



**Testimony of**

**James L. McClelland, Ph.D.  
President-Elect  
Federation of Behavioral, Psychological, and Cognitive Sciences**

**Professor, Department of Psychology  
Director, Center for Mind, Brain, and Computation  
Stanford University  
Stanford, CA**

**to the**

**United States House of Representatives  
Committee on Appropriations  
Subcommittee on Labor, Health and Human Services,  
Education, and Related Agencies**

**March 18, 2009, 10:00 am**

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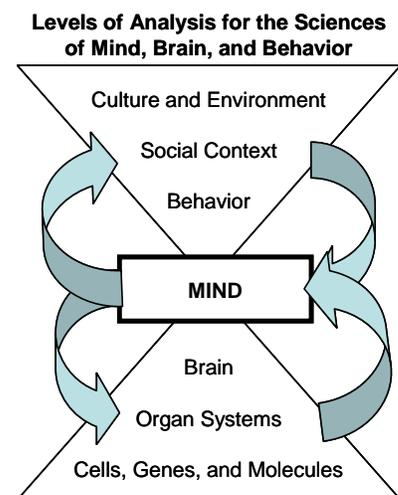
*Testimony of James L. McClelland, Ph.D.  
President-Elect, Federation of Behavioral, Psychological, and Cognitive Sciences  
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Mr. Chairman and Members of the Subcommittee:

Thank you for the opportunity to testify in support of research in the sciences of mind, brain, and behavior at the National Institutes of Health. My name is James L. (Jay) McClelland. I am President-Elect of the Federation of Behavioral, Psychological, and Cognitive Sciences, an umbrella organization representing twenty-one (21) scientific societies, as well as thirty-nine (39) academic affiliates and two (2) corporate affiliates. As a cognitive neuroscience researcher at Stanford, I am aware of the important research involving mind, brain, and behavior that is funded by NIH. In fact, I have served on peer-review committees and Advisory Councils for the agency, and I have received support from NIH for my own research.

At the Federation, we are pleased that science – including the study of mind, brain, and behavior – is becoming a national priority, and we thank this Subcommittee for its prior support. This directed attention will result in breakthroughs that will have far-reaching impact on human well-being and human potential, affecting areas such as health, education, and the workplace, and in turn, our nation’s long-term economic growth. Basic and applied research that examines how the mind functions, its relation to behavior and society, and its underlying biology are critically important in our quest to achieve our nation’s goals.

In the scientific community, we often speak of “levels of analysis.” By this, we mean that issues can be examined at various levels – ranging from genes and molecules, to organ systems including the brain, to behavior and social relationships, and even to the level of culture and environment. At the nexus of all of these levels is the level of the Mind – of our thoughts, perceptions, and emotions, the things we identify as ourselves. These mental processes influence and are influenced by all other levels of analysis. Scientists work at different levels, some focusing on important advances that can be gained at one level (e.g., cells), while others may examine complex relationships across levels. **All** these levels and their interrelationships are important if we are truly to understand the human condition and thereby enhance human health, potential, and productivity.



To underscore this point, I would like to highlight one example from the area of health and another from the area of education which may also benefit from basic research on the mind funded by NIH.

### *The role of social context and social support in health*

Heart disease, physical injury, and other maladies ranging from cancer to the common cold are all physical conditions. With these kinds of conditions, it is tempting to think that the body exists on a plane disconnected from the mind and brain, and therefore that the effort to understand and treat such illnesses should focus only on their physical basis. But in fact, research shows that social support and social context play important roles in all of these conditions.

People who have relationships with many others – partners, friends, co-workers, or relatives – are healthier overall and live longer than their counterparts who have fewer relationships. Furthermore, it is often found that people whose relationships with others are supportive and harmonious are often healthier and live longer than those whose relationships are marked by conflict and discord.

These studies show positive relationships between social support and health, an important first step. But we need to know more. What are the mechanisms – the mental and biological processes – that lead from social support to better health and longer life? More recent research begins to take up answers to these questions.

