

NOMINATION COVER SHEET
2009 Virginia Outstanding Faculty Awards

1. <u>NAME</u>	
Full (Legal): Raja Parasuraman	Preferred First Name: Raja
2. <u>INSTITUTIONAL INFORMATION</u>	3. <u>PROFESSIONAL INFORMATION</u>
Institution: George Mason University Rank/Position Title: Professor; University Professor Year Rank/Title Attained: 1986; 2007 Years at Institution: 4 Campus Email Address:rparasur@gmu.edu Campus Phone: (703) 993-1357 Campus Mailing Address: 4400 University Drive, MS 3F5, Fairfax, VA 22030 Campus Communications Contact: -Name: Kimberly K. Eby -E-mail: keby1@gmu.edu	Academic Discipline: Psychology Specialization/Field: Cognitive Neuroscience; Human Factors; Neuroergonomics Type of Terminal Degree: Ph.D. Year Awarded: 1976 Awarding Institution: Aston University, U.K.
	4. <u>PERSONAL INFORMATION</u>
	Home Phone: Cell Phone Number: Home Mailing Address:

Please check only one box:

- RESEARCH/DOCTORAL INSTITUTION NOMINEE:**
MASTERS/COMPREHENSIVE/BACCALAUREATE INSTITUTION NOMINEE:
TWO-YEAR INSTITUTION NOMINEE:
RISING STAR NOMINEE:
TEACHING WITH TECHNOLOGY NOMINEE:

Table of Contents

Cover Sheet	1
Mission Statement	2
Summary of Accomplishments	3
Personal Statement	9
Abbreviated Curriculum Vitae	11
Letters of Support (Excerpted).....	13
Additional Documentation	16

President or Chief Academic Officer

Signature: _____

Printed Name: Peter N. Stearns, Provost & Exec. Vice President for Academic Affairs

ii. Mission Statement

George Mason University will be an institution of international academic reputation providing superior education for students to develop critical, analytical, and imaginative thinking and to make well-founded ethical decisions. It will respond to the call for interdisciplinary research and teaching, not simply by adding programs but by rethinking the traditional structure of the academy.

The university will prepare students to address the complex issues facing them in society and to discover meaning in their own lives. It will encourage diversity in its student body and will meet the needs of the students by providing them with interdisciplinary and innovative undergraduate, graduate, and professional courses. The university will energetically seek ways to interact with and serve the needs of the student body.

The university will nurture and support a faculty that is diverse, innovative, excellent in teaching, active in pure and applied research, and responsive to the needs of students and the community. The faculty will embody the university's interactive approach to change both in the academy and in the world.

The university will be a resource of the Commonwealth of Virginia serving private and public sectors. It will be an intellectual and cultural nexus between Northern Virginia, the nation, and the world.

iii. Summary of Accomplishments

Teaching

师傅领进门。修行靠个人。 *Teachers open the door. You enter by yourself.* Old Chinese proverb.

Raja Parasuraman has “opened the door” for many hundreds of students in over 30 years of teaching. His accomplishments as a teacher can be measured by the many who chose to enter through the door. His students went on to enjoy future success in academia, in industry, and in government. They work in many diverse settings worldwide—in the U.S., in Europe, in Asia, and in Australia. Those who became teachers—several now full professors—have been singularly influenced in their own teaching by his mentorship. Others have risen to important leadership positions in government and industry.

The students Raja Parasuraman currently teaches at George Mason University should enjoy similar benefits after they graduate. He will not take credit for their accomplishments, but his ex-students testify to the enormous influence he had on their personal development and to his dedication and skill as a teacher and a mentor, which they attribute to a unique combination of skills: a dedicated teacher who is also a brilliant scholar conducting cutting-edge research published in world-class scientific journals, such as *Science*. On their own such characteristics would be sufficient to earn universal acclaim. But when found in a person who is also friendly, supportive, and genuinely concerned about students’ academic and personal lives, the result is a teacher who inspires strong feelings of commitment, loyalty, and support from his students.

Parasuraman sees the teacher’s role first as enabling students to master core concepts and theories. These serve as the scaffolding on which everything else must hang: facts, too, must be acquired, but only to flesh out the edifice. He then gives students tools to pursue and acquire knowledge on their own. Finally, he hopes to inspire in all his students a love of learning and a sense of excitement for discoveries about human nature and the technological world. All this he does in a challenging but supportive environment, both in the classroom and outside it, including his home, to which he often invites students for dinner and conversation. Parasuraman encourages students to critique their own assumptions and those of others in a tough but respectful way. Many students and colleagues testify to his laid-back style and openness, qualities that have allowed him to befriend students and to win their respect not just through his scholarship and encyclopedic knowledge, but also with his humility, kindness, and humor.

Raja Parasuraman has taught courses in psychology, human factors, and neuroscience over the past three decades. Psychology is typically described as the study of the mind and of behavior. But many argue that since it is the brain that enables mind, psychology must also include the study of the biological underpinnings of mind and behavior. Courses on biological factors in psychology are therefore required and form a major core of the undergraduate curriculum in psychology. Parasuraman has taught the core course, *Biological Bases of Behavior*, for many years, with outstanding teaching ratings. Parasuraman has also taught related courses on brain and behavior at the graduate level, specifically *Cognitive Neuroscience*, which was offered for the first time at Mason when he joined the university in the 2004-05 academic year. He received a rating of 4.8 (out of 5) for this course, which elicited comments such as: “*One of the best courses I have ever taken. Professor Parasuraman is an asset to Mason.*” He has taught this course at regular intervals since that time, to similarly high praise.

Another core course that Raja Parasuraman has taught is *Cognitive Engineering*, which is required for all incoming graduate students in the Human Factors and Applied Cognition (HFAC) program. This course provides HFAC students with a basic background on the role of human cognitive capabilities and limitations in the design of products, work places, and systems. The course is an important one because it serves a gateway for students to pursue more specialized topics in human factors once they have mastered the required basic knowledge. Parasuraman first taught this course on coming to Mason in 2004, receiving a rating of 5 (out of 5). A sample review: “*Professor Parasuraman is*

a great teacher. He really cares about students and the information presented. He has a comprehensive knowledge of the subject matter and he has a wonderful ability to present complex information in an understandable way.” He has taught the course regularly since then with similarly high ratings. Although Mason does not currently have a course in human factors at the undergraduate level, Parasuraman has taught a related course, *Psychology, Work, and Law*, which exposes undergraduates to concepts in workplace ergonomics and forensic human factors. This course received a rating of 4.75 (out of 5).

Peer reviews of Parasuraman’s teaching by colleagues confirm his pedagogical skills: *“Raja is a superb teacher. I have heard him many times lecture to various audiences, including those in an educational context (a short course). He has the talent of expressing complex phenomena clearly and simply, interleaving scientific/psychological concepts with intuitive examples.”*— Chris Wickens, Professor of Psychology, University of Illinois, Urbana-Champaign.

Parasuraman’s teaching responsibilities overlap considerably with his role as the HFAC program director in Psychology, overseeing about 35 M.A. and 15 Ph.D. students. This program is recognized as among the top human factors programs in the U.S. Parasuraman has strengthened graduate training in the program through a number of initiatives: encouraging and financing student attendance at conferences, supporting the student chapter of the Human Factors and Ergonomics Society, organizing weekly brown bags at which prominent outside speakers have presented their research, and integrating the newer cognitive neuroscience thrust with the HFAC program through his development of the emerging area of neuroergonomics.

