Parting words from recent Graduates ................................................................. 1

Ellen Clarke ........................................................................................................ 1

Great Addition by One of Our Very Own: Dr. Boehm-Davis ............................ 2

Semester Highlights .............................................................................................. 4

Alumni Panel Talk ............................................................................................... 4

Inter-Departmental Field Day .............................................................................. 5

FAA Competition Award Ceremony ................................................................. 6

Graduation! ........................................................................................................... 7

Portfolio Night ...................................................................................................... 8

Student Editorials ................................................................................................. 9

No, Mom...Video games don’t necessarily make kids violent ............................ 9

Growing Pains During Sequestration ............................................................... 12

Fairfax Should Adopt Red Bike Lanes .............................................................. 15

Publications, Proceedings, Presentations, and Awards .................................. 19
Since graduating in December 2012, I have been employed by a small government contractor, Aptima. At Aptima, I have worked on projects for a variety of clients—from healthcare to the military—and have had the opportunity to take on both technical and managerial roles. The most interesting thing I have worked on is designing a tablet-based application for managing chronic disease in older adults. I have found that even the most basic research I did at GMU has an application in industry. For example, understanding neuroimaging technology has allowed me to work on projects designing neurophysiological measurements of performance. Graduating from the HFAC program is constantly proving to be highly valuable.
Completing graduate school is difficult, but I found two keys to success: self-motivation and having a strong voice. Self-motivation can be challenging when your goal is as big as completing graduate school. The most helpful thing I did was to break the program down into manageable milestones and set corresponding deadlines. However, this only works if you stick to the deadlines, so don’t allow yourself to make any excuses. And the best way to keep to your deadlines is a little help: a talented and motivated RA is your best asset. Not only do RA’s help you get your work done faster, but getting to know my RAs and helping them develop research skill sets was one of my favorite and most rewarding parts of my experience in the graduate program. Regarding having a strong voice, do not be afraid to challenge those around you—in a respectful manner, of course. The most innovative work often develops as the result of successful collaboration, and collaboration does not happen if the conversation is one-way.

Transitioning from graduate school to the real world is not as daunting as it may seem, as long as you have set yourself up for success. If you have any interest at all in going into industry, it is critical to involve yourself in an internship program. At your internship, do not just do what is asked of you—go above and beyond. How you perform is likely to influence your marketability after graduation. I was able to get a job during sequestration with a government contractor because I had interned for them successfully. And even if you’re not looking to stay with the same company, a strong recommendation or reference may get you to the job you want. Regardless of whether you want to end up in academia or industry, great work ethic and positive attitude are the cornerstones of a successful career.
the basis for his class. It sounded like a good opportunity to work with an old friend, so I took him up on the offer.

2. What do you hope this book will accomplish?
We hope that the book is a readable introduction to human factors engineering from a systems perspective and that people enjoy reading it and learning from it.

3. What is special about this textbook, to you?
Our goal was to write a short book, replete with examples that would draw people in, but not get bogged down in details. We anticipated building a large web site with supplementary materials so that people could go into more depth there. We didn’t entirely succeed, as we ended up putting much more into the text than we initially envisioned. We also haven’t yet completed adding all of the additional modules we anticipated when we started the project.

4. Is there a section/chapter you are particularly excited about in the book?
I don’t know that there is any given chapter or section that particularly intrigues me, but we had fun using the wordle website to construct the wordles showing the concepts contained in each section of the book.

5. Are there any studies you were particularly excited to include and why?
Immodestly, it was fun to be able to include our own work in the book and to see our names in the back index.

6. What were your criteria for identifying the most relevant studies and ultimately including them in the textbook?
I can’t speak for my co-authors, but in writing my sections, I wanted studies that supported the points I wanted to make. If they did, I included them.

7. What areas of Human Factors did you find difficult to write/investigate?
My colleague, and first author, Roger wrote the majority of the initial draft. Thus, I can’t say that any particular section was more difficult than any other. I worked at editing the sections, and making them come together in one voice. Frankly, the biggest challenge was deciding how to structure the book, and deciding what topics would become chapters and which topics would be merged in a particular chapter. There were several chapters (mostly from Part IV of the book) that we re-organized several times as we were working on the book.

