyslexia. With effective instruction, children with dyslexia can learn to read and write well. They have to work harder than their peers. When working with children that have dyslexia, I build self-esteem to help them understand they are smart and that their brain simply works in a different way. I focus on strengths—not just weaknesses. I discuss others (including famous people) that have similar issues, so they can understand they are not alone. I feel the key in working with a struggling reader is to make reading worth the struggle. This means getting them excited about literature, even when it involves reading it to them! As I see a child complete a chapter book for the first time on his or her own, I know that I make a difference for the child with dyslexia, just as Mr. Falker made a difference with Patricia Polacco.

Jodi Pilgrim
Assistant Professor of Education, Sponsor
Texas Beta, University of Mary Hardin-Baylor

A case of appreciation delayed

Only once in forty-five years of college teaching have I had to deal with a student outburst in class. It happened back in the 1970s when I passed back a set of graded essay exams in an upper-division English class. One student—we'll call him Peter Dune—looked at his essay, the comments, and the grade, crumpled it all up, and then burst out:

"I'm tired of these pointless mind games. I don't learn anything from them. I learned more in my summer school English class back home than I've ever learned from you."

Peter was a Preacher's Kid, a PK in full rebellion—long hair, tie-dyed tee shirts, torn jeans, sandals, the whole '70s image that said "I am counter-culture, and I get high." I was in my early 30s, so despite recognizing the phase he was going through, his outburst hurt more than it would now. Still, I did my best to calm him down and get the class going:

"I'm sorry you feel that way, Peter. Why don't you see me in my office? We can talk more about what I'm asking you to do in these essays and why that's important."

Peter did come to see me. He'd had a lecture class in summer school and had found it easy to use a skill he'd long-ago perfected—memorizing and feeding back a set of information. I was asking for something different: skill in analyzing and interpreting texts independently. That was the skill he saw no point in; education was supposed to be all about learning facts.

Peter was an English major, so we continued to work together. I showed him again and again how analysis works, how it differs from running commentary. I tried metaphors: a running commentary is like a description of a city written as you drive through it, from outskirts, to industrial parks, to newer suburbs, to malls, to older neighborhoods, to downtown, and then the same all over again in reverse, while an analysis is like a description written from a helicopter above the city, with all areas of each type brought together—all commercial areas described together, all residential areas together, etc.

Peter continued to try, but he never made the "A" grades he wanted. And we never grew close as many other students and I often did. He remained remote after graduation, too. I never heard from him even though many alumni and I kept in touch, even in those ancient days before e-mail and Facebook. I thought of him as one of my failures, and that made me sad.

Then, lo and behold, one day twenty-five years later the college's alumni office forwarded me a hand-written note from none other than Peter Dune. "Oh, no," I thought. "Is Peter still stewing over those 'C' and (finally) 'B' essay grades?"

No, as it turned out, he was not. Just the opposite. After commenting generally about what a fine education he'd had at Lyon, Peter got specific. "I especially appreciate," he wrote, "the way Drs. Oliver and Tebbetts got me to think and write analytically. I wouldn't be where I am now in my career if I hadn't learned how to do that."

Wow. Often it's true that we don't know what impact we've had on others. But then comes something like this, and we can hope, at least, that it's just the tip of an iceberg, that others are thinking the same even if they're not writing it.

Peter and I are now friends on Facebook.

Terrell Tebbetts
Professor of English, Sponsor
Arkansas Iota, Lyon College

Beauty on the sidewalk

As a professor of literature, I find that my students often consider essays particularly uninteresting. The students aiming for "A" grades make a valiant effort to understand and participate in class discussion, but those who plan to settle for "C" grades usually think their own thoughts when we discuss Ralph Waldo Emerson, and even when we study the essays of authors with more appeal to college-aged students, writers such as Henry David Thoreau and Edgar Allan Poe.

In an attempt to get students engaged with Emerson, I took on that philosopher, using the vernacular of my students. When we read *Nature*, I disputed this comment in Chapter 3: "Beauty": "There is no object so foul that intense light will not make beautiful." My response was this: "If a dog poops on the sidewalk and I shine an intense light on the poop, will it really be beautiful?" One of those "C" students who appeared to be staring out the window replied, "When you think about how much better the dog feels, you might see the beauty in it." That was over ten years ago, and I still appreciate the empathy implied in that statement almost as much as I appreciate Emerson.

