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Student Chapter American Society of Civil Engineers

ERE MESSENGER

Environmental Resources Engineering

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Invasive Spartina & Restoration of the San Francisco Bay Tidal Ecosystem

Peggy Olofson, P.E., Director, San Francisco Estuary Invasive Spartina Project

What happens when you cross a highly invasive estuarine cordgrass with tens of thousands of acres of open mudflat and newly opened, formerly diked, unvegetated tidal marsh? Then what happens if that highly invasive cordgrass – known to have hybridized with related cordgrasses in other estuaries to create even more invasive cordgrasses – is a close relative of a native cordgrass that grows next to where you introduce it?

Someone should have pondered these questions back in the 1970s, before the Army Corps of Engineers (and environmental consultants working for them) decided to plant Spartina alterniflora in a tidal marsh restoration project in the San Francisco Estuary. This native cordgrass of the Atlantic Coast was taller and faster growing and they thought it might establish more readily and "restore" the marsh more quickly than its native Pacific cordgrass, S. foliosa.

It did indeed establish well, forming a dense monoculture that quickly accreted sediment and formed a high marsh with little species diversity. As the population grew, it produced large volumes of seed and pollen, and spread rapidly from the site. It wasn't long before the Atlantic cordgrass successfully cross-pollinated with the native Pacific cordgrass, forming a fertile hybrid. Scientists speculate that the hybrid offspring of this crossing were not nearly so reserved, quickly backcrossing with probably both parent species and with other hybrids. This would create what biologists call a "hybrid swarm" – a large number of fertile hybrids with widely varying genetics and morphology, vying for every open niche in the sparse Pacific estuarine ecosystem.

Peggy in the Spartina

Now enter the well meaning agencies and environmentalists around the San Francisco Bay who were finalizing plans and acquiring funding to undertake one of the most ambitious tidal marsh restorations in the country. I was one of them. More than 130,000 acres of formerly tidal wetlands had been "reclaimed" since the turn of the century by diking and draining to create commercial salt production ponds, agricultural lands, and seasonal wetlands managed for waterfowl production. Fish and tidal marsh-dependent native wildlife populations had plummeted, and the quality and function of the estuarine waters was substantially deteriorated. Restoration of the tidal marsh ecosystem was critically needed. So, with blinders firmly attached regarding the threat of the hybrid invasive Spartina, these

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IN THIS ISSUE

FROM THE EDITORS

Hello from the messenger staff! We hope you enjoy this Fall 2009 edition.

Please welcome two new Messenger staff members, Luke Armbruster and Cameron Muir. They will be reaching out to the student body to gather more insight and news for future issues.

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www.humboldt.edu/~ere_dept/undergrad/cat/alumninotes.php

"Those who would give up essential liberty to purchase a little temporary safety deserve neither liberty nor safety."

– Benjamin Franklin, Historical Review of Pennsylvania, 1759

Alumni Profiles

Phil Martien

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Community Air Risk Evaluation Program Manager
Bay Area Air Quality Mgt. District
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B.A. UC Santa Cruz, Physics, 1982
B.S. HSU, ERE, 1987
M.S. UC Berkeley, ME, 1990
Ph.D. UC Berkeley, CEE, 2004

It's been more than 20 years since I left the ERE program at HSU, but I still have fond memories of the classes and the program. I met many inspired students and faculty whose drive still motivates me today. While in the program, I developed a love for fluid dynamics in environmental applications, and I started learning about numerical methods for solving flow-related problems. The ERE program provided my introduction to the California Environmental Quality Act (CEQA), though at the time I considered it a giant waste of time.

My faculty connections at HSU led me to a work-study position at the Lawrence Berkeley National Laboratory (LBNL). While at UC Berkeley I studied urban heat islands – the way cities modify local temperatures and wind flow patterns. I started running numerical models to predict local meteorology and find ways to reverse the heat island effects to reduce the energy needed to cool buildings. While at a heat island conference, I first made contacts at the Bay Area Air Quality Management District (BAAQMD), my current place of work. The ERE program provided me with the fundamental tools and initial contacts that led to my current position.

At BAAQMD I manage the Community Air Risk Evaluation program that looks at the disparate levels of pollution that exist, often with minority and low-income communities bearing the greatest environmental burdens. I still apply numerical models of the atmosphere to understand how growth and pollution-reduction activities can change air quality in the San Francisco Bay area, both regionally and within communities. It's usually fun – but when not, it's at least educational – and I feel incredibly fortunate to get paid to do the work I love. In this position I attend many meetings, working on ways to evaluate and improve air quality. I am also helping to provide technical information used in the Air District's latest CEQA guidelines for cities and counties on what levels of air pollution should be considered significant.

Here is some advice: Learn what you love and work to become darn good at it. Find folks, like those at ERE, to help you along. Learn to effectively communicate the importance of what you're doing, both verbally and in writing. There's a good chance you'll find ways to do it!

Leslie Goodbody

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A mere 21 years have passed since I graduated from HSU (1988) and moved to Sacramento. I've had three jobs, one husband (Nial), two kids (Troy, 15 and Lucy, 13,) two houses, four cats and many wonderful friends and neighbors. It's not like Arcata, but Sacramento is truly a great place to live and have a family. It has a small town feel without the isolation.