One line of work examines how individuals with different amounts of social support respond to an experimentally administered virus – one that can produce the standard symptoms of a common cold. Individuals with high levels of social support and individuals with lower levels of social support both received the same dose of the virus, but those with less social support got sicker. They didn't just feel sicker – their levels of virus were higher, and their physical symptoms lasted longer.

Another study goes even further in demonstrating the differing health consequences of social harmony and discord. In this experiment, married couples were admitted to a hospital on two separate occasions. On one occasion, the couples were encouraged to talk about how they could best support each other. On the other occasion, the couples were asked to talk about an issue they often argued about. On both occasions, members of the couple received experimental skin wounds. After the discussion of mutual support, the wounds healed faster than they did after the discussion of an area of conflict. Based on this research, it now seems clear that the content of social interactions can have real health consequences.

Small skin wounds, perhaps, are not the first priority of health research. But these provide important experimental models in which scientists can begin to explore the underlying mechanisms. A key finding of the couples study was the observation that immune responses were initially stronger after the more supportive interaction. There is a sound basis for thinking that social support affects more critical illnesses as well, such as cancer and heart disease.

Future effort can now be directed toward understanding how social support “gets under the skin” and affects the way the body responds to injuries and illnesses.

### ***The role of beliefs in school performance and educational achievement***

It is important to understand that the sciences of the mind can enhance our efforts to promote human potential as well as human health. Given the new administration’s emphasis on education, and the fact that education falls within the purview of this subcommittee, I would like to describe research on how the way we think affects success in school.

There are different theories about this issue. One prominent theory holds that what is most important is to make children (and adults, too) feel good about themselves. If only we all thought we were inherently capable, the theory goes, we would be able to fulfill our full potential. This theory is believable, and it has been influential, but it actually runs contrary to recent research. These studies show that telling kids they are smart can actually reduce their achievement levels and even their IQ test scores.

This line of research is based on the idea that the thoughts and beliefs we have about the basis of our abilities can influence our educational accomplishments and outcomes. These studies show that people who think their abilities are fixed do less well in school and respond less well to challenges than people who think that they can shape their abilities through effort. Luckily, these studies also show that it is possible to shift people from one theory to another, depending on what they are told. When students are praised for their intelligence, it moves them towards a fixed theory. This saps their energy, and makes them respond poorly to challenges. When students are praised instead for their effort, they move toward a flexible, malleable conception of themselves. With this kind of self-concept in place, they are energized to engage their best efforts, and they are better equipped to respond to challenges.

The consequences of these interventions are real, and they are lasting. In one study, students entering a rigorous university viewed a film discussing how the brain can make new connections throughout life and how it grows when in response to effort and engagement. They also wrote a letter to a younger student on the malleability of the brain and the role of effort. At the end of their first semester, these students valued their academic experience more and achieved higher grade-point averages than students who did not receive this intervention. Similar findings arose in a study of children’s transition to junior high school. Students were taught good study skills, and they were also taught that the brain is like a muscle that can grow if you exercise it. These children showed improvements in their effort and in their grades. Which was more important, you ask: Training in study skills, or learning that effort can lead you to strengthen your brain? A group receiving the same study skill training but were not taught that the brain can grow if exercised provided the crucial evidence: This group showed no increase in effort and no increase in their grades. The results indicate that learning that effort can strengthen your mental capacities can have a big impact on academic performance.

This work, based on the role of beliefs, has so far been applied primarily in an educational setting. The potential applications to socialization, health behaviors, and a wide range of other

issues all deserve thorough investigation – the potential impact on health and well-being is enormous.