Katherine Grimes
Associate Professor of English, Sponsor
Virginia Theta, Ferrum College

From reluctance to confidence

I have been an educator for thirty years. I began as an English teacher, was a principal twice, and now find myself teaching secondary education methods courses at Sam Houston State University. Despite the age or the subject area taught, I always dealt with reluctant learners. I learned that reluctance is often not a form of stubbornness or laziness. In fact, most often it deals with the self-efficacy of students who simply lose faith in their abilities along their educational journeys. This is because assessment is deeply personal. We all have memories of getting back assignments covered in red or with an "F," along with the associated sense of shame. When this happens consistently, self-doubt sets in. Repeated self-doubt, in particular in mastery situations, usually leads to low self-esteem and apathy, all hallmarks of students at risk.

When I was a principal, I was fortunate to attend numerous conferences on assessment. It was here I learned how to use formative assessment to turn students of self-doubt into students willing to try, with little dollops of success leading them back into the land of effort. The good news is, it's not difficult to do and works well despite the age of the learner.

Many formative assessment strategies exist, but I will share an example that helped one of my secondary methods students. April was a willing student, but I could tell immediately from her lesson plans and other written work that she was a student who must have struggled for years. While I used formative assessment strategies with the entire class, I gave her large amounts of descriptive feedback, the cornerstone of formative assessments. Doesn't sound earth shattering, does it? However, it's *how* the feedback is used that counts. When April would turn in an assessment for grading, I would give her copious descriptive feedback tied to the standards associated with the assessment *before it received a grade.* Sometimes it took several iterations, but as the semester wore on, I could see her confidence grow, in particular in lesson planning, where she really struggled. At the end of the semester, I received a thank you card from her in which she wrote, "Thank you for giving me the support I needed to keep trying" and "I learned SO much in this course, I am confident I will do well in student teaching." That was worth every minute I spent offering the feedback!

Aside from descriptive feedback, I offer students models of strong and weak work and let them score the models with rubrics I use to assess assignments. They then score each other's work and offer each other descriptive feedback. If needed, I offer more. The grade finally occurs, but these strategies give students the confidence to try with no risk. They know what quality is and how to reach it. With the focus on learning and not grades, the anxiety wanes and they learn how to learn. Reluctance turns to confidence.

Lawrence Kohn
Associate Professor of Education
Texas Omicron, Sam Houston State University

'Who breaks a butterfly?'

The most memorable "aha!" moment in one of my classes in forty-plus years of teaching was not, I trust, the most profound or life changing. But it was delightful, and it also illustrated how teaching can satisfy the soul.

Back when few Chinese were allowed to study in the West, a dentist in our community financially sponsored a Chinese college English teacher who wanted desperately to earn a degree from an American university. We determined that the young man, who took the American name Paul, had enough transferable credits to qualify for a Harding degree if he took one year of mostly senior-level work with us.

Paul began his work in summer school, and although it was clear he was very bright and had perfectly acceptable speaking and listening skills in English, I was worried that the fast pace and challenging reading load of my summer course in Restoration and Neoclassical British Literature might overwhelm him. In addition, I didn't realize at first how little he knew about the concept of interpreting literature. In the Chinese university, he had read American (mostly) and British (some) literature primarily to comprehend plots and refine his grasp of the English language. The idea of reading for deeper, subtler meanings, which all my English majors took for granted, required a big step.

Not that the language of 17th- and 18th-century British poetry and prose, much of it shimmering with sophisticated wit and satire, wasn't challenging enough. Even my American students had to have some of the wordplay explained, as in a terrific line from Alexander Pope's poem "Epistle to Dr. Arbuthnot": "Who breaks a butterfly upon a wheel?" Pope writes this after advising Arbuthnot not to bother with replying to the attacks of one of their literary and political enemies, whom Pope has called by a Latin name that clearly indicates that the man is effeminate and an intellectual lightweight.

The students and I worked our way through the background of the passage, and once they remembered movie scenes of the medieval torture device of the wheel, I sensed they understood that Pope was saying the enemy was so overmatched in wit that it wasn't worth the effort to retaliate in kind; to get rid of a trifling insect, one doesn't go to the trouble of setting up a torture rack.

