

## **Spotlight Interview with Dr. Karen Quigley, President of the Society for Psychophysiological Research**



### **Research**

#### **1. How did you get into the field of Psychophysiology? You completed your bachelor's degree in Zoology. What made you decide to pursue Psychobiology for your graduate degrees?**

My route from zoology to psychophysiology was a bit circuitous. As an undergraduate, I did work on cognition in chimpanzees, a good fit with my interests in animals and my Zoology major. I also thought it would be a good fit for me as I did not want to sit in a rainforest somewhere scratching mosquito bites so that I could study chimpanzee behavior. I entered graduate school to do comparative cognition work and I began working with both my undergraduate mentor, Sally Boysen, and her collaborator, Gary Berntson. Gary at that point was doing some work with autonomic responses in humans who were unable to communicate ("locked-in syndrome"), using psychophysiology as a way to demonstrate the ability (or inability) of these individuals to respond to stimuli in the world via the cardiac orienting response. He and I began some discussions about doing related work in rats that would enable us to determine both the sympathetic and parasympathetic autonomic features of this response. I found the literature in autonomic physiology and psychophysiology fascinating, and it didn't take long before I shifted gears to the autonomic work solely, working with Gary, and leaving comparative psychology behind. My peripheral physiological work in animals broadened when Gary suggested that I also train with John Cacioppo, a recently hired faculty member at Ohio State University. My training in human psychophysiology turned out to be especially fortuitous as my increasingly severe allergy to rat dander limited my animal work, and eventually I made the move to working exclusively with human subjects.

#### **2. Your research investigates basic affective processes as well as more applied health psychology questions. How do these two lines of research inform and influence one another? How do you see psychophysiological principles applied in your work with the Department of Veterans Affairs?**

To start with your last question, I have used psychophysiological measures in my applied work with military personnel/veterans. For example, in my prospective longitudinal study in post-9/11 veterans, I used laboratory stressor tasks and cardiovascular measures to assess reactivity across multiple tasks as a predictor of later self-reported health. Those with greater blood pressure reactivity before their deployment had better self-reported health after deployment about one year later (McAndrew et al., 2013). This perhaps counterintuitive result is in line with newer work by Anna Phillips and Doug Carroll suggesting that greater cardiovascular reactivity is not always associated with poorer health outcomes. In

some newly funded work, we will be using a mobile device to measure sleep parameters in veterans with insomnia. This home-based device can provide some general staging of sleep states (e.g., REM, light and deep sleep) using peripheral arterial tone in the fingertip (along with pulse oximetry, actigraphy, and snore measures). Although the sleep staging is not quite as detailed as possible by classical polysomnography, the device is less intrusive and easier for participants to use, and provides more detail about sleep than actigraphy alone can. We will be pairing this device with participant use of a mobile app for teaching and motivating better sleep hygiene and other sleep-related behaviors to try to reduce insomnia in busy post-9/11 veterans.

My work in basic affective science currently is guided by a constructionist model, the Conceptual Act Theory (CAT) which I am working on with my collaborator, Lisa Feldman Barrett who originated the theory (see [www.affective-science.org](http://www.affective-science.org) for papers). Psychological construction relies on the kind of population thinking that is popular in scientific accounts of the biological world where categories (such as species) have fuzzy boundaries. This theory proposes that emotions are not physical (morphological) types, but are cognitive categories that contain a variety of unique instances. The Conceptual Act Theory is an example of the population thinking approach, where mental states like emotions are constructed moment to moment using basic processes (or ingredients) that integrate and make sense of sensory information from the world and from the body using stored representations from the past. One important feature of the theory is that it utilizes neuroscientific evidence demonstrating that the brain is a “predictive organ.” This means that healthy humans (and other mammals) enter new situations utilizing their prior knowledge which leads to expectations about what one is likely to encounter in any new situation, thereby shaping what we perceive and how we act. The CAT has a strong emphasis on context in affective and emotional responses as well as an emphasis on individual differences that informs the design of my applied work. For example, I view poor sleep habits in many veterans as having their origins in the requirements of their deployment job and environmental context. During a combat or other hazardous deployment, sleep schedules are often very different than in the home context to meet the needs of a mission. Once the individual returns home, however, it can be hard to re-set their sleep schedule and sleep habits. This is especially true alongside the many other changes they are experiencing (new work or school demands, a return to family demands, new demands to pay rent, wash laundry, cook food, and complete other household chores that the military takes care of for deployed service members). Couple this very major shift from deployment to home with psychological distress arising from combat exposure, or physical or psychological injury and it's easy to see why deployment and returning home can be so disruptive. Habits formed during deployment, like swerving across the center yellow line to avoid a possible explosive device on the side of the road, can result in embarrassment, distress or even injury in the context of the typical interstate highway with your family in the car. Retraining one's expectations and predictions in line with the familiar, but now changed context of the home environment takes time and support. Before I began working with Lisa on the CAT, I was using another constructionist theoretical model, Howard Leventhal's Commonsense Model of Self-Regulation, to guide our work on health in veterans, a group I feel very honored to serve. So, I see significant cross-fertilization both methodologically and theoretically between my lines of work.