Parasuraman views teaching as showing students how to address real-world problems based on what they learn in the classroom. He advised a group of students whom he encouraged to enter a design competition on new methods to improve airport runway safety. “Runway incursions,” in which aircraft collide with or have near misses with other aircraft and surface vehicles on the airport surface, are a major contributor to aviation accidents (more so than mid-air collisions, which are extremely rare). Hence there is an urgent need to reduce runway incursions to improve safety. The FAA created the competition to bolster innovative approaches to airport operations and to engage students in airport issues. The group of 6 students advised by Parasuraman won the first place award for runway safety. Using human factors principles and tools learned as part of their instruction in the HFAC program, they designed a system using a distributed network of sensors along the runway to alert pilots of runway incursions. Parasuraman and his student design team were elated to win first prize, beating out many engineering schools. But each of the students said that they gained more satisfaction from the process—working on a 6-month project aimed at solving a real-world problem under the guidance of Parasuraman’s teaching efforts—than from simply winning.

In all, over the past 30 years, Raja Parasuraman has taught over 3,000 undergraduate and over 1,000 graduate students. He has directed over 40 M.A. theses. He has directed or is currently directing the Ph.D. theses of 29 students and has served on another 25 Ph.D. thesis committees. He has been the external examiner for the Ph.D. theses of 10 students in other countries such as Australia, Italy, and Switzerland. In addition, he has mentored 15 postdoctoral fellows, most of whom have gone on to tenure-track positions in universities worldwide.

In recognition of his significant contributions to teaching, Raja Parasuraman received the Paul M. Fitts Education Award from the Human Factors and Ergonomics Society in 2006.

Discovery

Raja Parasuraman is internationally recognized for his research in *human factors* and in *cognitive neuroscience*. His work in these two fields supports Mason’s mission, which seeks scholarship in both pure and applied research. His scholarly output includes 10 widely acclaimed books. He has also written 81 book chapters and 117 articles in such prestigious journals as *Science and Proceedings of the National Academy of Sciences (USA)*. His other writings include proceedings articles, book reviews, technical reports, editorials, and articles for the general public. His vita lists about 400 conference presentations and invited lectures.

A major thrust of Raja Parasuraman's research in *cognitive neuroscience* is the examination of changes in attention and memory with aging and in Alzheimer's disease (AD). In the last 10 years, the number of AD cases in the US has risen from 2 to 5 million. According to statistics gathered by the Northern Virginia Regional Commission, the proportion of residents aged 65 and older in the region will double over the next 30 years, from 7% to 14%. This will dramatically increase the number of AD patients in Northern VA and create added demand for state and local services to address their needs. Nationwide, approximately one in every 45 Americans will be afflicted by 2050. There is thus a compelling need to find ways to detect and prevent AD—it is already an epidemic. Parasuraman's research is contributing to that effort by examining changes in cognition and brain structure (using MRI) in healthy middle-aged and older individuals who have an increased genetic risk for developing the disease later in life. If pre-cursors of AD can be found in younger adults, delaying or preventative treatments can be applied. He recently received a \$2.6 million grant from the National Institutes of Health to conduct a 5-year study using this approach, building on earlier pilot work funded by the Virginia AD Foundation.

Parasuraman's work on the brain mechanisms of human attention and memory examines how efficiently people select some information to attend to while ignoring distracters, how well they maintain attention over time, and how they remember what they attended to. He uses brain-imaging techniques such as MRI and event-related potentials (ERPs) to examine these cognitive functions in healthy young and old adults. He is the chair of a group of investigators overseeing Mason's MRI research, which began recently following the installation of a MRI scanner at the Krasnow Institute in 2006. Parasuraman also installed two high-density ERP recording systems for use in research and teaching at Mason. His MRI and ERP research has revealed how the act of paying attention modifies neural activity in specific regions of the brain. He has also been a pioneer in the use of molecular genetic methods to examine how gene expression contributes to individual variation in attention and memory.

Parasuraman's *human factors* research has shown how automation—the allocation of tasks to computers—can have both positive and negative effects on how well humans pay attention and how quickly and effectively they make decisions, thereby influencing system efficiency and safety. His research in this area has been funded by several agencies, including the Federal Aviation Administration (FAA) and the National Aeronautics and Space Administration (NASA). His books on the topic include *Automation and Human Performance* (Erlbaum, 1996) and *The Future of Air Traffic Control: Human Operators and Automation* (National Academy Press, 1998).

Obtaining external grant funding is essential for scholarship and research productivity in many scientific fields. Parasuraman has been singularly successful in this regard. His research has been continuously funded by \$6.5 million in grants since he arrived at Mason in 2004, including two NIH R01 awards, regarded as the most competitive of federal funding. His grant funds have supported salary, stipends, and/or tuition for two research faculty, two postdoctoral fellows, 12 graduate students, and 14 undergraduate students at Mason. Parasuraman also received about \$9 million in grant funds over a 20-year period prior to coming to Mason.

One quantitative (though imperfect) index of research impact is citation counts. As of September 2008, there were over 3,000 citations to Parasuraman's published research (Institute for Scientific Information) and over 4,000 when citations in books, chapters, and reports are included (Google Scholar). Finally, the *h* index for citations of his research is 28. Qualitative but equally important evidence of recognition is the acclaim that other scholars have accorded his books and articles. His very first book, *The Psychology of Vigilance* (1982), was lauded as a "*breakthrough in our understanding of this important human ability*." A leading scholar in attention research praised his second, *Varieties of Attention* (1984), with the simple admonition to readers, "*Attend to this!*" Even reviews of later books invoke his earlier work. At the height of the cognitive neuroscience "revolution" Parasuraman published *The Attentive Brain* (1998). A review the same year in the journal *Nature* said: "*Raja Parasuraman has compiled an exciting collection of papers aimed at one of the most fruitful subjects cognitive neuroscientists have tackled: attention. Parasuraman's 1984 publication Varieties of Attention was a*

highly influential collection that continues to be widely cited. This new volume promises to be even more useful.”

Parasuraman’s journal articles have been equally influential. A 1979 study on vigilance, published in *Science*, outlined a new theory of this important human function. The paper has since spawned several empirical tests of the theory published in numerous journal articles, many based on graduate student dissertations. The influence of this paper continues to this day. More recently, his 1997 journal article on humans and automation was selected as a “pivotal article” that was the subject of a special review in the 50th (Golden) Anniversary Special Issue of the journal *Human Factors*, the flagship journal of the Human Factors and Ergonomics Society (HFES), of which he became a Fellow in 1994. Pivotal articles were chosen to highlight the major discoveries and developments in the field of human factors and ergonomics over the past 50 years. Parasuraman’s article, along with another 1996 paper was also included in a recent book published by HFES entitled the *Best of Human Factors: Thirty Classic Contributions to Human Factors*. He has also twice won the Jerome H. Ely Award given by HFES for the best paper in the journal *Human Factors*, once in 1997 and again in 2001. Both of these award-winning papers were collaborative efforts involving his students as co-authors.

Parasuraman receives many invitations every year to give colloquia and named lectures at institutions throughout the world, only some of which he is able to accept. Recent invited lectures include the Distinguished Scholar Lecture, Chinese Academy of Sciences, (Beijing, China, 2006) and the Prometei Lecture (Berlin Technical University, Berlin, Germany, 2008).