8. What criteria did you use when writing/editing sections in this textbook?
The goal was to produce a book whose organization made sense, not only to us, but to people who we envisioned might want to
teach a course using our book as a base. We wanted topics to flow well and the examples make sense in illustrating the principles we were trying to describe. We were challenged in coming up with examples from numerous domains, not just from the areas with which we were most familiar.

9. What did you find most challenging during the creation of this textbook? Was it unexpected?

There are three of us who “co-authored” the book. However, Chip (Folk) and I found it difficult to “get inside” Roger’s head and write in the way he envisioned the book. As a result, Roger wrote the majority of the first draft of the book. Chip’s and my contributions were much smaller.

10. What were your sources of feedback and support throughout the different stages of this process?

Early on, we ran the outline and prospectus past some colleagues to make sure our overall approach made sense. Then, once we had a draft of the book, we sent it to four very brave souls who were kind enough to read through it and provide feedback on what needed to be changed. Frankly, we were not able to re-write as much as we would have liked, so any remaining flaws in the book should not be placed at their feet.

11. How did you manage your time and resources to successfully juggle all of your commitments?

We had a very nice plan, which allocated out all the tasks with deadlines, and we scheduled conference calls within the team to keep us on schedule (a challenge with two authors on the east coast of the US and one in Australia). However, the reality is that as the date by which we had promised the first draft to the publisher approached, we were much farther behind than we should have been. We just all put as many other things as possible on the back burner to work on the book and turn it around by the deadline (which we actually got extended).

12. Did you learn anything new about the field or about yourself while working on this textbook?

I think you always learn things, both about the profession, and about yourself, when writing and when working with others. For me, the experience reinforced the fact that although I care greatly about making sure every detail is accurate, I continue to make mistakes and miss things that are right in front of my eyes.

13. Are there any other books you are currently working on or are planning to begin in the near future?

With Frank Durso and John Lee, I am co-editing a book to be published by the American Psychological Association entitled “The Handbook of Human-Systems Integration.” The book will consist of roughly 40 chapters, and is designed as a handbook, that is, a “how to” in designing complex human-machine systems. The first drafts of almost all the chapters are in, and under review. We hope to have the final chapters in to APA by the end of the fall, with a release date in 2014.

14. How will your involvement in the publication of this textbook influence future collaborations and publications for you?

I’m not sure that the publication of the book will change the trajectory of my publishing
career. Books are difficult to produce, and they must be a labor of love, as there is no guarantee that anyone is going to want to read it once you write it. One hopes that someone will pick up the book and find it useful. Ideally, they might even like it enough to pass it along to someone else. Ultimately, if people learn something about how to implement human factors/human-systems integration, it will have been worth the effort.

Semester Highlights

Great Addition by One of Our Very Own: Dr. Boehm-Davis

Alumni Panel Talk
Semester Highlights

Field Day

[Images of students and activities on a field day]
Semester Highlights

FAA Design Competition
Semester Highlights

M.A. Graduation Day!

Portfolio Night
No, Mom...Video games don’t necessarily make kids violent

By Wendy Baccus

Dispensing scientific findings to the public is a challenge. Each one of you taking the time to read this article has assuredly encountered difficulty trying to translate their current work to a friend or family member; the glazed eyes, the confused expression, and either the abrupt change of subject or the exclamation that “Oh yes, of course, that’s like what Dr. Phil was talking about the other day...”. This frequent exchange is not always surmounted with a doubling of efforts on the part of the scientist to clarify the poor portrayal of scientific research, although it should be. This interaction is not only a frequent occurrence in our personal lives, but a current issue that has yet to be resolved within and between the scientific community and the public domain. This is not to say that there are not venues that sincerely try; however, the caliber of information relay varies substantially. I have subscribed to a number of popular scientific outlets, but much to my dismay, have found myself severely disappointed with the current status of popular science in the media.