### ***Evidence-based research on social support, beliefs, and outcomes***

The two kinds of work I have just described represent the kinds of insights that scientific research on mind, brain and behavior has to offer. I want to stress that the research I have described involves controlled, experimental studies of just the same kind that are required to demonstrate causal effectiveness of medications or other interventions. Based on these investigations, we know that social support can influence health outcomes, and we know that how you think about your abilities affects your educational attitudes and outcomes. We have, however, a long way to go to understand both of these findings. Exactly how does social support work its way through the mechanisms of the mind to mobilize the body's defenses to fight injury and illness? Exactly what is it that changes in the mind when a student stops thinking of his abilities as fixed attributes? What other kinds of aspects of people's health, well-being, and social behavior can be affected by these kinds of interventions? It will only be through sustained, on-going support for research that progress will be made in answering these questions.

### ***Broad impact of research on mind, brain, and behavior***

With investments, cutting edge research on the sciences of mind, brain, and behavior can tell us many things:

- how individuals make decisions to engage in healthy behaviors and how to communicate more clearly the health risk associated with certain behaviors;
- what processes are involved in learning, including how the brain and mind interact in cognitive processes that bear on health issues;
- how behavior interacts with genes and hormones to influence unhealthy behaviors including excessive eating and drinking, risk-seeking behaviors, and aggression;
- what cognitive or affective processes are involved in neurological and psychiatric disorders;
- how cognition and emotion develop throughout the lifespan from birth to the elder years, and the effects of interventions at different stages of development;
- the interaction of cognitive, social, and biological processes in the prevention and treatment of addiction;
- how personal (individual traits, attitudes, and goals) and social factors (incentives or community social norms) influence health outcomes, decisions about health behaviors, and health care;
- how the structure and nature of people's social networks can predict ordinary health habits as well as human responses during health epidemics, natural or human-caused disasters, or other crises, and how to intervene effectively;
- how our knowledge of the interactions of the mind and body can be applied in clinical, educational, and work settings;
- how human limitations and capacities must be understood and taken into account when designing machines, devices, and systems, including new health information technologies; and,

- how disparities in health outcomes can be understood, remediated, and prevented.

NIH is a world leader in sponsoring basic and applied research that will help us understand, prevent, and treat disease. Concentrated and sustained research in the sciences of mind, brain, and behavior through NIH will lead to significant discoveries and improved health for the American people. Keeping America healthy will benefit our country in numerous ways. We encourage this Subcommittee to support this important work and recommend an increase for NIH of at least seven (7) percent over the FY 2009 appropriations. We also urge comparable support for this important research in other agencies under this Subcommittee's jurisdiction. Once again, thank you for the opportunity to provide this testimony to the Subcommittee.

## **Federation of Behavioral, Psychological, and Cognitive Sciences**

### **Member Societies**

American Educational Research Association  
American Psychological Association  
Association for Applied Psychophysiology and Biofeedback  
Association for Behavior Analysis International  
Behavior Genetics Association  
Cognitive Science Society  
Human Factors and Ergonomics Society  
International Society for Developmental Psychobiology  
Massachusetts Neuropsychological Society  
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Society for Behavioral Neuroendocrinology  
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Society of Experimental Social Psychology  
Society for Industrial and Organizational Psychology  
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Society for Psychophysiological Research  
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### **American Psychological Association Division Affiliates**

Division 1: Society for General Psychology  
Division 3: Experimental Psychology  
Division 6: Behavioral Neuroscience and Comparative Psychology  
Division 7: Developmental Psychology  
Division 8: Society for Personality and Social Psychology  
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Division 21: Applied Experimental and Engineering Psychology  
Division 25: Behavior Analysis  
Division 28: Psychopharmacology and Substance Abuse  
Division 50: Addictions

### **Corporate Affiliates**

Sage Publications, Inc.  
Worth Publishers

## **James L. McClelland** **One Page Biography**

James L. (Jay) McClelland received his Ph.D. in Cognitive Psychology from the University of Pennsylvania in 1975. He served on the faculty of the University of California, San Diego, before moving to Carnegie Mellon in 1984, where he became a University Professor and held the Walter Van Dyke Bingham Chair in Psychology and Cognitive Neuroscience. He was a founding Co-Director of the Center for the Neural Basis of Cognition, a joint project of Carnegie Mellon and the University of Pittsburgh. He served as Co-Director until 2006. In that year he moved to Stanford University, where he is now Professor of Psychology and founding Director of the Center for Mind, Brain and Computation. McClelland currently teaches cognitive psychology and cognitive neuroscience and conducts research on learning, memory, conceptual development, spoken language, decision making, and semantic cognition.