The many indicators of the recognition of Parasuraman’s scholarship of discovery include his election in 1991, at an early stage of his career, as a Fellow of the American Psychological Association (APA), the leading professional organization of psychologists in the U.S. He is currently a Fellow of three Divisions within APA. In the same year he was also elected a Fellow of the American Psychological Society, which is the major organization for scientific psychology in the U.S. This was followed by his election in 1994 as Fellow of the American Association for the Advancement of Science, the premier professional organization of scientists in the U.S.

Finally, two important indexes of research recognition were his receipt in 2004 of the Franklin V. Taylor Award for Lifetime Achievement in Applied Experimental and Engineering Psychology from the American Psychological Association. In 2007 his scholarly contributions were recognized at Mason by his appointment to the position of University Professor.

Knowledge Integration

Very few scholars can claim to have integrated knowledge through the creation of a new field. Parasuraman is one of them. The two areas that he has worked in, human factors and cognitive neuroscience, have traditionally been separate areas of inquiry. Yet, Parasuraman has shown that either discipline can usefully inform the other. Human factors (or ergonomics) seeks to understand how human capabilities and limitations affect the design of technology. Cognitive neuroscience attempts to identify the neural mechanisms of the same human functions. Consequently, in 1998 Parasuraman proposed the interdisciplinary field of *neuroergonomics*, which he defined as the study of the human brain at work. The new field has blossomed in the intervening decade. Parasuraman introduced neuroergonomics into the curriculum of the HFAC program at Mason. Other evidence of impact includes special issues in journals and the publication last year of his book, *Neuroergonomics: The Brain at Work*. Equally important, his efforts at knowledge integration have succeeded beyond the academy. This year the Army Research Laboratory announced a \$50 million program on *Cognition and Neuroergonomics*, aimed at promoting research to improve the effectiveness of soldiers using new technologies.

Additional evidence of Parasuraman’s knowledge integration concerns the tools that cognitive neuroscience uses to identify the neural basis of mind. Parasuraman has championed the addition of molecular genetics to the cognitive neuroscientist’s toolbox, which typically uses brain imaging. In his view, neuroscience should capitalize on the tremendous breakthroughs in knowledge represented by the Human Genome Project. Parasuraman has argued that while brain imaging can reveal which brain

regions are active during a mental task, it cannot specify how neural activity in those regions is influenced by genes, or how gene expression varies between individuals. Discovering these influences is fundamental to a deeper understanding of brain, mind, and individuality. Many researchers are following his lead in using genetic methods.

Many scholars have strong research credentials. What makes Parasuraman's work truly outstanding as an example of knowledge integration is his efforts to make research findings accessible to an audience beyond fellow scholars, beyond the scientific elite—to the lay public, to policy makers in government, and to designers in industry. Parasuraman's research has been featured in many media outlets, such as *CNN*, *The Learning Channel*, and *National Public Radio*, as well as many newspapers and magazines, including *The New York Times*, *Washington Post*, and *National Geographic*. Parasuraman attempts to present his research in terms understandable by the lay public and always emphasizes the practical or societal benefits of his findings. His work on automation provides an instance of his effort to integrate research with important national problems. There have been widespread applications of his research findings on human-automation interaction in aviation and air traffic control, military systems, and robotics. Government and industry frequently seek him out for his expertise in human factors, particularly for his insights into how automation can be better designed for effective, safe, and enjoyable human use. A specific case of knowledge integration is Parasuraman's development of guidelines for automation design for use by engineers and policy makers. The FAA has adopted these for new automated systems being developed to assist air-traffic controllers.

Finally, Parasuraman has forged significant connections between discovery and teaching. Consider cognitive neuroscience, for example. This field has been made possible by new technologies such as MRI and high-density ERPs. Cognitive neuroscience has transformed mainstream cognitive psychology and is also influencing other fields of psychology, including developmental and social psychology. It is therefore vital that all students be exposed to this field, but teaching it ideally requires actual knowledge of brain imaging techniques. It cannot be taught (or learned) effectively by simply reading a text book. Parasuraman's extensive research experience with MRI and ERPs has allowed him to bring his first-hand knowledge into the classroom and to integrate laboratory demonstrations with traditional instruction. Brain imaging technology is a fast-moving field. Any teacher must keep abreast of state-of-the-art developments. Parasuraman has been able to do so because of his research, thereby providing his students an authentic and up-to-date learning experience.

Service

Raja Parasuraman has extensive service involvement at the society/community level. He served for many years as the Chair of the National Research Council's (NRC) Committee on Human Factors. This standing committee of the National Academy of Science (NAS) provides advice to the federal government on a variety of national and international policy issues involving human factors and technology. During his tenure, the committee deliberated on such important national issues as promoting homeland security, modernizing the air traffic control system, reducing musculoskeletal injuries at work, and reducing medical error. In 2008 he received a Distinguished Service award from the NAS in recognition of his services.

While he was NRC Chair and immediately following the events of September 11, 2001, Parasuraman was asked to speak before the Committee for Science and Technology for Countering Terrorism, formed in response to a request from the Executive Office of President George W. Bush. The committee was tasked to develop new technologies to counter terrorism and improve homeland security. Parasuraman's testimony emphasized the need for human factors to be taken into account in implementing new technologies. He pointed out that *all* proposals involved four major features: (1) new technologies; (2) human users; (3) new operational procedures; and (4) changed organizational structures. Consequently, he advocated that human factors was uniquely poised to assist in the seamless integration of technologies, human users, procedures, and organizations so as to maximize the effectiveness of new security efforts. The efforts of Parasuraman and other human factors experts

were recognized by the Committee, who in their executive summary (*Making the Nation Safer*, National Academy Press, 2002) stated: "*Recognition of human factors is important for ensuring that the role of people in providing security is not determined by default on the basis of what technology promises, but rather as a result of systematic evaluations of human strengths and weaknesses that technology can both complement and supplement.*" To this day, Parasuraman is continuing to serve the national need for enhanced homeland security through his work on human factors evaluation of radiation portal monitors that are being implemented at border crossings with Canada and Mexico (on the recommendation of the NRC panel) to screen truck and rail cargo traffic.

Parasuraman's service also extends to another arm of government—Congress. He has been involved in educating Congressional staffers and senators on issues related to human factors. These efforts were coordinated by the APA's Office for Legislative Advocacy. As an example, Parasuraman testified on Capitol Hill on the requirements for modernizing the nation's air traffic control system. Parasuraman's testimony concerned ways of improving safety while enhancing human performance and system efficiency.

Parasuraman's international service includes consulting for the Organization for Economic Cooperation and Development (OECD) in Brussels. He has supported OECD's long-term project to assess the implications of cognitive neuroscience research for educational practice—including literacy and mathematical skills—not just in children but in adults as well.

Other professional service contributions involve editorial board membership of several prominent journals, including *Human Factors*, *Ergonomics*, and *Neuropsychology*. Parasuraman has been a reviewer for over 100 scientific journals and reviewed grants for several funding agencies, including NIH, NSF, the Wellcome Trust (U.K.), and the Alzheimer's Association.

Raja Parasuraman has also been heavily involved in institutional service in the four years he has been at Mason. He serves as Chair of the Neuroimaging Core of the Krasnow Institute (NICKI), which oversees MRI operations and policies at Mason. He has taken a leadership role in defining and presenting to the University administration the requirements necessary to ensure the future scientific and financial success of the Krasnow MR center. He is also currently on the Neuroscience Advisory Committee which oversees the coordination of teaching and research activities at Mason related to neuroscience, which has been identified as one of three "spires of excellence" of the university. Parasuraman's work on the committee is part of a group effort to maintain growth and excellence in neuroscience teaching and research at Mason.