On the job hunt in 1988, I targeted environmental consulting firms, since I neglected to factor in the minimum six months needed to land a state job.

Continued on next page

Alumni Profiles

(Continued)

I ended up at ERM where I stayed for 12 years and worked mostly on contaminated site investigation and cleanup projects. None of this work related to Water Resources Engineering, but in the job market, an engineering degree gives you credibility. Here's a word of advice: stay current on the job market and fields that interest you.

In 2000, I decided to escape the consulting world and improve my family time, so I landed a state job with the Pollution Prevention group at DTSC (the California Dept. of Toxic Substances Control). A bonus: their office was in the CalEPA building, close to home and fully equipped with a bike locker, daycare center, and gym. This building has become my prerequisite for future employment.

In 2005, I landed a job with Air Resources Board on the Governator's Hydrogen Highway Initiative. With no experience in hydrogen and fuel cells, I got the job by being prepared for the interview, having good writing skills, and showing genuine enthusiasm. Now I work on hydrogen infrastructure (esp. renewables), manage our small fleet of fuel cell vehicles, and produce our CaH2Net newsletters. Next year, I may be working on a fueling infrastructure mandate. In short, the work is challenging but also highly political, one of the drawbacks of working on a Governor's pet project.

Politics aside, working on something you believe in has all kinds of perks, and sometimes it can bring you home. Through the years, I have encountered countless HSU alumni, all working for the environment in some way. It has been a special treat to get reacquainted with Peter Lehman and the rest of the ERE gang now working at Schatz Energy Research Center.

Freshman Profile

Heather Baker

First semester ERE student

I originally came to Humboldt State University to study Environmental Science. After a few classes, I realized it wasn't for me. I wanted to help the environment, but I wanted to be the one coming up with innovative ways to fix the problems we face as a society. I am also a chemistry and physics nerd, so I wanted to put those traits to good use. In addition, I am interested in renewable energy – especially wave and solar – and I wanted to gain hands-on experience in both of those areas.

I have always wanted to be an engineer, but I seriously doubted I could actually succeed. I spoke to an engineer friend of mine who helped me realize I should give engineering a shot, saying it would help to quench my thirst for knowledge. I changed my major to ERE and so far I am totally in love with the program. There is help at every corner, from professors to mentors. I feel like I am part of a family of like-minded individuals.

I was born in San Diego and I came up to Arcata a few years ago. It was financially difficult getting to Humboldt County, but I was determined to do it. I fell in love with the redwoods and welcoming atmosphere. When I saw Humboldt State, I knew it was where I wanted to go to school. Now, I had to implement a plan to get here. I worked full time as a vitamin specialist in a health food store and saved most of the money I earned. I also sold vintage clothing on eBay, sometimes bringing in more money than I earned in a day of work. It seemed like it was taking forever for my last day at work to come, and then one day, it did. I got rid of all the non-essentials and drove up here with my sister and father. At long last, I had arrived at Humboldt.

I don't really have a lot of spare time outside of classes, but when I do get a bit of free time, I enjoy reading about quantum mechanics and time travel. I also like to tie dye, plus I find bliss in baking and I enjoy watching movies. I have a good-sized yard, and I hope to start an organic garden. Sometimes I find pleasure in just sitting out in the sunshine or going for a walk. I am currently looking to volunteer somewhere, so I can give back to this great community.

I am glad that I moved here. In the short time that I have lived here, I have had the opportunity to meet some wonderful people and learn some valuable lessons. I have also engaged in some enriching life-experiences. Last, but not the least, I am working toward my goals of becoming an Environmental Resources Engineer, which will enable me to help heal Mother Earth.

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Crazy Corner

If a chicken-and-a-half can lay an egg-and-a-half in a day-and-a-half, how many eggs can three chickens lay in two days?
(Stumped? Email: ***EREmess@humboldt.edu****)*

The gene pool could use a little chlorine!

Experience is that marvelous thing that enables you to recognize a mistake when you make it again.

– F.P. Jones

ERE TRIES ON NEW PEER MENTOR PROGRAM

Beth Eschenbach, ERE Professor

A few years ago, ERE seniors Karen Wetherow and Corin Pilkington (now graduated!) came to me and said they wanted to mentor new students because when they were new students themselves, they had a lot of questions, questions they were too afraid to ask. This semester, we are trying a new approach – Peer Mentoring – that is inspired by Karen and Corin.

What is Peer Mentoring? A Peer Mentor is a student that is perhaps one to three years ahead of a "mentee". The mentee can ask the mentor questions about strategies for balancing academics and the rest of one's life, studying in particular courses, navigating the ERE flow chart, etc. Mentors are accessible to mentees and offer unsolicited advice to help mentees be more successful ERE students. There is much evidence that Peer Mentoring helps first-year students acclimate more quickly to their major and to a university, and students with peer mentors are more likely to stay in their chosen major and at their chosen university[1,2]. A Peer Mentor, however, is not a tutor. Mentors can help mentees find out how to get tutoring, but are not expected to be tutors.