### **3. You have had much success in funding your research with grants through organizations such as NSF, NIH, VA and many others. What advice do you have for those trying to find support for their research?**

Writing grants is a skill like any other, and therefore takes practice. Further, grant proposals have a different structure than scientific manuscripts. We write empirical papers by stating a hypothesis, presenting evidence, and then drawing conclusions from that evidence. Although we start with a hypothesis, I would argue that the crux of an empirical paper is mostly about the inductive process of making a broader statement, or conclusion, based on specific new evidence. The clearest grant proposals are instead structured more deductively. Early in the proposal you first provide an overview that goes something like this: You describe and provide evidence showing that there is some larger, important problem that your proposed project will address (the significance). You then describe what we don't yet know about the state of the world, and how if we did, it would address that important problem in a new way (the innovation). Then, you describe what is already known about the problem (the background). Finally, you describe how you will obtain novel data that will aid in solving the problem posed (the approach/methodology). The research plan then expands on this general overview. Also, when proposing

basic research it is important to indicate how the research is likely to eventually lead to a solution to the larger, important problem, even if you will not solve the larger problem in that project.

Another critical part of successfully obtaining funding is to know your audience – both in the narrow sense of understanding who the reviewers are and in the broader sense of knowing the goals and priorities of the agency. For each different kind of grant proposal, it is important to find out how the review process works, what the review criteria are, and when possible, who, or at least, what kinds of individuals are likely to review the proposal (are they scientists in your specific area, psychologists or neuroscientists more broadly, or does the panel also include non-scientist stakeholders in the research process (e.g., as happens with some grants from the Department of Defense where non-scientists play a role in the review). In some cases, the names of individuals on review panels can be determined before you write the proposal (e.g., standing NIH panel member rosters can be found on-line). In other cases, you may be able to obtain this information by talking with a program officer. In determining the fit of your idea with agency goals and priorities, many program officers will provide some feedback on fit with their program if you provide them with a brief sketch of your idea. Program officers are very busy, so if they are willing to spare some time to talk with you, be prepared and focus on a few key questions. They, of course, cannot tell you whether something will be funded, but if the idea does not fit with their agency's goals, they will tell you that, and that is crucial information to have up front.

Beyond federal funding sources, your own University may have funding available to help with supplies, equipment or other needed resources for your graduate work. Both NSF and NIH fund dissertation research. Writing a proposal to fund all or part of your graduate research is a great way to learn about the grant writing process while you still have the help of your graduate advisor, rather than doing it for the first time as a new faculty member. There are also foundations that fund research, although typically they have smaller budgets. Foundation sources may be useful for funding a small pilot study which can then provide that all-important pilot data for a larger, Federal grant. Finally, there are new crowdfunding sites that support small research projects, such as Experiment.com. These sites have not been around for long, and it will be interesting to see how these sites will impact science funding. Some of these ideas may only apply to those seeking funding in the American system, so if these don't apply to you, talk with local colleagues for advice on how to obtain research funding where you work.

## SPR

### **1. As the president of the Society for Psychophysiological Research, what direction do you see the field going? How have you seen SPR change since you became involved?**

It appears clear from my vantage (which of course will be dated in no time and reflects my own personal biases), that brain imaging measures are leading to important new knowledge in our field. Across the gamut from EEG/ERPs, fMRI, PET, SPECT, MEG to transcranial magnetic stimulation, optical imaging, optogenetics, and electrical neuroimaging, we now have several “mature” methods along with many newly emerging ones that permit us to make reasonable inferences about human brain function at multiple levels of analysis (sub-molecular, molecular, regional or network). These methods can provide ever greater specification of how psychological phenomena emerge from the brain (described at different levels of analysis) when the measures are combined with good experimental designs and analytic methods. In parallel with these developments, we are also gaining a greater appreciation for the role of the body in psychology, with more research in the last few years focused on interoception, or sensations from the viscera. For example, we are beginning to better understand how the brain instantiates interoception, including how disruptions in interoceptive systems may play a role in psychological disorders such as depression and anxiety.

Finally, I hope that in the next 10 years psychophysiologicalists will play a greater role in informing the “quantified self” movement and mobile health. Many ambulatory devices exist these days that measure signals traditionally measured in the laboratory by psychophysiologicalists. Some companies make rather wild claims about what those signals can tell us, often on the basis of data that is hidden behind a proprietary interface and claims are not substantiated by publically accessible scientific literature. In some preliminary work in our lab we find that some of these devices do not produce data of sufficient quality to

make reasonable psychophysiological inferences even tested under laboratory conditions, whereas other devices do. It is important for psychophysiologicalists to engage in discussions with computer scientists, biomedical engineers, app, game and virtual reality system designers, and with those in the corporate sector because we have expertise that they need, and some of them have tools that, if open to scrutiny and validated against standard measures, we can use.