Other institutional service includes serving on Mason's Minority and Diversity Committee. Mason prides itself on having one of the most diverse student bodies in the U.S. In his committee work Parasuraman has emphasized the need for periodic self-assessment by the university regarding well being, equity, and career issues related to diversity. Being himself of Asian origin, Parasuraman brings with him an appreciation and understanding of the needs and problems faced by minority students and staff. Parasuraman also has served since its inception as a member of the Mason Emerging Researcher, Scholar, Creator Committee, which seeks to reward "rising stars" among the faculty. He has also served on search committees for a Chair for the Department of Psychology and for faculty positions in Cognitive Neuroscience. Within Psychology, Parasuraman is a member of the Faculty Evaluation, Graduate Studies, and Diversity committees.

iv. Personal Statement

Why would a person trained as an electrical engineer turn to the study of the mind? Can the tools of engineering—mathematics, the electromagnetic laws, computers, etc.—help at all in understanding mind and behavior, the essence of psychology? And what, if anything, can psychology contribute to engineering? Are these not disparate endeavors destined to go their different ways, separated by their rigid disciplinary walls?

These questions may have swirled in my mind 35 years ago when I made the transition from engineering to psychology. But I can honestly say that at the time I had an answer to only the first: I turned from engineering to psychology because I had drifted into the former without much thought, following in my two older brothers' footsteps, both of whom were engineers, and not resisting my parents' pressure to pursue the traditional career path (for college-bound boys in India) of engineering, medicine, or government service. But as I near the completion of my fourth decade of teaching and research in psychology, there are answers to each of my opening questions. Yes, engineering methods can reveal much about human psychology, particularly the brain mechanisms that enable mind. And a branch of psychology—human factors—sometimes also called engineering psychology, has indeed contributed to the engineering of technologies so that human users can operate them safely and effectively. In answer to the last question, therefore, it is not inevitable that disciplinary boundaries be rigid: they must be breached so knowledge can be integrated and so that progress can be made in furthering our understanding of the natural and the designed world.

Such an interdisciplinary approach—combining psychology, engineering, and neuroscience—has shaped my teaching and research throughout my career, culminating at Mason. The path that led me here is a long and convoluted one. I left India in 1966 at the age of 16 on a scholarship to finish my schooling in England. My acceptance three years later into the electrical engineering program at the Imperial College at the University of London was the first significant event that shaped my future career. The curriculum at Imperial was highly diverse. I remember being peeved at first at having to take courses such as *Communication and Culture* (with Professor Colin Cherry, a pioneer in information theory) and *The Tao of Physics* (Professor Fritz Hofstadter, a leading quantum physicist): I thought, what had these to do with electrical engineering? Now, years later, my long-held conviction of the need for interdisciplinary approaches to scientific and practical problems undoubtedly stems from these early influences. The faculty at Imperial included several other luminaries in addition to Cherry and Hofstadter. I am not ashamed to drop the names of other professors with whom I took courses: Dennis Gabor, the Nobel Laureate physicist well known for the effect named after him, and Eric Laithwaite, who first demonstrated electromagnetic levitation to us in the lab and several years later watched the Japanese reap the fruits of his creation with the development of high-speed maglev trains.

It was during this time that I slowly decided to move away from pure engineering. I began reading articles in psychology for my senior project on an analog-digital system for the analysis of human physiological signals (EEG). I was intrigued by reports that these signals had psychological significance, e.g., that EEG could index a person's attention. I decided to do graduate work to learn more. Unfortunately, I came up against the British educational system, which straitjacketed students into science and arts streams from an early age. It was difficult to obtain a Ph.D. in psychology without having an undergraduate psychology degree. Luckily, Aston University had just begun a new graduate program in psychology that accepted students in engineering. That did it. I applied and was accepted at Aston. I graduated with the Ph.D. four years later. I never looked back, and my career in human factors, cognitive neuroscience, and, years later, neuroergonomics, was firmly on track. The rigidity of my early educational training in Britain stands in stark contrast to my later experiences at Mason. Mason's Mission Statement strongly values interdisciplinary research and teaching: the path that led me to integrate engineering, psychology, and neuroscience steered me to a place that I now call home.

I often relate this history to my students so that they can see that behind what appears to them to be a confident, multi-faceted professor, there was once an unsure student not knowing where his interests and skills lay and where his career was bound. Many students often feel this way, so I try to

reassure them that the path to self-discovery can be long, but that it will nevertheless be resolved if they remain open to all possibilities. I also retell these incidents to inspire in my students the value of interdisciplinary work, hoping they will break the disciplinary boundaries that so often hem us in. When I began my academic career, however, I did not yet have the tools to breach disciplinary barriers, nor the standing to argue for them, so I pursued work in two disparate areas—human factors and cognitive neuroscience. But I always exposed both students and colleagues in one field to findings and theories in the other, often simply by introducing them to each other. Eventually I succeeded in breaching the barrier by arguing that interdisciplinary work is essential for knowledge integration and for stimulating new approaches to discovery. This led me in 1998 to propose the creation of a new field, *neuroergonomics*, which combined the goals of human factors (or ergonomics) and neuroscience.

I believe my development of neuroergonomics heeds the call of Mason's mission statement to "rethink the traditional structure of the academy." It has been gratifying to see the field emerge from its shaky beginnings and on the verge of being firmly established. The invitation I received to write a paper on neuroergonomics for the 50th anniversary issue of *Human Factors* (June 2008) for inclusion in a section on "Discoveries and Developments" is one index of recognition. Also significant is the praise my 2007 book *Neuroergonomics: The Brain at Work* has received from such leading scholars as Michael Posner (psychology) and Thomas Sheridan (engineering).

Of course, there is more to teaching than promoting interdisciplinary work. My role as a teacher is to allow students to master core concepts and theories, beyond memorization of facts. If I can show them how to pursue and acquire knowledge on their own, how to sort out the information flood with a critical eye, then I have succeeded. I encourage students to critique their own assumptions and those of others respectfully but forcefully. With graduate students and postdoctoral fellows, my goal is to allow them to develop into fully independent researchers and teachers. Much learning takes place when there is a collegial group of highly active researchers working together on related topics. By placing my students in this environment in their first year, even as they are busy taking classes, I hope to get them caught up in the excitement (and occasional frustrations!) of research.

Many graduate students have difficulty with one of the cardinal requirements of a Ph.D.—writing. I strongly believe that graduate students should have at least one article published in a journal before they graduate with a Ph.D. Some are successful in this regard, while others struggle or do not try at all. I have always worked closely with students to help them in their writing, but nevertheless, many still struggle. Recently, I have begun an initiative to help graduate students write papers for submission to peer-reviewed journals. Combining my expertise in research with another of my talents—I am told I am an excellent cook and I do like to entertain—I have begun a series of dinner writing workshops at my home. At each workshop I critique two manuscripts currently being worked on by students for possible submission to a journal, offering practical suggestions for improvement. Other students are also invited to attend. All enjoy dinner and drinks while learning useful tips to improve their writing in a relaxed setting.