We have more than 90 incoming ERE students this fall and the ERE department wants to help these students quickly learn how to be successful ERE students. We encourage mentees and mentors to have some type of contact (face to face, phone call, email, text message) once a week. After the first ENGR 115 exam was returned to students, the ERE department sponsored a pizza dinner for mentees and mentors. The following ERE students volunteered to meet with ENGR 115 students during their lab and have met with their mentees at least once since the first meeting: Andy Harris, Adam Howell, Brenda Johnson, Brett Vivyan, Craig Lorenc, Dylan Gray, Eric Martin, Gabriel Salazar, Jeffren Ramos, Jeremy Watson, Nanette Nickerson, and Nolan Kloer.

How will we know if the program is a success? We will ask both mentees and mentors at the end of the semester how they felt the program worked and how it could be improved. A number of seniors have told me they would like to be involved next semester, so we will continue the program for at least one more semester. Please contact me at **eae1@humboldt.edu,** if you have ideas or suggestions related to peer mentoring.

[1] Springer, L., M.E. Stanne, and S.S. Donovan, Effects of small-group learning on undergraduates in STEM: A meta-analysis. Review of Educational Research, 1999. 69(1), p. 21-51.
[2] Ender, S. and F. Newton, Students helping students: A guide for peer

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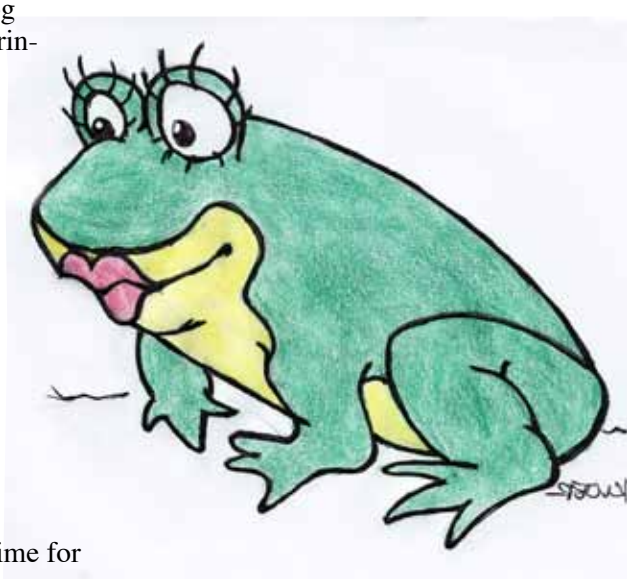
"An ERE Student and His Frog"

Mark, a senior ERE student, was crossing a creek one day when a frog called out to him and said, "If you kiss me, I'll turn into a beautiful princess." Mark bent over, picked up the frog and put it in his pocket.



The frog spoke up again and said, "If you kiss me and turn me back into a beautiful princess, I will stay with you for one week." Mark took the frog out of his pocket, smiled at it and returned it to his pocket.

The frog then cried out, "If you kiss me and turn me back into a princess, I'll stay with you and do ANYTHING you want." Again Mark took the frog out, smiled at it and put it back into his pocket.

Finally, the frog asked in exasperation, "What's the matter? I've told you I'm a beautiful princess, and I'll stay with you for a week and do anything you want. Why won't you kiss me?"

"Look," Mark said, "I'm an HSU engineering student. I don't have time for a girlfriend, but a talking frog – now THAT'S cool!"

Invasive Spartina

(continued from page 1)

projects catapulted forward, opening thousands of acres of perfect incubators for invasive Spartina! Fortunately, there were a few voices (ecologist Peter Baye and Shannon Klohr, among them,) shouting warnings to the restorationists. One agency, the State Coastal Conservancy, paid attention. The Conservancy is one of the primary funders and managers, along with US Fish and Wildlife Service and California Department of Fish and Game, of the major tidal marsh restoration projects underway in the San Francisco Estuary. With prompting from the concerned scientists, Conservancy staff began to notice that the restoration projects were overrun by the super-invasive hybrid Spartina within a couple of years of opening to tidal flows. They realized that there would be little chance of achieving restoration goals (typically to support healthy populations of native plant and animal species) with sites covered with monocultural cordgrass meadows.

In 2000, the Conservancy initiated the San Francisco Estuary Invasive Spartina Project to lead a regionally coordinated effort to eradicate invasive Spartina. At that time the invasive grass (if all gathered together in one patch) covered an estimated 300 acres of mudflat and tidal marsh; by the time the project completed planning and environmental compliance (CEQA, NEPA, State and Federal Endangered Species, NPDES, etc.) and started actual control work in 2005, the hybrid Spartina had spread to cover nearly 3,000 acres. The Spartina Project has been aggressively working for five seasons, and the hybrid Spartina population is reduced to less than 100 net acres. The project, which uses sophisticated GIS-based mapping systems, field and remote monitoring techniques, and helicopters and boats for both monitoring and treatment, has cost the State and Federal agencies approximately $1.8 million per year, and is expected to continue for another three or four years.