The Discovery Channel is a major distributor of “educational” programming. It produces shows that chronicle Bearing sea fisherman and swamp people, as well as programs devoted to the scientific process and current research. These shows, for one, attract a wide audience from young to old, as well as people who subscribe to a more visual and entertaining form of scientific dissemination. I see both pros and cons to this venue of scientific dissemination. For example, the show Mythbusters “tests” common misconceptions and clichés from everyday life. An episode I found uniquely relevant investigated whether or not humans only use 10% of their brains. To resolve this debate, the Mythbusters team sought out a neurosurgeon who measured activity in various brain regions while an individual performed tests of memory, mathematical calculations, decision making, and visual information processing. The results indicated “a normal level of usage (or activity)”, but could not provide an exact percentage because only cortical surface activity was recorded.

To reach a conclusion the team looked into using a different method of measuring
brain activity; functional magnetic resonance imaging (fMRI). Brain activity was measured at rest and when telling a story. One of the team members, Tory, registered 15% while at rest, but 30% during the story telling task. Based on the comparison, the team declared the myth busted. Although their methods make a mockery of the scientific process and draw conclusions based upon less-than-stellar explanations of actual scientific experiments and a small sample, the aim can be interpreted as a failed attempt at a noble cause. Selling a simplified version of the scientific method in a fun, interesting and engaging format, while exposing new people to scientific exploration is a step in the right direction. My hope is that shows like this one pique the interests of children, who might go on to discover more formal outlets for investigation of similar questions. An almost certain downside is that this that older adults view these shows as the gold standard of SCIENCE and more interactions like the anecdote I introduced in the beginning persist.

Radio also offers a variety of science digest programs, one of which includes NPR’s “Science Friday” which covers current topics in various fields of science. This particular program favors brevity over elaboration of recent findings, but does a fair job of summarizing the important take-away message of the studies they deem worth reporting. The danger here lies in the delivery of the information as simple fact, rather than a stepping stone in the scientific process. Experimental results from a single study do not fundamentally alter our understanding our human behavior. Over time, synthesis of the results of different experiments, by various researchers, across different domains of science ultimately contribute to a greater understanding within the scientific community, as should be the case in the general public. In a time where leaps in scientific advancement are happening every day, little success is achieved by any of these outlets to make science digestible for the public while also maintaining the healthy skepticism necessary for scientific consumption.

A survey conducted by Vanderbilt University found that scientists and engineers rated news outlets such as The New York Times and The Washington Post as the best resources for relaying current findings (Retrieved from http://www.firstamendmentcenter.org/madison/wpcontent/uploads/2011/03/worldsapart.pdf); however, the most detailed and reliable source of scientific information is found in peer-reviewed journals, but these journals may not serve the general public as they do the scientific community. The first hitch is that journal articles are not always accessible to the public. Most require a subscription provided by a university or similar facilitator,
otherwise requiring payment per article. Secondly, even those that are available, are written in a format and style tailored to the scientific community’s skills, familiarity with the relevant literature, and knowledge-base. Peer-reviewed journals also vary with respect to the quality of research in the publication. A common system for assessing the quality of scientific journals is known as the impact factor, which is dependent upon the number of citations the publication’s articles receive over the course of a year. Those with the greatest number of citations are ranked with the highest impact factor, generally agreed to reflect the journal’s importance in the field; although there exists some debate of the validity of the impact factor system. Naive pursuers of scientific knowledge are likely unaware of these complexities when navigating journal pages, if they have seen them at all. Although open-source databases are emerging and outlets like science.gov exist to disseminate research, the level of comprehension required to benefit from these sources is not a skill to be assumed of the average reader; therefore, intermediaries are required.

We have established a need for scientific outreach to the public in a fashion that supports the true nature of the scientific process in a manner readily consumed by those who do not work in the field, but where does the responsibility for this miscommunication lie? Is it in the hands of scientists or should the media carry the burden of translation to the public? Quite simply, it is upon us, as researchers, to properly inform the public as well as the media about how best to interpret and communicate scientific findings. As I hinted early on, we must take the time and have the patience to better explain what it is we are working on. Having the ability to confer important aspects of our research in an understandable way should result in the listener walking away with the true value of our work. If this goal is not of the utmost importance to the scientific community, how will our research ever have the far reaching affects we hope for?