But Paul continued to look puzzled and asked me to explain again, which I was glad to do. Suddenly his face lit up with the joy of comprehension that many students learn to mask for fear of not looking cool. He said,

"Now I understand! We have in China the same kind of saying: 'Do not use a butcher knife meant for hogs when you want to kill a chicken!"

Surely some of the literary charm of the Mandarin was lost in English translation, but in the context of our class it was just as funny to me and the students as Pope's elegant, witty iambic pentameter line. Paul laughed loudly with the rest of us. All of us, I think, celebrated in that moment the pure delight of learning and the wondrous power of language. What more could a teacher ask?

Dennis M. Organ
Executive Director of Alpha Chi
Arkansas Eta, Harding University

Vygotsky and the unicycle

I was recently asked to teach an honors course in our University Honors program. Because the course was to cover concepts outside the regular core curriculum, I focused on what would interest these highly motivated students. I finally decided that we would analyze the act of teaching and learning itself, under the auspices of the learning theorist Lev Vygotsky. I wanted my students to understand Vygotsky's concept of "scaffolding"—how the teacher builds support and support systems, and then, eventually, when knowledge and sturdy structure are there, the teacher pulls away and/or removes the supports. Later, another set of supports may be given, all of which lifts a learner to higher levels of understanding, similarly to a painter's scaffold for painting the side of a house.

I also wanted my students to realize their own "zones of proximal development" as envisioned by Vygotsky—that what they can learn on their own is greatly enhanced when working with a competent "other," such as a peer, parent, or teacher. I hoped they would see that learning indeed has a social nature, that talking, sharing, and using language to construct new knowledge are part of the nature of learning.

So how did I teach these concepts? Over the semester, we interviewed teachers and learners, we observed school and university classrooms, and we designed our own personal collages of our learning styles. These activities helped to anchor Vygotsky's concepts of teaching and learning. But what really made the concepts come alive was the day a unicyclist arrived outside our building. I had arranged for him to give us lessons on how to ride a unicycle. None of my students had ever ridden a unicycle, so for the first time in a long time, they were forced into learning something new. They could see and feel how valuable the notions of scaffolding were; his teaching tricks gave us what we needed. My students noticed their zones of proximal development. Each brought his or her understanding of balance and bike riding to the unicycle experience and then expanded the zone with help from the knowledgeable "other." And finally, during our unicycle sessions, the dialogue, sharing, and construction of knowledge happened spontaneously!

What was fascinating to me, however, was the way my students added to Vygotsky's theory. During our lively discussion of the unicycle experience, two new observations spilled into the conversation. First, they insisted that for learning-teaching to work best, a student must experience motivation from some inner drive or interest. All said that learning could happen from outside motivation, but best learning happens due to one's own motivation. Second, my students insisted that for most new learning to become integrated into old learning, practice needed to happen. In fact, several said that practice by oneself of the new skill or learning was required. Learning was both social *and* solitary.

I was very pleased with our course outcome. My honors students made great strides in claiming and even adding to Vygotsky's learning theory, thanks to a unicyclist and his cycle!

Twyla Miranda
Professor of Education, Sponsor
Texas Mu, Texas Wesleyan University

One student's epiphany

I teach a series of interdisciplinary studies courses consisting of students in different academic majors. The course outcomes are designed to increase their abilities to analyze and apply critical thinking skills (including team working skills, communication, research, leadership, decision-making, etc.) to a variety of topics and issues. The course is built around a project which requires the students to apply these skills and their knowledge to produce a definitive product ("learning artifact") and requires a reflection paper analyzing the class experience be turned in the last day of class.

One class was having a particularly difficult time coming to grips with the fact that their product—garden beds of native Kentucky plants and flowers—was a result, not the intended learning. They actively voiced their dissatisfaction with having to actually produce plans, layouts, rationale for selecting plants, coordination with a local arboretum for plants, etc. I reached the saturation point and walked the class to the garden plots and asked, "What is this class about?" After many heated remarks, I stated the construction of a garden bed was not the course outcome, but was a tool. The students were still unhappy, but committed to finishing the class to the best of their abilities.