Peggy Olofson (ERE 1993) was previously the manager of the five-year multi-agency San Francisco Estuary Baylands Ecosystem Goals Project, which was key in developing the saleable vision of a restored San Francisco Bay tidal marsh ecosystem and prompted the rapid acceleration of restoration projects.

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Clockwise from top left:

Old Alameda Creek

Spartina and a Great Egret along a slough.

Breaching a levee.

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RESU Designing Brownout-sensing Smart Outlet

James Apple, ERE Student

HSU's Renewable Energy Student Union (RESU) is developing a "Smart Outlet" to reduce brownouts on village-scale electrical grids in developing countries. The project is funded by a $10,000 grant from the EPA's People, Prosperity, and the Planet (P3) program, a design competition for teams of undergraduate and graduate students. We are currently building our first prototype circuits, and we look forward to presenting our work to the EPA in April 2010.

The project objective is to reduce brownouts on village-scale electrical grids in Bhutan and Thailand, most of which are powered renewably with hydroelectric generators. Hydropower produces plenty of electricity during most of the day, but local electrical grids become overburdened during the evening hours when residents cook meals with electric rice cookers and water boilers. The excessive demand causes a brownout, a drop in electrical grid voltage, nearly every evening. Brownouts result in dim lights, slower cooking, and difficulty using sensitive appliances.

Brownouts can be prevented in several ways. Utility companies could install new power plants or energy storage systems to meet peak electricity demands during evening hours. However, energy generation and storage are too expensive for most rural villages. Power plants also cause environmental damage, especially if they rely on fossil fuels. A more affordable and environmentally-friendly option is to encourage residents to use their appliances earlier in the day, a concept known as "load shifting." Karma Dorji, a graduate of the Energy, Environment and Society graduate program option, who works for the Bhutan's Department of Energy, suggested that RESU design a device to encourage load shifting.

RESU aims to design and build a "Smart Outlet" that encourages load shifting. The Smart Outlet will replace every electrical outlet in every house. Smart Outlets will encourage load shifting in two ways: by indicating the state of the grid and by preventing residents from using large appliances during brownouts. When voltage on the electrical grid is sufficient, the Smart Outlet will show a green light. During a brownout, a red light will appear to alert the user. If a large appliance is already in use when the brownout begins, the Smart Outlet will allow the resident to continue using the appliance for one more hour. If no large load is present, the Smart Outlet will limit the available power to 400 watts. By allowing existing loads but preventing new loads, the Smart Outlet is expected to reduce the intensity of brownouts without disrupting meal preparation. Over time, residents will learn about their grid by watching the brownout indicator lights on the outlet, and the automatic power-limiting mode will encourage residents to use their appliances during non-brownout times.

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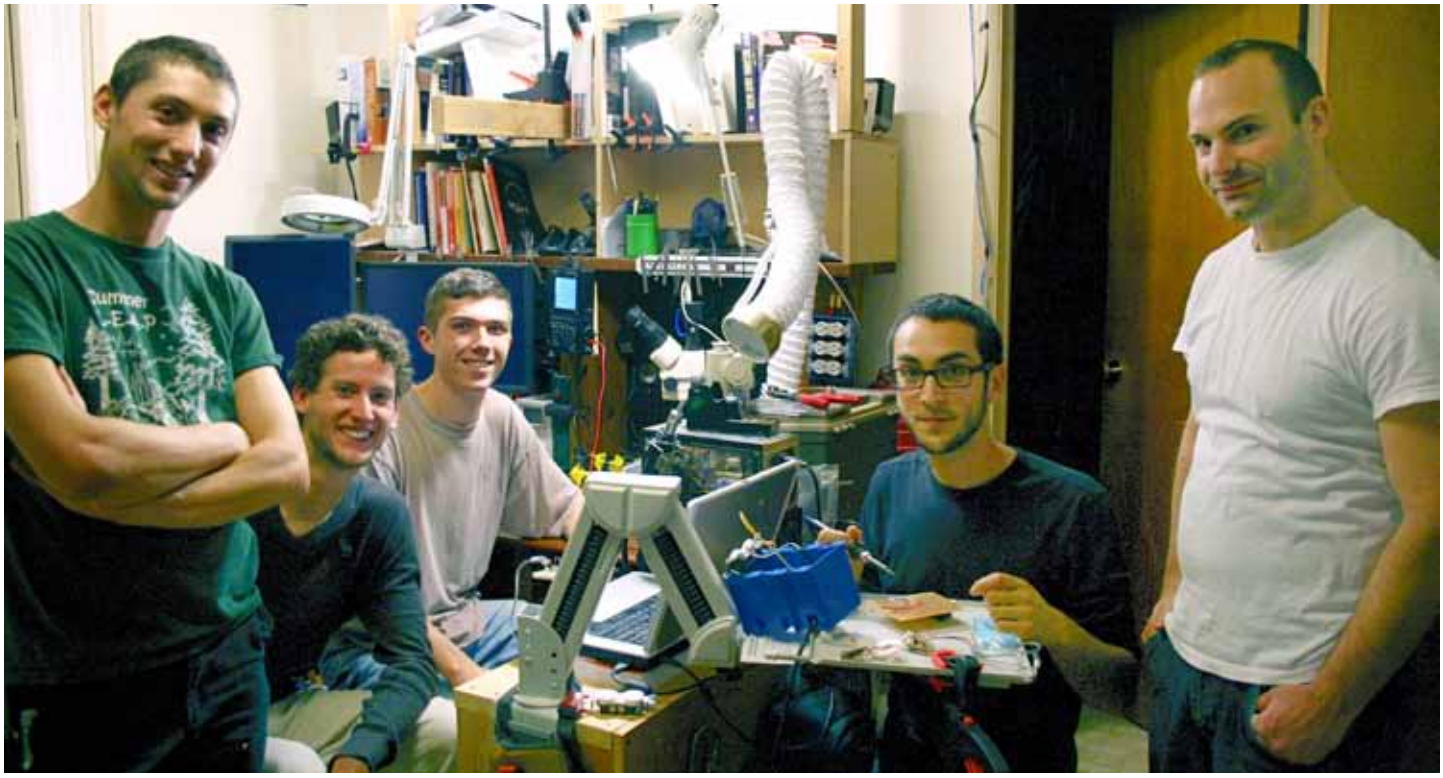