Finally, I seek to marry the interests of students with those of mine. I am not interested in producing clones of myself—rather I hope to learn from the ideas that students bring with them. My role is simply to help give them shape. I expect students to work hard, obtain empirical data diligently, attend colloquia and conferences, and to publish their work. In return I try to facilitate their success in each of these endeavours by supporting their conference attendance, introducing them to well known researchers, and encouraging them to present and write about their research. I feel quite proud of having used these methods over the past three decades to shepherd 23 Ph.D. students who have gone on to rewarding careers.

v. Curriculum Vita

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Education

1976 Ph.D., Psychology, Aston University, Birmingham, U.K.
1973 M.Sc., Applied Psychology, Aston University, Birmingham, U.K.
1972 B.Sc. (1st Class Honors), Electrical Engineering, Imperial College of Science and Technology, University of London, U.K.

Positions Held

2007-present: University Professor, George Mason University, Fairfax, VA
2004-present: Professor, Department of Psychology, George Mason University, Fairfax, VA.
1986-2004: Professor, Department of Psychology, Catholic University, Washington DC
1982-1986: Associate Professor, Department of Psychology, Catholic University,
1978-1982: Research Fellow, Psychology, University of California, Los Angeles, CA

Selected Awards and Honors

2006: Paul M. Fitts Education Award, Human Factors and Ergonomics Society
2004: Franklin V. Taylor Award for Lifetime Achievement in Applied-Experimental and Engineering Psychology, American Psychological Association
2001: National Associate, National Academy of Sciences
1997, 2001: Jerome H. Ely Award for Best Article in Vols. 38 and 42 of *Human Factors*
1994: Fellow, American Association for the Advancement of Science
1994: Fellow, Human Factors and Ergonomics Society
1991: Fellow, American Psychological Association (Divisions 1, 3, and 21)
1991: Fellow, American Psychological Society

Teaching Experience

Advanced Topics in Cognitive Science; Biological Bases of Behavior; Cognitive Engineering; Cognitive Neuroscience; Directed Readings; Human Factors in Systems; Neuroergonomics Seminar; Neuroscience Seminar; Special Topics in Psychology: Psychology of Work and Law

Recent Selected Grants

2008-2013: Principal Investigator, Air Force Office of Sponsored Research (AFOSR) Multi-University Research Investigation (MURI), "Harnessing Complexity in Human-Machine Systems" (Subcontract from Carnegie Mellon University), \$911,209.
2007-2012: Principal Investigator, National Institute on Aging Grant 2R01AG019653, "Apolipoprotein E, Attention, and Alzheimer's Disease", \$2,632,673.
2007-2009: Principal Investigator, Army Research Laboratory Contract DAAD-19-01-C-0065 (Task Order 91), "Neuroergonomics of Attention, Action Recognition, and Action Performance Applied to Uninhabited Vehicles," \$370,000
2005-2008: Principal Investigator, Army Research Laboratory Contract DAAD 19-01-C-0065, "Adaptive Automation Architecture Documentation," \$347,000.
2004-2007: Principal Investigator, National Institute of Aging Grant R01 AG19653, "Apolipoprotein E, Cognition, and Alzheimer's Disease," \$810,563.
2004-2005: Principal Investigator, Defense Advanced Research Projects Agency Grant "Neural and Genetic Assays of Mental Workload," \$80,000.

Public and Academic Service

Editorial Boards, *Journal of Experimental Psychology: Applied*, *Ergonomics*, *Human Factors*,
Neuropsychology

- 2007-present: Chair, Neuroimaging Core of the Krasnow Institute, George Mason University
2007-present: Chair, Awards Committee, Human Factors and Ergonomics Society
2001-2007: Chair, Committee on Human Factors, National Research Council
2001-present: Consultant, Federal Aviation Administration (AAR-100)

Selected Books (out of 10)

- Davies, D. R. & Parasuraman, R. (1982). *The Psychology of Vigilance*. London: Academic Press.
Parasuraman, R. & Davies, D. R. (1984). *Varieties of Attention*. Orlando, Florida: Academic Press.
Parasuraman, R., & Mouloua, M. (1996). *Automation and Human Performance: Theory and Applications*. Mahwah, NJ: Erlbaum Associates.
Parasuraman, R. (1998). *The Attentive Brain*. Cambridge, MA: MIT Press. (Reprinted in paperback by MIT Press, 2000).
Parasuraman, R., & Rizzo, M. (2007). *Neuroergonomics: The Brain at Work*. New York: Oxford University Press. (Reprinted in paperback by Oxford University Press, 2008).

Selected Journal Articles (out of 117)

- Parasuraman, R. (1979). Memory load and event rate control sensitivity decrements in sustained attention. *Science*, 205, 924-927.
Parasuraman, R. & Beatty, J. (1980). Brain events underlying detection and recognition of weak sensory signals. *Science*, 210, 80-83.
Parasuraman, R., Greenwood, P. M., Haxby, J. V., & Grady, C. L. (1992). Visuospatial attention in dementia of the Alzheimer type. *Brain*, 115, 711-733.
Parasuraman, R., & Riley, V. (1997). Humans and automation: Use, misuse, disuse, abuse. *Human Factors*, 39, 230-253.
Greenwood, P. M., Sunderland, T., Friz, J. L., & Parasuraman, R. (2000). Genetics and visual attention: Selective deficits in healthy adult carriers of the e4 allele of the apolipoprotein E gene. *Proceedings of the National Academy of Sciences*, 97, 11661-11666.
Jiang, Y., Haxby, J. V., Martin, A., Ungerleider, L. G., & Parasuraman, R. (2000). Complementary neural mechanisms for tracking items in human working memory. *Science*, 287, 643-646.
Parasuraman, R., Sheridan, T. B., & Wickens, C. D. (2000). A model for types and levels of human interaction with automation. *IEEE Transactions on Systems, Man, and Cybernetics. Part A: Systems and Humans*, 30, 286-297.
Parasuraman, R., Greenwood, P., & Sunderland, T. (2002). The apolipoprotein E gene, attention, and brain function. *Neuropsychology*, 16, 254-274.
Parasuraman, R. (2003). Neuroergonomics: Research and practice. *Theoretical Issues in Ergonomics Science*, 4, 5-20.
Parasuraman, R., Greenwood, P. M., Kumar, R., & Fossella, J. (2005). Beyond heritability: Neurotransmitter genes differentially modulate visuospatial attention and working memory. *Psychological Science*, 16(3), 200-207.
Parasuraman, R., & Wickens, C. D. (2008). Humans: Still vital after all these years of automation. *Human Factors*, 50, 511-520.
Parasuraman, R., & Wilson, G. F. (2008). Putting the brain to work: Neuroergonomics past, present, and future. *Human Factors*, 50, 468-474.

vi. Excerpts from Letters of Support for Dr. Raja Parasuraman

From Colleagues

“While I chaired this department for 12 years, I hired 28 faculty—Dr. Raja Parasuraman was clearly the strongest hire I made during this period. Dr. Parasuraman’s many accomplishments in scholarship, teaching, and service are detailed in his impressive vita. Rather than recount those, let me offer my perspective on why I am so impressed with him. First, he gives of himself willingly and often. During his hiring negotiations, I mentioned that, with his extensive grants, he could buy down to a lower teaching load—he resisted that, as he sees teaching as an obligation he willingly shoulders to pass on knowledge to a younger generation. He mentors graduate students, postdoctoral fellows, and junior faculty, helping them to develop their careers, garner research funding, and publish. While many faculty do this to a degree, Dr. Parasuraman far exceeds the expected. In mentoring, collaboration with other faculty, and his extensive professional and university service, he typically takes the lead not because he pushes his views, but by virtue of his command of the issues involved. He is simply embedded in the life of his program, the department, the university, and the profession, and he teaches and serves at all levels well and willingly. Second, most faculty would be quite satisfied with a single stream of publications less numerous than he has in either of his two major foci. To be internationally renowned in more than a single research area is extraordinarily rare, with both original data and integrative reviews in both, is generally reserved to the likes of Linus Pauling. Raja has two major research foci, each of which reflect his intellectual contributions, each of which has commanded generous external funding, each of which has commanded approbation and honor from his peers around the world. Every strong university has some faculty who are outstanding. Dr. Parasuraman rises above that descriptor. While Mason has other faculty of renown, we have none who match his combination of depth and breadth of scholarship with his commitment to teaching, mentoring, and service. I cannot imagine a faculty member more worthy of this award.”