The last day of class, we discussed the experience, the students turned in their reflection papers, and the semester was over. I had a sense that while the class ended on a slightly more positive note, they still missed taking to heart the transferable skills I had intended to impart and did not look forward to the bashing which I expected in their papers, until I read this comment:

> When the class met that Tuesday night, Dr. Donathan said five words that hit me hard, "It wasn't about the garden!" standing there looking at all three flower beds I thought to myself, he's right, this had nothing to do with these plants at all. This class was meant for all of us to put together all we had learned over the previous three and a half years whether it be teamwork, planning, or communication skills and work together for one simple task.
>
> In the syllabus there was not one word mentioned about a garden which shocked me once I sat down and read the entire document. Here we had all been stressing out over these plants when that should have been some of the least of our worries.
>
> We as a group did not communicate. …. I failed to use the knowledge and skills I have been given here at St. Catharine College to better my group and classmates.
>
> I have a lot to learn before taking on a career in management. I see this class as a stepping stone and an excellent learning experience to help me reach my career in management goal.

I still worry about the format of the class, but this has helped me realize that in spite of the bumps, you still get to the end of the road.

David Donathan
Professor of Management, Chair of Business, Management, and CIS
Kentucky Mu, St. Catharine College

Electrifying literature

A friend of mine who was an engineering major when I was an undergraduate once told me that he thought my field (English) was more difficult than his, "because in English, there are no right answers." Well, I guess there are some right answers, such as does a comma go here or not (and often even then there is room for debate), but punctuation or the fine points of grammar do not result in thrilling breakthroughs. When I saw this "breakthrough moment" topic, I thought it would be easier for those in data-driven math, science, and engineering areas than for those of us in English and the social studies. Although I do often see students in my first-year composition courses gain confidence in their writing as they find that using details and lively and appropriate evidence enables them to write more fully and convincingly, such progress if often slow; there is no moment.

I think what I'd like to write about is a young woman in a recent British Lit class I taught, though again, this was more like a breakthrough semester than breakthrough moment. Since we have no literature majors at Southern Polytechnic, our focus in the class, instead of illustrating obscure literary theories, is on understanding the literature and seeing how it can affect our lives. Dena had come to the U.S. from Iran many years before, speaking and writing English at a near-native capability. Her problem was that she was struggling in her electrical engineering technology major. She was certainly intellectually capable, but she was having difficulty with motivation. Our class focus on how the messages in literature can be applied to our lives seems to have caught her fancy and, I think, helped her get through the struggles of her senior year.

One of the things we do in our class is to write short daily journal entries on a theme (say, heroism, social class, or love) that we're covering in our readings, relating the theme to our lives. Near the start of each class, we go to the "envelope of opportunity" and pull out three or four names of students to read their entry of the day. The assignment required only a hundred-word minimum, but Dena would often write two or three pages, and when her name emerged from the envelope, I'd always notice a distinct interest in her classmates. She was honest and fearless in her revelations and often kept all of us hanging on her every sentence, as when she wrote about the hardest thing she ever had to do (reconciling with her father) or a time when she faced despair (dealing with alcohol abuse), for example. We all agreed that she was best-of-class.

Dena did make it through her senior year, getting her degree in engineering technology this past May, and I like to think that our class helped her achieve it. She seemed to understand that literature has much to say about how we live our lives, and that part of living her life was to finish her technology degree. Even though in her journals there were no right answers.

Mark Stevens
Professor of English, Sponsor
Georgia Nu, Southern Polytechnic State University

Comp One

More than forty years ago at William Jewell College in Liberty, Missouri, I taught my most successful class, a remedial composition class. William Jewell, a Baptist liberal arts college, claims to be the oldest four-year college west of the Mississippi. Its beautiful red-brick, white-columned buildings sit on a green, tree-shaded hill. The students are children and grandchildren of former graduates, and even in the late '60s and early '70s, 60 percent of the students went on to graduate school. Most of the students could write a good five-hundred-word essay when they first climbed the hill.

However, a few in each section could not and seemed to be holding back the majority from discussing ideas and fine-tuning their critical thinking. The English Department one fall scheduled all of the Comp I classes at the same hour, gave the first two weeks to concentrated writing to determine which students could already write an acceptable college essay, and then switched all those students who could not write to the same section. These "remedial" students would still receive credit for Comp I but would concentrate on the basics of organization, development, and Standard American English. I volunteered for the first remedial class, figuring that I might as well get my turn over with.