RESU Designing Smart Outlet (*Continued)*

RESU members are working in teams to develop different parts of the circuit. James Robinson, Joey Hiller, Blair Kinser, and I are working with ERE graduate Kyle Palmer to develop a microcontroller-based device that switches the circuit between brownout mode and regular mode according to a computer program that we are writing. Adam Schumaker, Jenny Tracy, and Aaron Parker are developing circuits that sense the voltage and current delivered to the appliance. Nathan Chase, Meg Harper, and Nathan Lohse are investigating different ways of simulating a Bhutanese electrical outlet with 230-volt 50-Hertz electricity. Chhimi Dorji, who has experience with Bhutan's Department of Energy, is providing key information about Bhutanese electrical systems. Several other RESU members and our Faculty Advisor, Arne Jacobson, are also contributing to the project. We are looking forward to producing our first prototype outlet by January and presenting our work to the EPA in Washington, DC in April 2010.

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ERE RAFTING TRIP

Blair Kinser, ERE Student

The ERE rafting and camping trip is an annual event that takes place toward the end of Spring semester when students can use a break from school. This year's trip occurred over the weekend of April 25, and approximately thirty ERE students and their guests made their way to Trinity County to raft the Class III Pigeon Point section of the Trinity River. Three rafts, each holding a guide and up to six paddlers, made three runs during the two days of rafting and camping.

The annual event was started seventeen years ago by ERE student (now alumni) Patrick Sullivan, and is currently organized by ERE Professor Mike Anderson. A pre-trip meeting stresses safety, equipment, clothing, and the importance of having fun. Student volunteers organize car pooling and meals. The guides this year were Patrick Sullivan, who acted as the trip leader, plus Mike Anderson and ERE alumni Tony Llanos. The cost was $25, which paid for equipment rental (rafts, life jackets, splash jackets, paddles, etc), camping and meals. Each ERE student was allowed to bring one guest. Camping was optional, and some students participated for just one day.

While on the water we enjoyed sunny weather, and we saw bald eagles and other wildlife. Aaron Parker commented about the trip, "I really liked it. The runs were not too intense. It was my first time rafting and the scenery there is awesome." The trip is also a great way to relax and enjoy camaraderie among students before the week of finals. Students were able to get off the raft at one point and jump off of a large rock into the river. Students even got revenge on one of their professors: "The trip was great, except when Lee [Tuminello] tackled me into the water," said ERE Professor Dustin Poppendieck. During the trip Dustin got dunked at least three times by a number of students.

If you have any questions or comments regarding the ERE rafting trip, email Mike Anderson at **cma2@humboldt.edu**. Details about the 2010 trip will be available sometime next March or early April.

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ERE & GRAMMAR: Some rules and why you should care

Charles M. Anderson, ERE Emeritus Professor

Responding to a question during his first press conference following the 2008 presidential election, President Obama said, "President Bush graciously invited Michelle and ***I*** to meet with him and First Lady Laura Bush. We are gratified by the invitation. I'm sure that in addition to taking a tour of the White House there's going to be a substantive discussion between ***myself*** and the president…" The highlighted words "I" and "myself" are grammatically incorrect, and each should be replaced by "me." Unfortunately, this type of error involving pronoun case is very common, and is often made by even highly-educated and successful people. Fortunately, you can avoid this and many other types of grammatical errors by using the simple rules and tests presented below to check your wording.

At this point you might be wondering why you should care about grammar. After all, in the case cited above, there is little chance that anyone in the audience misunderstood President Obama's meaning. So, what's the big deal? Who cares? One reason to care is that writing quality is carefully scrutinized on job applications. Employers often use grammar and spelling as hiring criteria for competitive positions. If your spelling or grammar contains errors, your application may be rejected before your technical qualifications are examined. It is an unfortunate situation that can be avoided by taking your writing practices seriously.