Over his career, McClelland has contributed to both the experimental and theoretical literatures in a number of areas, most notably in the development and application of a computational framework for understanding brain function, called the *parallel distributed processing* framework. McClelland was a co-founder with David E. Rumelhart of the Parallel Distributed Processing research group, and he and Rumelhart led the effort leading to the publication in 1986 of the two-volume book, *Parallel Distributed Processing*, in which the framework was laid out and applied to a wide range of topics in cognitive psychology and cognitive neuroscience. Since that time, McClelland has applied models developed in this framework to address topics ranging from the dynamics of the decision process in split-second decision making situations and changes in the content and structure of conceptual knowledge over the course of child development. Other topics include aspects of first and second language learning, the neurobiology of memory, and the loss of conceptual knowledge in dementia.

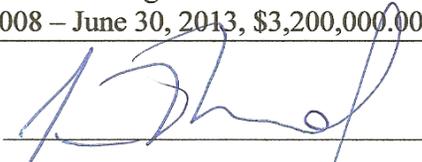
McClelland and Rumelhart jointly received the 1993 Howard Crosby Warren Medal from the Society of Experimental Psychologists, the 1996 Distinguished Scientific Contribution Award from the American Psychological Association, the 2001 Grawemeyer Prize in Psychology, and the 2002 IEEE Neural Networks Pioneer Award for their joint work. McClelland has served as Senior Editor of *Cognitive Science*, as President of the Cognitive Science Society, as chair of an NIH Peer-Review Panel on Integrative, Functional and Cognitive Neuroscience, and as a member of the National Advisory Mental Health Council. He is currently president-elect of the Federation of the Behavioral, Psychological, and Cognitive Sciences. He is a member of the National Academy of Sciences, and he has received the William James Fellow Award from the Association for Psychological Science for lifetime contributions to the basic science of psychology. In fall, 2009, he will become Chair of the Stanford Psychology Department.

**Subcommittee on Labor, HHS, Education  
and Related Agencies**

**Witness Disclosure Form**

**Clause 2(g) of rule XI of the Rules of the House of Representatives requires non-governmental witnesses to disclose to the Committee the following information. A non-governmental witness is any witness appearing on behalf of himself/herself or on behalf of an organization other than a federal agency, or a state, local or tribal government.**

<p>Your Name, Business Address, and Telephone Number: James L. McClelland, Ph.D. Department of Psychology 344 Jordan Hall, 450 Serra Mall Stanford University Stanford, CA 94305</p>
<p>1. Are you appearing on behalf of yourself or a non-governmental organization? Please list organization(s) you are representing.</p> <p>NGO: Federation of Behavioral, Psychological, and Cognitive Sciences</p>
<p>2. Have you or any organization you are representing received any Federal grants or contracts (including any subgrants or subcontracts) since October 1, 2006?</p> <p style="text-align: center;">Yes</p>
<p>3. If your response to question #2 is "Yes", please list the amount and source (by agency and program) of each grant or contract, and indicate whether the recipient of such grant or contract was you or the organization(s) you are representing.</p> <p>None to the Federation of Behavioral, Psychological and Cognitive Sciences.</p> <p>Grants or Contracts to McClelland:</p> <ul style="list-style-type: none"><li>● Air Force Office of Scientific Research. MURI Program. July 1, 2007 – July 1, 2012, \$7,290,000.00</li><li>● NSF IGERT Training Grant. July 1, 2008 – June 30, 2013, \$3,200,000.00</li></ul>

Signature:  Date: March 16, 2009

Please attach a copy of this form, along with your curriculum vitae (resume) to your written testimony.