—Robert F. Smith, Ph.D., Professor, Director, Biopsychology Graduate Program and former Chair.

“Raja Parasuraman is indisputably the top name in this country, if not in the world, in the emerging discipline of neuroergonomics: the application of the study of brain physiology to addressing critical problems of human factors and human-system interaction. This level of distinction has arisen from his 40 years of work as an experimental psychologist and human factors scientist in which he has made vital contributions both to the study of brain mechanisms, and, particularly, to the study of human-automation interaction. Indeed in the latter discipline—of emerging importance—I would also classify him as one of the top 2-3 recognized scholars in the country. Explicit documentation of his reputation in both of these areas is witnessed in the fact that he was invited to publish *two* articles in the Golden Anniversary issue of the *Human Factors Journal*, one on human-automation interaction and another on neuroergonomics. This is a special honor because there were only a small sampling of authors (less than 20) invited to do so, to honor their unique contributions to scientific scholarship in our discipline of human factors; of these, Raja was the only scholar invited to submit two such articles. Through his past work on human-automation interaction, and his forward-looking creative work on neuroergonomics, his scholarship has done a magnificent job of propelling our discipline into the 21st century.”

—Christopher Wickens, Ph.D., Emeritus Professor, University of Illinois at Urbana-Champaign.

From Former Students

Raja Parasuraman’s qualities as a scholar are self-evident by his numerous scientific and professional accomplishments. His greatest asset is that he mentors by example. He has a passion for science. As a former student and now a colleague, I am inspired by his broad range of interests within psychology, never being wedded to a single paradigm, theory, or technique. Raja has the admirable ability to simultaneously focus on necessary details as well as the big picture of scientific problems. His intellectual restlessness sets an example for me to keep a broad lookout for potentially interesting phenomena on the horizon—what I call the “periscope approach” to research—and to always keep my

mind open and keen. Importantly, Raja maintains a personal interest in his students and a penchant for having fun (he plays a good game of racquetball!). Many of his students have achieved success. I count myself as one of them and thank Raja for his commitment and inspiration to research, teaching, and mentorship.”

—David J. Hardy, Ph.D., Assistant Professor of Psychology, Loyola Marymount University.

“Raja Parasuraman’s accomplishments speak for themselves. What one cannot glean from his vita, however, are the warmth, humility, curiosity, open mindedness, and perhaps above all, integrity that he brings to his teaching and his research. As I acknowledged in my Ph.D. dissertation in 1996, ‘...it is extraordinary to have a brilliant, nurturing, and accommodating advisor. It is priceless to call such a person a friend.’”

—Brian G. Hilburn, Ph.D., National Aerospace Lab, Amsterdam, Netherlands.

“One of Raja Parasuraman’s prominent qualities is his ability to motivate students at all levels, undergraduate, graduate, and postgraduate, by helping them to gain self confidence. He expresses genuine interest and curiosity in the work of his students and is willing to learn from their ideas and their research. What makes him such an exceptional teacher is his ability to motivate students to engage in a high level of self-directed research. His credibility as a teacher is further strengthened by many public outreach activities on human factors issues (e.g., supporting the APA initiative on the Decade of Behavior, interviews broadcast on radio and television) as well as providing expert testimony to Congress (e.g., on human factors implications of homeland security). Raja is also a very literate and open-minded person willing to learn from the multicultural mix of his staff. His sense of humor makes him not only well respected among students and colleagues but also contributes a lot to making it fun working with him.”

—Bernd Lorenz, Ph.D., Human Factors Scientist, DLR Institute for Aviation, Germany.

From Current Students

“The first class of my first day as a graduate student at George Mason, on Cognitive Engineering, was one of Raja Parasuraman’s. I remember Raja saying that along with most of us, it was his first day at George Mason as well. He quickly got into the meat of the lecture, ending with one of his signature slides—a collage of the key historical figures in the discipline. For me, these photos illustrated that we weren’t just talking about theories and words, but instead the ideas that real people had produced. Raja was purposely putting a human face on the concepts we talked about, making it easier for us to relate to them. Together with the admission that it was his first day too, Raja was tearing down the wall between himself and his students—all within the first hour of the course! In every interaction that I’ve had with Raja, both as my advisor and as a course instructor, I have constantly been impressed by his ability to humanize the academic process. His lectures are full of information—much gained firsthand—but the courses always thrived on discussion and interaction among the people in the room. Raja had time and respect for every questioner and knew the information he was presenting so well that he could often weave questions from left field into his previous thought. In every class, he fostered a sense of community among all of us. We were in it together, and everyone in the course could help everyone else learn. Raja also makes a point of relating to students outside of class. His were the only courses I have ever had where the instructor took everyone out for a beer—remember, this is graduate school—after the last class. Again, he was creating an environment where a learning community could flourish. To me this is what separates Raja from many of the other professors I have had. His mastery of the material is a given, and he creates an environment where students are comfortable and motivated to ask questions and learn. To me, this is the mark of an excellent teacher. As an advisor, I have seen Raja display the same respect for his students. Graduate students are not in competition with each other for time, attention or resources in Raja’s lab. Instead, we are expected to learn from each other, and teach each other what we know. To me, this is an extension of the humanizing of scientific discovery that Raja

does so well in class. In the example Raja sets, science is done by people who learn from each other and work together.

—John Fedota, 4th year graduate student in the Ph.D. Human Factors program.

“There is no other professor who could have helped me more as an undergraduate student, than Dr. Raja Parasuraman. He has proved to be an invaluable advisor by not only opening countless doors, but by also acting as a role model in the field of psychology. With his help I was able to complete my own study on sleep and cognition, and with his financial support, present the results at the 2008 American Psychological Society conference. Raja has also introduced me to other professors working in the field, thus enabling me to assist with numerous projects. The most pronounced includes analyzing and reading MRI data for an NIH-funded Alzheimer’s study, work which undergraduates normally do not engage in and would otherwise be out of reach. I could continue to name instances where he has helped me in the field, but most importantly Raja has clearly separated himself from other professors by acting as an exemplar advisor, showing me not only how to act as a student of psychology, but as a person as well.”

—Ryan McGarry, senior undergraduate student in Psychology.