The following are examples of four types of common grammatical errors, along with corresponding rules and tests you can use to avoid them. Errors are shown in Bold Italics.

1. "***Me*** and my sister ate lunch." "Lunch was served to my sister and ***I***." This type of error occurs almost exclusively when there are two or more people or things in the subject or object of the sentence. To avoid this error, remove all of the words in the subject or object except the pronoun, and check to see what is correct. In the first example, remove "and my sister" from the subject. Is it correct to say, "Me ate lunch," or "I ate lunch"? In the second example, remove "my sister and" from the object. Is it "Lunch was served to I," or "Lunch was served to me"? The corrected sentences are: "My sister and I ate lunch." "Lunch was served to my sister and me."

2. "I have ***less*** dollars to spend this week." Here, the rule is to use "fewer" with discrete items (count one, two, three items), and use "less" with stuff (matter) that cannot be broken into discrete units. Thus we have: less money, but fewer dollars; less time, but fewer seconds; and less water, but fewer water droplets. Since a dollar is a discrete item (count one, two, three dollars), the corrected sentence is: "I have fewer dollars to spend this week." Or (since you do not count one, two, three money) you can say instead, "I have less money to spend this week."

3. "Expect ***cooler*** temperatures next week." "The reaction rate is very ***fast***." This type of error is commonly made in scientific and engineering presentations. Temperature is a property (a variable that takes on numerical values) of some stuff, or matter (in this case, air,) that does not take on numerical values. It is the air, not the temperature, that is expected to be cooler. And, if the air is cooler, the temperature (which has a numerical value) will be reduced or lowered. Similarly, the reaction, not the reaction rate, is fast. The reaction rate is large. Thus, we have: large heights, not high heights; lower humidity, not dryer humidity; etc. The corrected sentences are: "Expect lower temperatures next week." "The reaction rate is very large."

4. "The pH went from 2.0 to 6.0, a ***three-fold*** increase." "The average car in America uses 30 gallons of gasoline to go 500 miles, while the 2010 Toyota Prius uses ***three times*** fewer (gallons)." This type of error can lead to serious misunderstanding. In the first example, the problem stems from confusing "three times more (or, a three-fold increase)" with "three times as many." Three times as many of something is determined by multiplying the original number by three, while three times more of something is determined by multiplying the original number by three and adding it to the original number. Thus, three times as many as two is 2 x 3 = 6, whereas three times more than two is (2 x 3) + 2 = 8. As you can see, three times more of something is the same as four times as many. A correct version of the first example is: "The pH went from 2.0 to 6.0, a two-fold increase." In the second example, three times less than 30 would be 30 – (30 x 3) = – 60. This is obviously impossible, since even a Prius requires some gasoline to go 500 miles! The recommended way to deal with this problem is to use "times as much as (or, times as many as)" rather than "times fewer than". Also, it is a good idea to include the actual numbers: "The average car in America uses 30 gallons of gasoline to go 500 miles, while the 2010 Toyota Prius uses only 10 gallons (one third as many)."

I hope this has been both interesting and informative. For additional information on English grammar, check out these web sites:

http://www.grammarbook.com/
http://owl.english.purdue.edu/owl/
http://grammar.ccc.commnet.edu/grammar/
http://www.usingenglish.com/glossary.html
http://web.augsburg.edu/~schield/MiloPapers/984OfSigCompare3.pdf
http://www.ece.msstate.edu/academics/writing_resource/grammatical_errors.html
http://college.cengage.com/devenglish/fawcett/evergreen/7e/students/grammar_errors.html

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Ten Tips to Write Good

1. Never abbrev.
2. Pronouns must agree with its antecedents.
3. Verbs has to agree with its subject.
4. Prepositions are not to end sentences with.
5. Don't use no double negatives.
6. Use commas, only, when needed.
7. Use commas to separate words in a series parentheticals introductory clauses and the like.
8. Use hyphenated-words only when appropriate.
9. Read over your work to be sure you have not any words out.
10. Allways use your spellchecker.
11. Keep your work neat andtidy.
12. While a transcendent vocabulary is laudable, one must nonetheless keep incessant surveillance against such loquacious, effusive, voluble verbosity that the calculated objective of communication becomes ensconsed in obscurity.

IS THERE A SANTA CLAUS??

from SPY magazine (January, 1990)

With research help from SPY magazine, here is the latest and most complete scientific inquiry ever carried out into the myth and reality of Santa Claus.

1. No known species of reindeer can fly. BUT, there are 300,000 species of living organisms yet to be classified, and while most of these are insects and germs, this does not COMPLETELY rule out flying reindeer, which only Santa has ever seen.

2. There are 2 billion children (persons under 18) in the world. BUT since Santa apparently doesn't handle Muslim, Hindu, Jewish, Buddhist and other non-Christian children, that reduces the workload to 15% of the total (378 million according to Population Reference Bureau). At an average (census) rate of 3.5 children per household, that works out to 91.8 million homes. And one presumes there is at least ONE good child in each.