Twenty-three somewhat loud, somewhat rebellious students were switched to my section. Control of the class was sometimes difficult, but the discussions were never dull. Because it had been determined by instructors in the English Department that none of these students could write a "C"-level theme, the first half of the semester I assigned √, √+, and √– to the papers. After mid-term the eight required papers had grades on them, but extra topics were available for students who wanted to write replacement essays for better grades. The eight highest scores were averaged for the final grade. One student didn't turn his papers in the first half of the semester, but when the dust settled, he had composed twelve essays. I still feel as if I tricked him into working much harder than he intended to.

My department chair approved the class's meeting only Monday and Wednesday so that on Thursdays and Fridays each of the students could be scheduled for a thirty-minute weekly appointment to go over the latest papers. No student could assume everything the instructor said was directed toward someone else because I discussed each paper with each student individually. Before long a student who had problems with sentence boundaries would walk in for his appointment saying, "Did I have any comma splices?" By the end of the semester he didn't have any.

All twenty-three students passed with at least a "C." One student published one of his essays in the student newspaper. That course was more work for me than any course since, but it also brought my greatest sense of accomplishment. Nothing substitutes for plentiful practice and personal attention if students are to reach their potential. And I'm still proud of that class.

Mimosa Stephenson
Professor of English, Sponsor
Texas Alpha Omicron, University of Texas at Brownsville

Reaching Jeremy

It took me only a week to fully appreciate the depths of Jeremy's apathy. Freshman Composition was the price he had to pay for four more years of football. He was disappointed to be playing at a Division III school, but a knee injury forfeited his D-1 scholarship. From the outset, I faced the perennial problem of the unmotivated student who gives up preemptively.

When I began teaching composition, I had high hopes that the power of ideas would transform my students. I quickly learned that this was my agenda and not theirs. To successfully teach organization, paragraph development, style, and focus ought to be enough, but I hesitated to surrender my loftier goals. So I threw out my old model and began rebuilding. Perhaps if I could make students invest in their own writing, I could guide their writing skills. As Parker Palmer says, "What we teach will never 'take' unless it connects with the inward, living core of our students' lives."

Jeremy was a part of my class of guinea pigs, which was designed around the idea of belief and action. I began by asking students to write about a single core value and the roots, influences, and experiences that shaped it. Then I introduced texts that link personal experience and belief systems to moral responsibility.

Thoreau's "Civil Disobedience" would be pivotal, but it is understandably difficult for freshmen and was particularly so for Jeremy. His frustration and belligerence, which had been growing throughout the semester, reached critical mass and he quit turning in work. He rejected all my attempts to help him and it looked like he would be just another football player who would slip through the cracks.

I was not surprised when he failed, but I was surprised to see him in my class the following semester. I was even more surprised when he took on an emotionally difficult topic for his essay on belief, the knee injury that cost him a football scholarship. He wrote sincerely about second chances, hard work, and hope in the face of disappointment. He made frequent visits to the tutor because this essay connected with his "inward, living core." In this place of authentic awareness of belief, the essays of the Dalai Lama and Thoreau became relevant and he spent time in my office working to understand and integrate them into his own thinking.

On his last visit, Jeremy thanked me because for the first time, he enjoyed writing. The teacher's marks, the grade, the quantitative measures of success mattered less than the intrinsic reward of discovering his ideas and finding the words to make them live.

I am not sure what shifted in Jeremy between the semesters. As teachers, we cannot always take credit for breakthroughs and I am not sure we would want to. We simply open doors and the reward comes when we watch students walk through them. When a student finds an intrinsic motivation and we are there to nurture it, we have done our best work as teachers.

Jeanna Fuston White
Professor of English, Sponsor
Texas Alpha Zeta, East Texas Baptist University

A third chance

I teach writing and editing courses to beginning Point Park University journalism and mass communication majors. For the past twenty-five years I have helped them improve their work from a high school to a beginning professional level, and often that has involved a lot of heavy lifting.

I learned early on that I had to start at the beginning—parts of speech, clauses and phrases, punctuation, etc. —because to do well, they had to go back to the beginning communications building blocks to correct bad habits and understand what I was trying to teach them.

I always related it to my first attempts at teaching as an adjunct: Someone had taught me the great rules of grammar, punctuation, writing style, and format. But that had been so long ago that I had to re-learn all those rules and principles before I could teach them.