The next question is how might we achieve this goal? This is by no means, a simple task. Even though the primary responsibility is upon scientists, cooperation between researchers and the media is necessary. The technology of today sets the stage for scientific enlightenment, but that
can only happen if the public is equipped to understand and participate in the discussion. There is a need to eliminate the gospel-like propagation of findings, which involves educating the media of the power of peer-reviewed journals. Furthermore, emphasis should be placed on science as a process of exclusion. This means that scientists must withdraw from their windowless labs and actively promote their research in the community, while continuing to publish. Students should be required to take courses on how best to relate their research to a general audience. No longer can we sit idly by, blaming the media for incomplete or lackluster delivery of our work. Mainstream media satisfies the need for intellectual junk-food, but we have yet to give the public the sort of scientific diet they need. Who better to cure the ill-informed, than those who live and breathe science each day? So, next time you find yourself rolling your eyes at a friend who thinks you can read their mind because you are involved in psychology research, take a deep breath, clarify, rephrase. Make it your mission to give the public a more profound understanding of your work.

Growing Pains During Sequestration

By Kevin Zish

Many champions of research have developed and expanded their skill in the human factors department at GMU. The education that students receive at Mason is particularly well-recognized in the research community and is re-emphasized year after year with a considerable presence at HFES. This work in human factors is largely funded by grants from defense contractors and federal agencies in the DC Metro area. Considering the unstable sentiment in the economy and its effects on recent fiscal policy, the future for graduate students is left unclear.

The sequester is the future. Law makers have proposed that government spending is out of control and that the current rate of borrowing is unsustainable. According to the “Issues” page of WhiteHouse.gov, policy makers in 2011 were unable to agree on what programs should be changed to reduce
spending. The solution to this issue was a medicine so bitter that few thought it would come to fruition. Cuts would come equally from defense and domestic programs over the course of ten years. Automatic cuts of $1 trillion were signed into law and would come into effect in 2013 if no agreement was made.

Cutting spending generally sounds like a good idea. Reducing budgets is more effective however when it is a targeted approach. At an individual level there are certain budgeting practices that make more sense than others. As an example, it would be less painful to use coupons at the grocery store rather than skipping a mortgage payment or rent check. In this regard the sequester is blind, a knife in the dark slashing at spending in a very crowded room.

The issue, is that cuts to certain programs create drastically larger ripples in the economy such as in the cases of healthcare, defense spending, and education. Each sector supplies millions of jobs to healthcare employees, researchers, and teachers that heavily contribute to national financial stability. Economists are nervous because some theories state that ‘money makes money’. According the Alan Coddington, author of Keynesian Economics: The Search for First Principles, this is known as the Keynesian Multiplier (KM). KM refers to the power of money to produce jobs that give wage earners the opportunity to put money into the economy. That money can then be used to purchase goods and services by businesses for things like machines and supplies. This work can provide wages for employees in other industries. KM is a macroeconomics term.
based in Keynesian economics. The Keynesian Multiplier is most commonly associated with the Aggregate Expenditure equation, which is used to calculate a nation’s Gross Domestic Product (GDP). The AE equation is as follows:

\[ AE = \text{Household Consumption (C)} + \text{Investment (I)} + \text{Government Spending (G)} + \text{Net Exports (X)} \]

Aggregate Expenditure has several variables that can be affected by the sequester. Chief among these is government spending (G) and investment (I). As the government reduces spending the fear is that GDP will decrease. As GDP decreases then the effect of the Keynesian Multiplier will also decrease.