3. Santa has 31 hours of Christmas to work with, thanks to the different time zones and the rotation of the earth, assuming he travels east to west (which seems logical). This works out to 822.6 visits per second. This is to say that for each Christian household with at least one good child, Santa has 1/1000th of a second to park, hop out of the sleigh, jump down the chimney, fill the stockings, distribute the remaining presents under the tree, eat whatever snacks have been left, get back up the chimney, get back into the sleigh and move on to the next house. Assuming that these 91.8 million stops are evenly distributed around the earth (which, of course, we know to be false, but for the purposes of our calculations we will accept), we are now talking about 0.78 miles per household, and a total trip of 75 million miles, not counting stops to do what most of us must do at least once every 31 hours, plus eat, rest and be merry, etc. This means that Santa's sleigh is moving at 650 miles per second, 3,000 times the speed of sound. For purposes of comparison, the fastest man-made vehicle on earth, the Ulysses space probe, moves at a poky 27.4 miles per second. A conventional reindeer can run, tops, 15 miles per hour.

4. The payload on the sleigh adds another interesting element. Assuming that each child gets nothing more than a medium-sized lego set (2 lbs), the sleigh is carrying 321,300 tons, not counting Santa, who is invariably described as overweight. On land, conventional reindeer can pull no more than 300 pounds. Even granting that "flying reindeer" (see point #1) could pull TEN TIMES the normal amount, we cannot do the job with eight, or even nine reindeer. We need 214,200 reindeer. This increases the payload, not even counting the weight of the sleigh, to that of the Queen Elizabeth (that's the ship.)

5. Now, 353,000 tons traveling at 650 miles per second creates enormous air resistance (this will heat the reindeer up in the same fashion as spacecraft reentering the earth's atmosphere). The lead pair of reindeer will absorb 14.3 QUINTILLION joules of energy per second. Each. In short, they will burst into flame almost instantaneously, exposing the reindeer behind them, and create deafening sonic booms in their wake. The entire reindeer team will be vaporized within 4.26 thousandths of a second. Santa, meanwhile, will be subjected to centrifugal forces 17,500.06 times greater than gravity. A 250-pound Santa would be pinned to the back of his sleigh by 4,315,015 pounds of force. SO, if Santa ever DID deliver presents on Christmas Eve, he's probably dead now.

Merry Christmas!

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RESUMES AND PERSONAL STATEMENTS: The Art of Selling Yourself

Brian Parmer, Grady Koupal, and Nolan Kloer, ERE students

With winter break approaching, 'tis the season for students to start applying for summer jobs, internships, and research opportunities! The first task is to update both your resume and personal statement. The importance of having a refined resume and personal statement cannot be stressed enough. Whether or not your experience qualifies you for a certain position, your application is likely to be discarded if it is not polished and presentable.

RESUMES:
Your resume can be likened to a sales pitch. It should present all pertinent information about your education, work experience, qualifications, and contact information in a succinct yet thorough manner. Ideally, your resume will emphasize your strongest qualifications for the type of work you are applying for, as well as your skills that are applicable from one job to another (communication, organization, etc.). There is no prescribed format for a resume, and it is possible to choose a creative yet clear layout.

Keep in mind that the average time spent skimming a resume is 10-15 seconds! Thus, it should be easy for the viewer to differentiate between sections of data, which can be accomplished through the use of descriptive titles and different font styles/types. One important element in resume writing is the use of proper spelling and grammar (See: ERE and Grammar).

Possible headings for your resume:

Personal information: Include your name, address, phone number, and email contact. This section should serve as the heading of your resume, and should 'pop' out at the reader.

Education: Include the name and location of all institutions you have attended, as well as your major/minor fields of study. You may also include information about your GPA, and any coursework that may strengthen your background.

Experience: Give concise descriptions of duties performed in past jobs, using action words relevant to the position you are applying for. Include information about summer, part-time, and internship employment.

Qualifications: Includes technical skills associated with computer systems, communication, lab/field techniques, certifications, experience with special equipment, etc.

Extra Curricular Activities and Awards: Divide these into two different sections, or compile them into one larger section. Information should include involvement in campus and community activities, honors/recognitions, and special interests.

References: It is a good idea to include a references section on your resume. Include the names, job titles, addresses, telephone numbers, emails, and your associations with the people you have listed. Be sure you list people who will serve as good references for you!

PERSONAL STATEMENTS:
Your personal statement should model one of two styles. The first is a comprehensive and general style that includes your employment-objective(s), a brief background summary describing your relevant interests and motivations to apply for a certain position, and a summary of your relevant education/skills. The second style is a collection of responses to specific questions provided by the employer or institution. For this second style, it is important to address each question thoroughly, as your prospective employer will likely use the depth and completeness of your answers as hiring criteria.

Before writing a personal statement, you should ask yourself general questions which you could be expected to answer in an interview or application. Some examples of these questions are:

- What is relevant and unique about your life story?
- What are your career goals?
- What personal characteristics (integ rity, compassion, persistence, etc.) do you possess, and how do they help to qualify you for this position?
- What relevant skills/experience have you acquired, and how have they contributed to your growth as a professional?
- What is your interest in this field, and when and how did you learn about it? Also, do you have any experience with it?