It was going along pretty well in my first few years of teaching. Then in fall 1996 I met Lloyd Pratt, a likable young man in my beginning editing skills class. He worked hard in every session, but Lloyd struggled. The requirements stipulated that students earn a "C" to move on to the next required writing class, and he could only manage "D's" even with tutoring help and the defeat was crushing him. We sat down to talk about it, and I asked if he had had similar problems in high school. "Oh, I had dyslexia," he said. "But I've been cured." I have a brother-in-law with that same problem, and I just looked at him. "You're really never cured," I responded. "You just need more help."

So we made a deal. If he only earned a "D," he would take the class again and seek more outside help. If he still struggled, took more time, I would let him withdraw from it almost to the last day of the semester and he could take it a third time. This meant I was bending our two strikes and you're out student policy. But I just had that gut feeling he was worth it.

I did have to bend the rule. But Lloyd kept his end of our deal. He continued with our tutoring program but found an outside support group for adults with dyslexia and additional tutoring. He needed that third time to pass my class but did so with a "B." We cried together when I told him what his final grade was that term.

Lloyd did finish his degree, and he is doing very well. He came back to Pittsburgh from Georgia to see me and other professors last summer, and we had a great time catching up.

My reputation at Point Park has been that I am a tough professor but a fair one, and I appreciate that. The hundreds of students I have taught teach me something every semester. Lloyd taught me that sometimes students do earn those second and even third chances. It can sometimes even change their lives.

Helen Fallon
Professor, Director of Honors Program, Sponsor
Pennsylvania Eta, Point Park University

Put them on stage

I have been thinking about the call for essays on effective teaching strategies that might inspire other faculty or give them insight into their own teaching approaches. I have had to consider this in light of the hectic academic school year 2010-11, which for us in Alabama involved snow closings and terrible tornadoes, both of which devastated the learning process. It was easy for students to postpone assignments when they had a good excuse and when as a school we gave them the option to complete their tasks by this fall.

So how do you keep them focused on learning and challenged with the task? This can be difficult even without extenuating and aberrant weather circumstances. What is a good approach that will stimulate learning going forward? I've found it important to recognize that this generation of students, raised on reality TV and accustomed to seeing things unfold before them in real time, are alert to the sense of always being on stage. They are not apt to want to perform poorly in front of their peers or to experience ridicule or embarrassment. Therefore, in every course I assign group projects and debates that must be presented to the class. I encourage them to be as creative and as free as they choose in presenting the assigned content. I insist that they should want to create the best learning environment for their peers and themselves, and thus that goal drives the task of developing the best lecture or presentation for the class.

I assign a significant grade percentage to the project, and I introduce the assignment early in the semester so students will have adequate time to prepare and meet as a group. What works for me is to motivate them by saying, "You don't want to mess up in front of Oakwood University students." The product generated by the student groups is often exceptional. They arrange their own meeting and preparation times. I usually give the first presenters an advantage in grading because of their limited preparation time, and then I increasingly motivate succeeding groups to rise above the earlier ones. This pumping and priming works to get the most creative and exciting presentations. Significantly, I do not have to give extra credit to motivate the unmotivated. Students motivate their peers because each must show a contribution to the group process. I am convinced that this approach, with the internal stimulation by the group and external pressure by me to get them to show their best, encourages more commitment to the learning environment.

Trevor H. Fraser
Associate Professor of Religion, Sponsor
Alabama Zeta, Oakwood University

Shaping graduate researchers

Like many of my colleagues, I have bemoaned students who just don't seem to measure up. However, an experience teaching a graduate research seminar designed to prepare students to develop and defend their master's thesis proposal changed the way I approach these students.

A heart-to-heart conversation with the most recent cohort revealed that students were as frustrated by the experience as we faculty were. Students had no clue what we wanted them to do when we asked for a review of the literature or expected them to ground their proposal in a theoretical perspective. They were not unwilling to work; they really didn't know how! What we had "caught" as doctoral students, these students needed to be taught.

I redesigned the course to focus on process rather than product starting with the literature review. Surely the many annotated bibliographies included in the program had prepared students for this? We quickly realized, however, that although students were able to produce an acceptable bibliography of annotations, we had in fact *not* equipped them to position potential sources effectively in dialogue or in the context of past, ongoing, or original research. With the lit review as the focus of the semester, students were "suddenly" generating more focused, better defined topics and were demonstrating a better grasp of the germinal literature relative to that proposed topic.

