**Preface**

**The challenge is to transform the personal, private deliberations leading to critical and creative thinking to a more transparent process. If that can be made more public by using computer algorithms, the innovative paths can be better understood. Typically, the research process is presented beginning with the recognition of a problem to be addressed. However, that process is hidden.**

**There are different ways to select a problem. It could be recognized after a review of the existing literature. It could be determined by observation during daily activities. It could be determined after discussion with colleagues. The particular path leading to the recognition may be hidden from the individual so that when queried, the best response is – the problem is important *because…***

**Making the critical and creative thinking process transparent begins with an important mechanical task – the identification, extraction, and organization of the authors’ ideas from scholarly publications. That task can be performed by software by employing pattern recognition capabilities. The result is a separation of the mechanical and intellectual components of building and using a resource. The essential data consist of authors’ ideas. These intellectual building blocks can be used to develop descriptions of the topic and to identify gaps or inconsistencies that could lead to new research strategies. This separation and the subsequent actions may be labeled as Contextual Analysis. It is a process integrating the efficiency of database management with the higher cognitive functions leading to creativity.**

**The use of ideas can be made transparent by application of computer algorithms. The advantage is a discernible path of tasks describing the creative act. This separation of mechanical acts performed using algorithms and intellectual acts have advantages. Among which is a shortened time and a shift in energy expenditure from the mechanical/clerical to the intellectual. The emphasis is on the higher cognitive functions – synthesis, comparison, evaluation, judgment, and application. The focus is on the development of *measures* associated with each cognitive function, the establishment of *criteria* to determine how to use those measures, and the recognition of *decision-rules* describing the resulting actions associated with the measures and criteria. These deliberations are examples of critical thinking and intellectual function.**

**The application of text mining software to scholarly publications is not without challenges. The text mining software must deal with different writing styles and vocabularies. In addition to the variation in specific topics considered and ways of describing them, there are numerous sources contributing bibliographic data to PubMed. This bibliographic resource contains over 26 million documents making the assessment of accuracy a monumental task. The resource is continuously changing making retrieval results an estimate rather than a fact.**

**A significant advantage of the text mining approach is the ability to provide estimates of completeness and accuracy. The matching of vocabulary identified (nouns, adjectives, and gerunds) used by authors with that identified by the software yielded a median of 85% (66% to 99%) across subjects. In terms of capture of author ideas, the software identified over 95% of those used. These estimates of vocabulary identification compared favorably with other approaches – human indexing identified 50% - 60% of the authors’ vocabulary. Other text mining methods identified about 30% and random sampling yielded about 20%. Idea capture was not determined by methods other than the Contextual Analysis system.**

**The subsequent chapters illustrate the benefits of Contextual Analysis. There are two major approaches involved in Artificial Intelligence – statistical and contextual analysis. Statistical Analysis identifies high frequency terms and their correlates. Sophisticated statistical models are used to clarify the information provided. The findings may be contextually relevant or not, due to the criteria employed. In contrast, Contextual Analysis is focused on the contextually relevant terms and relationships provided by the authors. This attribute is determined by position of terms in the domain of sentences. The publishing system (authors, editors, peer reviewers) must agree on the terms and their placement. This agreement suggests a relevancy not realized by statistical models.**

**This focus on contextual meaning is equivalent to having experienced mentors guiding the learning process. Traditionally, learning was presented in a linear fashion. The reliance on ideas, presented by author-specialists, is associated with a different, more global learning process. This gestalt approach provides insights and understandings in a more rapid and effective fashion.**

**John M. Weiner, Dr. P.H., Director of Idea Database construction and maintenance, Center for the Study of Scientific Ideas, XXIV Century Press, Richmond, VA** [**weiner.john@tutorghost.com**](mailto:weiner.john@tutorghost.com)

**Debora Bartoo, Ph.D., Head of Innovation, PSCU, Adjunct Faculty, University of Denver, University College, Debora.Bartoo@du.edu**

**John J. Walsh, Ph.D., Co-Director, Program in Disaster Research and Training, Vanderbilt University Medical Center.** [**john.walsh@vanderbilt.edu**](mailto:john.walsh@vanderbilt.edu)

**Sharon Weiner, Ed. D, MLS, Director of Library Services, Division of Student Success, John Tyler Community College. Chester and Midlothian, VA.** [**sweiner@jtcc.edu**](mailto:sweiner@jtcc.edu)**, Professor of Library Science Emerita and W. Wayne Booker Chair Emerita in Information Literacy**

**Andrew Keller, Web Developer,** [**andrewkellerweb@gmail.com**](mailto:andrewkellerweb@gmail.com)