William Bricken

Dr. Bricken has received a B.A. from UCLA in Social Psychology, a Diploma of Education in Mathematics and Guidance from Monash University Teacher's College (Melbourne, Australia), and a MS in Statistics from Stanford. His PhD from Stanford is multidisciplinary, in Research Methodology, Computer Science, and Educational Psychology.

Bricken's dissertation empirically validated the unique nature of errors made by students learning formal systems such as algebra. Using a wide range of techniques (multivariate experiments, exploratory factor analysis, protocol analysis, clinical case study, historical review, and remediation), he demonstrated that symbol manipulation errors made by novices are neither random nor predictable, rather they are context sensitive and unique. These results were applied to modeling student performance within an intelligent tutoring system.

Bricken began his career in 1983 as a Wizard at the Atari Sunnyvale Research Lab under Alan Kay, where his research interests included browsing and navigating massive pictorial databases, generating fractal images, and developing a theory of user interface.

As the Principal Research Scientist at Advanced Decision Systems in Mountain View, California, Bricken specialized in the application of void-based computational models to problems in Artificial Intelligence, addressing asynchronous parallel deduction; Boolean minimization; reasoning in the presence of contradiction; optimization of expert systems and databases; and semantic debugging, verification and optimization of computer programs. He also developed innovative user interface techniques, including an database interface that negotiates meaning with the user, and a family of visual programming languages. He applied his mathematical innovations to projects in avionics, maintenance training, capabilities assessment, distributed processing and intelligent tutoring systems.

Bricken then became a Distinguished Fellow, and Director of the Autodesk Research Lab in Sausalito, California. There his team developed one of the first immersive Virtual Reality systems, using AutoCAD as a construction environment. His other projects included the development of an algebra of drawing that provides a formal basis for the intuitive construction of complex drawings, and visual programming languages that provide a formal basis for computing with spatial forms rather than tokens.

Bricken joined the Human Interface Technology Laboratory at its inception in late 1989, where he negotiated and acquired over $3 million of infrastructure support. While at HITL he designed and implemented software for interactive, cognitively appealing, multiparticipant virtual worlds. He led the

development of the Virtual Environment Operating System (VEOS), a comprehensive software infrastructure for the connection and coordination of VR components. His other projects included the Wand, a hand-held interaction tool for viewpoint and object manipulation; the Virtual Body, which associates arbitrary sensors of physical activity with arbitrary effects in the virtual world, using an intermediate physiological model of the participant; Experiential Mathematics, formal techniques for treating computation spatially rather than textually; Educational Worlds, a study of effective pedagogical techniques for VR; and VR Modeling, incorporating new modeling techniques such as generalized sweeps and L-systems into a virtual world construction package.

Bricken became a half-time consultant to Interval Research Corporation, Paul Allen's computer science company in Palo Alto, California, shortly after its inception in 1993, and remained on the staff until it closed in 2000. He worked exclusively on a project with the objective of rebuilding the theory and art of computing from scratch. There he began intensive software development of boundary mathematics, a formalism that uses void-based and spatial techniques to simply computation. At Interval, he also designed and implemented innovative algorithmic techniques for Boolean satisfiability, factoring and minimization, with applications to semiconductor logic synthesis and design optimization.

Bricken is widely experienced as an educator. He taught classes in statistical analysis, educational technology, and mathematics prior to becoming a Research Associate Professor of Education and Research Associate Professor of Industrial Engineering at the University of Washington. He has taught short courses and tutorials at UCLA, SIGGRAPH, IEEE Visual Languages, ACM-CSC, and the Northwest Council on Computer Education.

He left UW to become an Assistant Professor of Computer Science and Software Engineering at Seattle University in 1996, where he led the Masters of Software Engineering Program.

In 2001, Bricken co-founded a start-up company to develop and commercialize his work in boundary mathematics. As Chief Scientist, he spent three years developing unique software tools for the design and optimization of semiconductor circuitry. He also contributed to the design of reconfigurable hardware based on the principles of boundary logic. Although his software demonstrated world-class performance, the company failed to gain commercial traction, and closed in 2005.

Bricken is currently working to develop high performance, innovative algorithms for network optimization while collecting his work on boundary mathematics for publication.