“Ivan Pavlov described three core values of a man dedicated to science: gradualness, modesty, and passion. Raja exemplifies all three. He exhibits *gradualness* because he guides his research steadily from the idea to the published peer-reviewed paper. He reminds us often that our work should be theory-driven, that we should never stop asking the question ‘why?’ Yet Raja is *modest* because he does not boast about what he knows, is always ready to explain the facts, and asks when he does not know. In my experience with him he does not consider his time more important than other’s and readily receives students to discuss projects or new ideas. Furthermore, even though he founded the field of neuroergonomics, which has met with critical acclaim, he emphasizes that the term that itself is not important; in fact he thinks it should be dropped eventually. Rather the theoretical models, methodologies, and new questions that arise are what he emphasizes as important. Most of all, Raja has a deep *passion* for conducting research, and teaching. His ability to share his passion for writing cumulates in unique events such as the Dinner Writing Workshop, which helps students publish research in peer-reviewed journals while also enjoying Raja’s superb cooking. This idea summarizes Raja’s philosophy: Use your passion to work hard and produce quality work, but don’t forget to have a little fun. I cannot have imagined a better advisor. He has encouraged me to pursue my own research and ideas, helped me when I was stuck, and always pushes me to do better by setting the bar high.

—Ewart de Visser, 4th year graduate student in the Ph.D. Human Factors Program.

“Dr. Raja Parasuraman has been instrumental in shaping my scientific identify. Students often hear about and fear the loud, self-promoting professor: Although he his highly accomplished, Dr. Parasuraman is anything but these things. I often stop by his office when I am upset or have a question; and even though these interactions interrupt his work, he is always willing to speak with me and make sure I am doing well. In addition to taking time to meet with me, he also seeks to connect me (and others) with scientific opportunities. For example, as a first year graduate student I was invited by him to participate in a National Academies of Science workshop; such offers are the norm. As a teacher and advisor, he has pushed and challenged both myself and other students to not only think critically about our theories, but about their societal implications. Although this is a single testimonial, my voice is not alone; everybody who has worked with him would say that Dr. Parasuraman has shaped their lives too.”

—Peter Squire, 5th year graduate student in the Ph.D. Human Factors program.

vii. Additional Documentation

Teaching

Recent Course Evaluations

Course Name	Year	Enrollment	Course Rating	Teacher Rating
<i>Cognitive Engineering</i>	2004	17	5.00/5	--
<i>Psychology, Work, & Law</i>	2005	20	4.75/5	--
<i>Adv. Topics Cog. Science</i>	2005	17	4.79/5	--
<i>Psychology, Work, & Law</i>	2006	45	4.79/5	4.91/5
<i>Cognitive Engineering</i>	2006	15	4.80/5	5.00/5
<i>Adv. Topics Cog. Science</i>	2007	11	4.63/5	5.00/5
<i>Cognitive Engineering</i>	2007	18	4.60/5	4.94/5
<i>Cognitive Neuroscience</i>	2008	12	4.67/5	4.90/5

Peer Review of Teaching

The Psychology Faculty Evaluation Committee uses a Behaviorally-Anchored Rating Scale (BARS) to evaluate teaching on an annual basis. The BARS scale is 0-10, with ratings 8-10 being reserved for the following: "Student course evaluations (4.3-5.0, clearly above cluster norm); 4-6 doctoral advisees; 4-6 additional mentees; has graduated 2 doctoral students; praise of teaching to the chair; evidence of teaching innovation; teaching awards; student publications."

Since my arrival at Mason in 2004, my BARS teaching ratings have consistently been above 8.5, with my most recent rating being 8.75.

Awards for and Reviews of Teaching

"As president of the Human Factors and Ergonomics Society (HFES), it is my pleasure to inform you that you are the recipient of the HFES 2006 Paul M. Fitts Education Award. This award is presented in recognition of your outstanding contributions to the education and training of human factors/ergonomics professionals. Your dedication to scholarly activities, student advising, and administrative service are honored by this award. Congratulations and many thanks for your important contributions. We are pleased to add your name to the roster of outstanding recipients of the Paul M. Fitts Education Award." —*Marvin Dainoff, Ph.D., President, Human Factors and Ergonomics Society, July 2006.*

"It is a pleasure to inform you that your student team submission to the FAA Airport Design Competition for Universities titled "Runway IncurSION Monitoring and Direct Alerting System (RIMDAS)" is the First Place Winner in the Runway Safety Challenge. The proposal was selected by a review panel of FAA, industry, and academic experts in an extremely competitive process. Our congratulations to you and team members Jane Barrow, Kevin Durkee, Jennifer Moore, Carl Smith, and Peter Squire. The students will equally divide the cash prize of \$2,500 and receive an award certificate. The FAA created this competition to engage students in addressing airport and runway issues. Your students did an excellent job of researching and stating the problem and the limitations of existing approaches to preventing runway incursions. They systematically defined an innovative system to address runway incursions using multiple analyses and task modeling frameworks. Congratulations to you for your work

in engaging, advising, and encouraging these student winners and to the students for their outstanding effort.” —*Kirk Shaffer, Associate Administrator for Airports, Federal Aviation Administration, May 2007.*

“Raja Parasuraman is an eminent psychologist who has earned international recognition for his research and teaching efforts. We share an interest in the field of vigilance or sustained attention, an important area in the human factors domain. In my view, and that of many specialists here and abroad, Dr. Parasuraman ranks as the foremost investigator currently at work in this field. His research interests extend to a broad spectrum of other important problems to which he has also significantly advanced knowledge. Dr. Parasuraman has provided empirical and theoretical contributions that form a significant portion of modern education in human factors. He has also personally impacted the education of a large number of students who have been fortunate enough to study directly under him. He is a magnificent teacher. Equally at home as a lecturer or a discussion leader, he leads his students to excellence through his depth of knowledge, intellectual excitement, and his unusual capacity to blend theoretical and practical issues. In addition to being a master in the classroom, Dr. Parasuraman is a superb mentor who reflects a patient and caring attitude towards his students. His ability to be always there for his students is remarkable and evidence of his exceptional dedication and skill as a teacher. His pedagogical efforts have been the gateway for many of his students to achieve exceptional careers in the academic, industrial, and government sectors. In sum, Raja Parasuraman stands as one of the three or four most brilliant and effective scientists and teachers I have been privileged to know in my professional career that covers a span for more than 40 years.” —*Joel S. Warm, Ph.D., Professor of Psychology, University of Cincinnati.*

“Raja Parasuraman’s pioneering studies in the field of Neuroergonomics were the reason that I asked to complete my dissertation with him. I thought I had a lot of things to learn from him about the type of research that he was doing. I was wrong: I have learned more than that from Raja. I have learned an effective way for running a lab, managing staff, dealing with everyday issues at work, and, most important, thinking internationally. Indeed, Raja’s multi-cultural lab has become a network of young scientists located all around the world, developing scientific collaborations, novel ideas, common writing, and student exchanges. I think Raja’s main capability is that of being a living example of how a scientist should be. He is a very motivating, generous, and supportive mentor and colleague. He is a prolific writer, and a winner of many awards. I share with many colleagues the feeling that we will never accomplish what he has done. Nevertheless, he is a very friendly person, and his humbleness is always disarming. If I had to use only one sentence to describe Raja’s influence on me, I would use the question that typically comes to my mind when I face a difficult situation at work: ‘what would Raja do now?’” —*Francesco Di Nocera, Ph.D., Professor, University of Rome “La Sapienza”, Rome, Italy.*