For residents of the DC area a reduction in government spending is quite unsettling. The New York Times reported that the state of Virginia is expected to be hit hardest. Few other state economies are as tied to federal government defense spending as Virginia. Many people who live in northern Virginia rely on the Office of Naval Research, DARPA, NIH, and the FAA for their livelihood. To keep people employed, institutions are using furlough days to both cut costs and preserve the same level of output. The Bureau of Labor and Statistics reported that around 90,000 civilian employees could experience furloughs in VA alone. Considering that government defense spending accounts for about 20% of the DC area GDP, there is a long way to fall.

Students can be particularly sensitive to this fiscal volatility. Many students come to school with the hope of finding high paying jobs once they graduate. The pain of living on a smaller income relative to their fully employed counter parts is dulled knowing that in several years they will have more leverage with employers. During that time however graduate students rely on grants from advisers, scholarships, or other external funding to support themselves. These sources of funding are less stable because of their competitive nature, shorter time frames, and dependence on federal budgets. Some of these budgets are made two years in advance and so current budgets do not always reflect present fiscal fortitude. The latter of the two can affect the willingness of a company to take on new projects until funding is secured and reduces the likelihood of hiring full-time staff.

Students at George Mason in particular rely on defense, NIH, and NSF funding. The NSF alone is expected to shrink its budget by nearly $300 million dollars. People applying for funding should expect an increase in competition for resources as grants and financial support for these institutions dries up, disappears, or is held up by sequestration procedures.

In the meantime, it is worthwhile to calculate what opportunities exist now. Although there are still furloughs for federal/civilian employees, the work still needs
students as a foot in the door to otherwise unrealistic job opportunities. While the paid/unpaid status of the internship may be questionable, it is useful to remember that there is always work to be done.

### Fairfax Should Adopt Red Bike Lanes
*By Ewart de Visser*

I see another morning of danger and violence ahead of me, yet I have no choice but to proceed. At 7:02 AM, I hop on my bike, an Italian Botecchia 21 speed for you anoraks out there, and immediately I feel the familiar freedom of the biking experience. There is something liberating about wind swooshing by when a man uses his own legs to propel himself forward; Flinstone-style. But I know what is coming next. I take a right turn, out of my safe apartment complex and enter the dangerous road full of frustrated, caged-in, road-raging drivers. The hostile arousal can be felt immediately. It appears to me that none of these co-road habitants will volunteer to share adequate space on the road. I have to claim it. I approach Fairfax Circle, a.k.a. “The Circle of Death”. This road abomination is the idea of a roundabout gone horribly wrong (FYI Fairfax, you broke the one sacred rule of building a roundabout: don’t build a road through the inner circle). I don’t know where to put myself so I wait in the middle of the road in front of other cars. Cars are coming from all directions closely passing me. The traffic light finally turns green and I speed up along Old Lee Highway. I notice a pothole in the road and swerve to avoid it. A car, about to pass me, honks loudly. I decide to switch to the sidewalk to avoid the cars a bit. I approach a few pedestrians and shout “on the left” and pass them. The sidewalk ends and I return to the road passing through busy downtown Fairfax. As I finally approach the peaceful George Mason Boulevard I notice a sign marked “Share the Road” with a biking icon.

![Fig. 1: Yeah right...](image-url)
affixed above it, supposedly sufficient to instill a culture of harmoniously sharing the road between bikers and drivers. What a joke…

Biking in Fairfax, VA is unnecessarily dangerous. There is no clear marking for bikers on most of the roads, sidewalks are incomplete and inconsistent, and road crossings are poorly designed. Bikers are forced to adopt self-preservation heuristics leading to frustration for drivers and pedestrians alike.

As an experienced biker (~20 years) in both the Netherlands and the United states, I can provide some insight into my decision making process when biking on American roads. My biking philosophy here in America centers on one truth: A biker will likely get badly injured in any type of car collision. Unlike a driver, a biker does not have a 4000 pound steel cage protecting them from potential harm. The acceptable number of collisions for me is therefore zero. I use a set of heuristics to protect myself on the road and to prevent any collision.