A personal statement should tell a seamless story. It should emphasize personal experiences that pertain to the position desired, and should illustrate your positive characteristics in a logical manner. The first paragraph needs to garner interest from the reader, and should refer to the specific program or organization, as well as the position you are applying for. The subsequent paragraphs should support the first paragraph with specific examples about your experience. A conclusion is added to tie together the important points from the body paragraphs, and to re-emphasize WHY you fit the position. Present yourself in a genuine manner, and write creatively! A personal statement is the closest you will come to speaking with your prospective employer before an interview.

For additional information or help critiquing your resume and personal statement, see an advisor at the Career Center during walk-in hours: Monday-Thursday, 11am-1pm.

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Get Involved: ERE Clubs Information Board

Compiled by: Gabe Salazar, Luke Armbruster

Club:	***Environmental Resources Engineering Student Association (ERESA)***	***Society of Women Engineers (SWE)***
Purpose:	Acting on behalf of, and in the best interest of, the ERE student body, ERESA's primary goal is to develop and foster relationships between ERE students, the community, University and the E.R.E. faculty, in order to better provide fun and rewarding opportunities for all E.R.E. students.	Student organization dedicated to promoting women in the technical fields of science and engineering through outreach, team building and networking.
Activities:	Opportunities for professional development and fun include internship talks, guest presentations, resume workshops, the WSCL conference, the ASCE design competition, tours of local engineering firms, an annual rafting trip, the Welcome Back Pizza Night, the Fall BBQ, and Fall Follies. Many of these events are made possible by ERESA's main fundraising venture: The Coffee Table. Come by and get your main source of morning sustenance! Open Monday-Friday from 8am-12pm.	Usually every year, organizes a sushi event called SWESHI, a chili, spaghetti, or curry feed fundraiser (finances outreach events, including a trip to the annual regional SWE conference and an engineering educational event at a local elementary school), as well as professional discussions, and tutorial sessions, (including the recently held Calculator Help Tutorial).
Contact:	Email: **eresa@humboldt.edu** Website: **http://www.humboldt.edu/~eresa/**	Email: **swe@humboldt.edu** Website: **http://www.humboldt.edu/~swe/**

Club:	***Renewable Energy Student Union (RESU)***	***Engineers without Borders (EWB)***
Purpose:	Dedicated to the promotion of research, education and application of clean renewable energy technologies and energy conservation, RESU seeks opportunities for hands on learning and community involvement to further the academic experience through student directed projects.	Primary goal is to improve the quality of life of communities worldwide through the implementation of sustainable engineering projects that train both engineers and engineering students
Activities:	Current engineering projects include the designing of a brownout-sensing Smart Outlet; Maintaining the Solar Radiation Monitoring Station (SoRMS); Designing an off-grid solar system for Forks of Salmon School; Maintaining an off-grid solar/ microhydro system for the Smith River Alliance; various Humboldt Energy Independence Fund (HEIF) projects.	Currently working with RESU on projects, including the Forks of Salmon off-grid solar system, possible installation of an on-campus rain gauge for manual precipitation readings, and demonstrating a ram pump at a local school. Sadly, unlike SWE, ERESA, and RESU, support for EWB has weakened due to the absence of a permanent faculty advisor and dwindling student support. In the past, EWB has been involved in projects abroad, bringing a cross-cultural experience to ERE students. With growing ERE faculty and student support, EWB has the potential to offer the ERE student body many great cross-cultural engineering opportunities.
Contact:	Email: **resu@humboldt.edu** Webpage: **http://resu.humboldt.edu/**	Email: **ewb@yahoo.com** Webpage: **http://www.humboldt.edu/~ewb/home.html**

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ACTUAL BUMPER STICKERS:

TIME IS WHAT KEEPS THINGS FROM HAPPENING ALL AT ONCE.

WOMEN WHO SEEK TO BE EQUAL WITH MEN LACK AMBITION.

LOTTERY: A TAX ON PEOPLE WHO ARE BAD AT MATH.

I DON'T SUFFER FROM INSANITY, I ENJOY EVERY MINUTE OF IT.

ACCORDING TO MY CALCULATIONS THE PROBLEM DOESN'T EXIST.

WARNING: DATES ON CALENDAR ARE CLOSER THAN THEY APPEAR.

GIVE ME AMBIGUITY OR GIVE ME SOMETHING ELSE.

MAKE IT IDIOT-PROOF AND SOMEONE WILL MAKE A BETTER IDIOT.

HE WHO LAUGHS LAST THINKS SLOWEST.

THERE ARE THREE KINDS OF PEOPLE: THOSE WHO CAN COUNT AND THOSE WHO CAN'T.

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www.humboldt.edu/~ere_dept

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$$\nabla^2 \rho_A + \frac{\dot{n}_A}{D_{AB}} = \frac{1}{D_{AB}} \frac{\partial \rho_A}{\partial t}$$

$$\nabla^2 T + \frac{\dot{q}}{k} = \frac{1}{\alpha} \frac{\partial T}{\partial t}$$

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