“Dr. Raja Parasuraman is an inspirational scientist and a tremendous teacher. I have interacted with him at three different levels: as an undergraduate, as a graduate student, and now as an Assistant Professor. I first met him in 1998, when as part of my undergraduate studies at Tufts University I completed a three-month summer internship in his lab. As an undergraduate, one can imagine my surprise when Raja supported my interest in conducting my own lab experiment. In 2000, I began my graduate studies with him. My six years in his lab were met with a breadth of research opportunities and a great deal of professional freedom. In the classroom, Raja is magnificent. He generally starts lectures by providing the historical background of a topic, he encourages students to bring in outside experiences as they relate to the area of study, and most importantly he keeps the class engaged, regardless of the size and duration. You walk out of the classroom thinking ‘that learning stuff is fun!’ That said, I learned the most from him in the lab. As a junior graduate student, I was impressed with how closely he worked with me when I would get stuck with the data or even the experimental programming code. As a senior graduate student, I realized one of Raja’s greatest strengths is teaching others to write well. He would revise manuscripts quickly, assist me in understanding why particular sections needed to be flushed out better, and most importantly encourage all his students to write grant proposals, book chapters, and peer

reviewed journal articles. Now, two years removed from his lab, I can better appreciate two fundamental aspects of how Raja set the atmosphere for his lab. First, he sought diversity in the lab as evidenced by the many international graduate students and post docs. At the time, it was a great cultural experience, but now it is a fabulous professional network. This dovetails on my second point. Raja's students, regardless if they've spent time together in the lab, maintain a warm spirit of camaraderie. This may stem from having participated at one point or another in the 'starving students program.' These were occasions when Raja would cook for his students. These evenings impressed me the most because Raja was always teaching, regardless of the environment. He took these opportunities to discuss art or a literary piece that related to the work currently conducted in the lab. As a student, I learned the importance of reading broadly and having an open mind towards various influences on science. As a faculty member now, I realize the importance of shaping casual interactions with students to be learning opportunities. Lastly, Raja is a humble individual. He is welcoming towards all: students, junior scientists, and other professionals." —*Ericka Rovira, Ph.D., Assistant Professor, United States Military Academy, West Point.*

Post-Doctoral Fellows Mentored

<u>Name</u>	<u>Dates</u>	<u>Current Position</u>
1. Paul Nestor	1984-1986	Professor, University of Massachusetts, Boston, MA
2. Pam Greenwood	1986-1991	Associate Professor, George Mason University, Fairfax, VA
3. Toufik Bahri	1990-1991	(deceased)
4. Indramani Singh	1990-1994	Professor, Banaras Hindu University, Varanasi, India
5. Mustapha Mouloua	1992-1994	Associate Professor, University of Central Florida, FL.
6. Charles Adams	1993-1994	Computer Scientist in industry
7. Evan Byrne	1993-1996	Investigator, National Transportation and Safety Board
8. Yang Jiang	1996-2000	Assistant Professor, University of Kentucky, Louisville, KY
9. Alan Francis	1998-1999	Staff Scientist Maryland Psychiatric Institute
10. Yue-Jia Luo	1998-2000	Professor, Chinese Academy of Sciences, China
11. Bernd Lorenz	2000-2002	Senior Scientist, Eurocontrol, Budapest, Hungary.
12. Shimin Fu	2002-2004	Research Assistant Professor, George Mason University
13. Hiroshi Furukawa	2002-2003	Associate Professor, Tsukuba University, Japan

Discovery

Reviews of Books

"Even though this book is quite dear, students of attention—indeed, of cognition—should dig deep in their pockets and come up with the cash. It is chock full of information, well-reasoned argument, and serious thinking. It is skyscrapers above the usual edited volume. I spent many a pleasant evening reading the chapters in this book. They made me feel good about the field and my association with it. Those in need of intellectual refreshment should buy and enjoy." —*Review by W. Hirst of Varieties of Attention (Academic Press, 1984) in Contemporary Psychology: APA Review of Books, 1986, pp. 45-48.*

"*The Attentive Brain* is a timely volume by Parasuraman, who is a leading expert in the field of attention and cognitive neuroscience. Essential reading for anyone interested in attention." —*Review by M. Chun of The Attentive Brain in Contemporary Psychology, 2000, pp. 45-48.*

Reviews of Neuroergonomics: The Brain at Work. (Oxford University Press, 2007).
 "The problems posed by *Neuroergonomics*—involving the reciprocal interaction of brain and physical world—not only provide ergonomics with a route to analysis of work that goes beyond traditional assessment of performance and subjective ratings, but can also enhance the efforts of basic neuroscience. This book should be on the book shelf of every human factors and ergonomics researcher who cares about the future of the field. It elaborates the promise of what might be and the

effort required to complete the journey.” —*Marvin Dainoff, Professor Emeritus of Psychology, Miami University, and former President of the Human Factors and Ergonomics Society.*

“In this authoritative volume the world of work (ergonomics) meets the new methods and results that have been developing from cognitive neuroscience, neuroimaging, and molecular genetics. The chapters illustrate how this mixture of science and application provides the potential for designing new technologies and improving their use by people.” —*Michael Posner, Professor, University of Oregon, Member, National Academy of Science.*

“Parasuraman and Rizzo have forced us to think about humans in a whole new way. At first the term ‘neuroergonomics’ made me skeptical, but this book makes clear the importance and timeliness of this brain based perspective. The authors have made a great contribution.” —*Thomas Sheridan, Professor of Engineering and Applied Psychology, MIT, former President of the Human Factors and Ergonomics Society, and member of the National Academy of Science.*

Reviews of Grants

NIH R01 Grant Proposal, “Apolipoprotein E, Attention, and Alzheimer’s Disease. “Although the project is ambitious, the investigative team is top notch and uniquely poised to complete the proposed work. Overall the project promises to have an important impact on the field with practical implications for public health. The Principal Investigator. Dr. Raja Parasuraman is Professor of Psychology and George Mason University. He is a very productive senior investigator with extensive experience in the study of cognitive change with aging and Alzheimer’s, including longitudinal assessment, visual attention, and working memory. He and co-investigator Pamela Greenwood are leaders in the field of the genetics of cognitive aging. They are a productive team and their work is published in highly rated journals.” —*NIH Summary Statement 3/01/07 (Score: 137. Percentile: 3.2). Funded for 5 years at \$3,278,915.*

AFOSR Proposal, “Building Bridges between Neuroscience, Cognition, and Decision Making. “It is my pleasure to write in support of this proposal by Dr. Raja Parasuraman and others. The researchers have outstanding scientific credentials and are international leaders in neuroscience and psychology. The ability to understand the influence of stress, ambiguity, and conflicting goals on human decision making would have substantial impact on the missions conducted by the Air Force. It will be exciting to see the influence that your proposed research has on personnel selection, evaluation, training, and the development of decision aids.” —*Kenneth Boff, Ph.D., Chief Scientist, Wright-Patterson Air Force Base, October 27, 2006.*

Service

“I want to take this opportunity to express my appreciation for your valuable contributions as Chair of the Committee on Human Factors. The achievements of the committee are in large measure the result of the expertise and commitment provided by you and your fellow members. Your service has advanced the knowledge base and contributed to more informed public policy. Please accept our thanks for the time and specialized knowledge which you have contributed to the National Research Council and the nation, and for a job well done.” —*Ralph Cicerone, Chair, National Research Council, National Academies of Science, Jan. 2008.*

“Thank you very much for reviewing the draft report *Shipboard Automation Identification (AIS) Displays: Meeting the Needs of Mariners*. Your comments, many of which have been addressed in the revisions to the text, have helped ensure the report’s accuracy and overall quality. In particular, the committee appreciated your suggestion that the report include a discussion of issues concerning human performance, automation, and team performance. Thanks again for assisting with the review of this report.” —*Robert Skinner, Executive Director, Transportation Research Board, NAS, June 2003.*