1. *Swerve heuristic*. Sometimes I deviate from a straight linear course along the road. Often times there are potholes in the road, drains, people exiting parked vehicles or other unexpected obstacles and I have to quickly swerve around them. If I bike too close to the side of the road, cars will quickly go by at close range, which is unnerving. I adjust my distance from the sidewalk depending on how close cars pass me. If they pass too close, I usually shift to a course closer to the middle of the road so cars have to stay behind me or pass with a wide margin on the right side of the road. I use this to maintain a safe and comfortable distance between the cars and me.

2. *Middle-of-the-road heuristic*. Sometimes I line up in the middle of the road in front a traffic light blocking any cars behind me and ensuring a slow start for them when the light turns green. This is a crucial technique for turning left on a big road, for instance. As a biker needing to turn left, I cannot stay on the side of the road because I would cross cars going right. Lining up next to cars instead of in front of them also creates an unsafe situation in which cars can pass a biker on both sides. I use the middle-of-the-road heuristic to make sure cars see me and force them to adjust their speed and stay behind me.
3. **Hat-switch heuristic.** Sometimes I switch from the road to the sidewalk or from the sidewalk back to the road. It is uncomfortable to be sandwiched between two cars especially while waiting in front of traffic light. The sidewalk provides some safety in this situation. Alternatively I sometimes switch from sidewalks to the road to avoid pedestrians walk or because a sidewalk simply ends and there is no other choice but to bike on the road.

4. **The death-stare heuristic.** Sometimes a driver leaves a driveway and does not see me. In this case, I make it a point to establish eye contact with the driver before proceeding further. It is a lot more difficult for a driver to run over a biker once human contact has been established. In front of a traffic light, I often look back to make eye contact with the driver to make sure they know I know they are there.

5. **Bend-the-law heuristic.** In some cases here in Fairfax, an intersection does not have separate pedestrian lights or another way for a biker to safely cross the road. Regular traffic lights are activated by a sensor that detects the degree of disturbance in the force (an electro-magnetic field). Me and my bike and do not produce enough change in the field for the traffic light to be triggered. This is usually not a problem because there is a lot of traffic everywhere. But occasionally, I bike early in the morning and then it can take a long time before cars approach the light. In those situations, I cross the road after carefully checking for traffic, even though the traffic light is red.

6. **Head-start heuristic.** While waiting in front of a traffic light, I often look at the surrounding traffic lights to predict when my light will turn green. I rely on this crucial information because when I know the traffic light changes, I can already mount my bike, clip in my shoes, and start biking as the traffic light turns to green. This way I can quickly zip away and gain speed and not slow down the other cars too much.

These heuristics may seem elaborate, but they are designed to play on the fear of the driver, get me noticed on the road, maintain a safe distance from cars, have an escape route, and force certain car behaviors. So far these rules of thumb have worked for me. I would prefer not to use these heuristics.
because they make drivers nervous. But on roads here in Fairfax, I am left in an awkward situation where there is no clearly allocated spot for me on the road, unlike the roads in the Netherlands. Roads are designed for cars and sidewalks for pedestrians, but I am left to my own devices, which forces me to use my self-preservation heuristics. There is some wishful thinking going on with “Share the road” signs. This should not be done with such a vague description assuming all people will now be in the mindset of sharing the road. This should be done by design so people automatically adopt the correct behavior.

The solution is simple: Install clearly marked red bike lanes throughout the city. This places the biker in one lane and would get them out of everyone’s hair. There are lots of examples of how this may be done. In fact, one does not have to go all the way to the Netherlands or California to find these types of bike lanes. They are in DC, Vienna and also on the GMU campus. Fairfax should adopt these paths throughout the city to ensure safety for bikers, drivers, and pedestrians alike.

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**Fig. 2:** Examples of a Dutch road, bike lane, sidewalk (all-in-one) and a roundabout

**Fig. 3:** Bike lane at GMU.

**Fig. 4:** Bike lane at Vienna, VA.


Grants and Awards


Raja Parasuraman, Principal Investigator, Air Force Research Laboratory (Subcontract from Perceptronics Solutions), “Adaptive Interface and Management System (AIMS)”, $14,878.

“Electroencephalography (EEG) Feedback In Decision-Making” - Army Research Office, P.I. Matt Peterson
