



UT Dallas Technion Alliance

Dear Friends,

Since the visit of the Technion Delegation to Dallas in January, we have been exploring prospects for collaboration between researchers at the Technion and UT Dallas. As these develop, we want to share news of them with you. If you wish to learn more or maybe wish to participate in a developing research relationship, please contact Dr. Steve Goodman (972.883.4872) or me (972.883.2733) and we will direct you.

One such relationship began with the visit on February 27th of Dr. Miriam Reiner of Technion's Department of Education in Technology and Science to Dr. Russell Hulse and others at UTD and UT Southwestern Medical Center. While here, Dr. Reiner visited researchers at UTSW's Center for Minimally Invasive Surgery, UTD's Center for Brain Health, and Engineering and Computer Science faculty associated with the Science and Mathematics Education Program. Recently, a team of surgeons at UT Southwestern has been working with TI engineers with the goal of stimulating innovative clinical concepts that could be developed into surgical tools and/or medical devices. When informed that Dr. Hulse (Nobel Laureate in physics) has been working with Dr. Reiner to plan a return visit in mid-late August, planning commenced to discuss with Dr. Reiner the feasibility of using available brain imaging technology for future experiments, and plan future collaborations accordingly.

Co-Chairs

Steven Goodman, Ph.D.

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Three main scientific themes emerged from this visit, linked by their connection to research involving a scientific understanding of the learning process.

- Technology for enhanced learning of manual-conceptual skills, more specifically, haptic-visual surgical simulators (those which involve integrating a sense of touch along with visual feedback). These allow for developing somato-conceptual intelligence (i.e., linked sensory and conceptual knowledge), which is essential to many critical tasks, and which is in turn also related to telemanipulation and telepresence. This research also has significant connections to robotic artificial intelligence, e.g., to the role of sensory input in enabling effective cognition in humanoid robots as explored by Rodney Brooks at MIT.
- The neuroscience of learning, involving neural correlates of learning and implications for education: recognition, sensory learning and the embodied mind, memory, implications for higher reasoning skills and the use of smart Virtual Reality technology to study learning/recognition and the brain correlates of these cognitive processes.
- The practical implications for science and mathematics education and education research in view of the above, including alternatives to current practices in pedagogy and assessment, and a better understanding of the role of sensory, non-symbolic thinking in scientific understanding (for example, visualized thought experiments).

A second important research relationship has been developing between Dr. Steven Goodman and Dr. Aaron Ciechanover of the Technion. Professor Ciechanover shared the Nobel Prize in Chemistry in 2004, with Avram Hershko and Irwin Rose, for determining the mechanism by which cellular proteins are degraded by the ubiquitin-proteasome system. Dr. Goodman, at UT Dallas, found that proteasomes are present in human red blood cells. This was a unique finding as human red blood cells do not synthesize proteins and were thought not to require the ubiquitin proteasome system. Professor Ciechanover and Professor Goodman have now joined forces to understand the physiologic function of proteasomes in normal red blood cells and determine their role in red blood cell pathophysiology. For example, Professor Goodman has also found that proteasomal proteins are increased in Sick Cell red blood cells. These red blood cells are under extreme oxidative stress and have a large amount of damaged and dysfunctional proteins. Professor Goodman and Professor Ciechanover will, together, attempt to define the cellular role of proteasomes in the absence of protein synthesis and in disease related oxidative stress.

A third area of collaboration between the Technion and UT Dallas will be in the area of nanoscience. We will report to you on this third collaboration in our next letter.

Regards,



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Professor of Political Economy and Public Policy

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