"It's all about the lit review" became advice given by seasoned students to newcomers, but theoretical foundation was still woefully lacking. Again probing students' understanding of this concept, we confirmed the problem was not their lack of willingness to work at the product, but a lack of understanding of the process. A well-structured graphic organizer and a synthesis paper later, we saw marked improvement in the students' ability to ground their proposals in appropriate, intentional theoretical perspectives.

This experience affirmed that today's students are neither less motivated nor less intelligent; they just learn very differently. Where we were left to figure things out for ourselves (and how many of our classmates did not!), these students thrive on more structure. When faculty meet their needs as learners, these students rise to the challenge and often exceed our expectations. Of that initial cohort of about ten, all but one finished the master's program. Four have gone on to Ph.D. work, many have presented their research at regional and national conferences, and most are now very successful teachers in their own right who pass along what they have learned to another generation of students. As a result of this experience, these students became scholars. I learned that we teachers sell students short when we prepare them only for the task at hand without equipping them for the larger goal of lifelong, transformative learning that comes with understanding that task.

DawnEllen Jacobs
Vice Provost, Sponsor
California Beta, California Baptist University

Motivating math students with projects

Teachers enjoy teaching because we make positive differences in the lives of our students. Many students work very hard even under various challenging personal circumstances. But sometimes we encounter challenges, the chief of which may be teaching students who could succeed but do not try hard enough. Nonetheless, we keep trying because we are hopeful that we will eventually reach these students, especially those who have the potential to succeed but are still precariously perched on a dangerous precipice in their academic career. I have found that a project-based instructional strategy can help motivate and re-energize students, increasing the likelihood of their staying in college.

Project-based instruction refers to the use of carefully planned project assignments that involve students' writing and presenting the project reports to support or complement instruction. Project-based instruction can be useful in promoting students' interest and participation in the learning process. What is usually not so obvious is that project-based instruction can also do wonders for even underprepared or struggling students. Initially, the very mention of a math project assignment that involves writing might elicit comments like "Duh! Writing papers in math too?" or "RU kidding me? Essays in math?" But if the projects are relevant and thoughtfully planned with bright opportunities for students to eventually showcase or present their projects, the students will soon fall in love with the projects. Once that happens, it can make a huge difference in the life of underprepared, struggling students—a difference between attending classes regularly and staying in school or dropping out of college. Comments from students reveal that once they are immersed in the project process, many of them love coming to school to meet with their math teacher or project mates.

Some of the project topics for my general education math courses are "Uses and Misuses of Statistics," "Everyday Uses of Business Mathematics," "100 Applications of Applied Calculus," "Importance of Math in Entertainment," "Amazing Contributions of Women in Math," and "Who Needs Algebra? I Do, and You, Too!" Recently my students presented their projects during a recent Scholars Day at our college. One student who was going through family hardships and was at the verge of dropping out for the semester said she kept coming because she just wanted to finish the project and present her work. In another instance, a military student who had completed his transfer process to another bigger university was contemplating dropping out for the semester and continuing at the new university the following semester, but his interest and investment in the project kept bringing him to school.

After years of teaching, I have tried and tested many teaching strategies and learning styles. But I am still not an expert—I only strive for excellence. A teaching strategy that works perfectly in one class might not work so well in a different class. Often, to make it work, we have to be ready to tweak or adapt it to fit the "socio-temperature" (the changing group dynamics) of the new class. We must also strive not to be frustrated with struggling students and be prepared to reach out to meet students where they are academically, not where we wish they were.

Agashi P. Nwogbaga
Associate Professor of Mathematics, Sponsor
Delaware Gamma, Wesley College

Call for Nominations
Distinguished Alumni Award

Alpha Chi is now accepting nominations for the 2013 Distinguished Alumni Award, which will be presented at the 2013 national convention in Nashville. We invite individuals and especially chapters to recommend potential recipients for this honor. The recipient's nominating chapter will receive a $500 grant, and the recipient will be invited to speak at a general session during the convention.

Nominees should have been inducted as undergraduate or graduate members, should have made notable achievements in their chosen careers, and should represent the ideals of Alpha Chi. Nominations must include a letter from the nominating individual or chapter, a resume or C.V., and any additional supporting documentation to aid the selection committee.

For assistance with determining eligibility, contact the national office at 800-477-4225 or office@alphachihonor.org.

Please send all nomination materials to the national office by March 1, 2012. The recipient will be chosen during the National Council meeting later in March.