## **2. How has being a member of SPR influenced and furthered your research?**

SPR has played different roles in my research at different points in my career. As a student, it was a place that I came to meet and get to know people whose work I knew and admired first just by reading it. Gary Berntson and John Cacioppo were great advisors, and were both active and visible members of SPR who introduced me to many people in the Society. What I especially liked and still do like about SPR, though, is its very non-hierarchical feel. At SPR meetings, I could introduce myself to those at a poster session or symposium even though that did not come naturally to me. At later points in my career, these same people whose work I admired became my colleagues and friends, and provided me with an incredible range of available expertise on which I could rely. I could (and still do) ask them methodological, conceptual and theoretical questions, and they willingly share their expertise. The SPR zeitgeist is incredibly collegial and I continue to find it the most incredibly expert and amazingly supportive group of scientists that I've had the privilege to know for the 25+ years that I have been a member.

## **3. What has been the highlight of your career thus far? Is there anything you would have done differently?**

I hope that the highlight of my career is still ahead! Being honored by being elected SPR President is certainly among the highlights given my fondness for the scientists who make up SPR. I am also really enjoying my current work co-directing the Interdisciplinary Affective Science Lab at Northeastern University with Lisa Barrett and directing my work at the Bedford, MA VA hospital. The intellectual environment of both of my workplaces is a "dream come true". I enjoy being part of truly exceptional interdisciplinary teams of scholars working on basic affective science questions that will change how we view emotion, and applied health psychology questions in support of better health for American military veterans.

There are always things one could do differently, and I would not have initially envisioned my career as it unfolded. However, I could not have done better in terms of the caliber of mentors, colleagues and collaborators I have had, and continue to have the privilege to work with. In that sense, it's hard to envision an outcome better than my current life. I also hope and plan for many more interesting days to come, and I look forward with great anticipation to new scientific adventures.

## **Advice for Young Psychophysiologicalists**

### **1. What advice do you have for young psychophysiologicalists on the job market? You have had success working as a research professor as well as in more applied settings such as the Department of Veterans Affairs. What can graduate students and post-doctoral researchers do to land the job of their dreams in either domain?**

Never underestimate the power of your career network – it is THE way that you get a job. Networking works both ways – the implied social contract is that you do your best by those whom you asked to help you along the way. Part of that is done by "paying forward" the great mentoring you've had to your mentees. That means taking the time to listen to them, encouraging them to do their best, facilitating their doing their best work, and then helping them obtain the job they envision.

Regardless of whether your dream job is a tenure-track faculty job, or one of any number of other jobs that use your academic skills (e.g., researcher at a government lab, a clinical setting, a company, etc.), the more you have worked to hone your skills, the better your chances at landing that job. Today, it is not uncommon for individuals to change where they work multiple times in a career, so aim high and land the

very best first job you can because that is the best opportunity to launch you into whatever you want to do. Because publishing impactful scientific papers in top-tier journals is the “coin of the realm” in our field, doing that has to be the top priority throughout your academic career, but is especially critical early on. Other opportunities will follow from publishing good quality, high impact work, and from having creative and testable research projects that answer important questions.

**2. You have successfully mentored a number of graduate students and post-doctoral researchers. What is your approach to training young psychophysiologicalists? Do you have any advice for young faculty members who are just beginning to mentor graduate students?**

Training starts with some basics in psychophysiological inference, an overview of the physiology being measured, then a lot of “measurement basics”. In our lab, we have people collecting many different kinds of data in many different paradigms, so we also have a psychophysiology reading group to read papers to learn more about new and interesting methods, analytic techniques, etc. It’s eclectic, and driven by lab members’ current needs. We also look at data a lot in this group and the group provides advice about visualizing and analyzing data.

Psychophysiology is best learned using an apprenticeship model. There are many details, and they are learned over time as you DO the work and as problems or issues become apparent. At first students need a lot of oversight, but then you have to eventually let them do it on their own. The goal in mentoring graduate students is to prepare them as well as possible for their future careers. That means they should be involved in as many aspects as possible, including setting up the lab, troubleshooting hardware and software problems, writing programs for running and analyzing experiments, reducing and analyzing data, writing papers, helping to write (and eventually writing their own) grant proposals, teaching/mentoring undergraduate students in the lab, giving presentations, and writing reviews. These are all skills needed in the first faculty job, and it makes that first job go more smoothly if these skills are already practiced before that day comes.

Other tips for good mentoring include: (1) help students work on clear and effective writing early and often (I find that many very smart students do not find that writing comes naturally, as it did not for me), (2) give feedback to students in a timely way, and (3) praise in public, punish in private. Graduate students need to know how to set-up and run a productive and efficient lab (including how to manage people), how to teach, and how to fund a lab. These days at least some minimal level of funding is required for most if not all, psychophysiological labs since we use expensive equipment or consumables, or have expensive participant costs (e.g., fMRI scans). Remember that your students are your legacy, so it’s important to send them into academia (or into jobs outside academia) prepared for what they will need to do.

## REFERENCE

McAndrew, L. M., D'Andrea, E. A., Lu, S.-E., Abbi, B., Yan, G. W., Engel, C. C., & Quigley, K. S. (2013). What pre-deployment and early post-deployment factors predict health function after combat deployment? A prospective longitudinal study of Operation Enduring Freedom (OEF)/Operation Iraqi Freedom (OIF) soldiers. *Health and Quality of Life Outcomes*, 11, 73.