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Computing with Words, Machine Learning, and Semantic Processing

By

Stuart H. Rubin, Ph.D.

SSC-PAC

San Diego, CA 92152

Abstract How do we learn, why do we forget, and more importantly, how do we understand each other? This talk will provide key insights into the answers to these and related questions. A first system, which learns to understand natural language, will be demonstrated live. It is said that this system can learn to understand, translate, or respond to natural language queries with greater rapidity and accuracy than you or I could in a foreign context. This system does not have the advantage of knowledge of the physical world that each of us acquires over decades of maturation.

Information reuse and integration play a key role in the underpinning mechanics of any methodology for computing with words. That being the case, it needs to be understood that reuse goes far beyond say simple table lookups. In the processing of natural language, it involves the reuse of subsequences whose semantics must necessarily undergo constant refinement in an attempt to *randomize* them. Such subsequences are effectively dynamic information granules.

The applications for computing with words range the gamut from the semantic web to voice-driven typewriters and beyond. In particular, applications for military decision making, intelligent cell phones, voice recognition systems, sonar, and computer vision will be touched upon.

Stuart H. Rubin (M'88–SM'00) is a senior scientist at the Space and Naval Warfare Systems Center (SSC) in San Diego, code 56340, and a fellow of the Society for Information Reuse and Integration. He was previously a tenured Associate Professor of computer science at Central Michigan University (CMU). He has since given plenary speeches at numerous international conferences, founded and currently serves as general chair of the IEEE Information Reuse and Integration (IRI) conference, previously the IEEE North American Fuzzy Information Processing Society (NAFIPS) conference, mentored several post-docs, and supervised numerous MS Theses and independent studies. His current interests include computational creativity, computing with words, and knowledge-discovery systems.

Dr. Rubin was previously an ONT post-doctoral fellow at the Naval Command, Control, and Ocean Surveillance Center (NCCOSC). He received a BS from the University of Rhode Island, Magna Cum Laude in 1975, an MSISE in systems engineering from Ohio University in 1977, and an MS in computer science from Rutgers University in 1980. He received his Ph.D. from Lehigh University in Bethlehem, PA in 1988. Dr. Rubin's Ph.D. thesis was entitled, "On the transformative compression of coherent

languages." His dissertation was selected for novel AI content by SIGART in January, 1989. Dr. Rubin received SSC-PAC's Publication of the Year Award in 2007, 2009, and 2010.

Dr. Rubin was awarded the US Government Certificate of Merit in 1987 for his technical work on the Very High-Speed Integrated Circuits (VHSIC) program. He received the Navy Award of Merit for Group Achievement in 2002.

Dr. Rubin chairs the IEEE System, Man, and Cybernetics (SMC) Committee on knowledge acquisition in intelligent systems and has served on the IEEE Board of Governors. He currently serves as the IEEE SMC industrial and AAAI liaison. He also serves as an Associate Editor for the IEEE SMC:C Transactions. He is the author of over 220 refereed papers and book chapters as well as numerous patents, patents pending, and patent disclosures.