

Revealing Analytical Rigor: A Strategy for Creating Insight into the Information Analysis Process

Connectivity is pervasive. Access... abundant. And more people now have available at their proverbial fingertips more data, in more varied forms, than ever before. Paradoxically, no matter of how much data availability technology affords us, it still requires a person to transform that data into information... to give it meaning. Simply put, it demands a process of information analysis.

Google is in a unique position as one of the premier tools that people routinely use to support the task of information analysis, representing a nexus point in the analysis process. From the middle school student doing research for a book report, to the recent high school graduate preparing for the purchase of a new car, to the busy parent looking to identify an affordable yet fun-for-all-ages destination at which to spend an upcoming family vacation, these individuals are unified in that they are all engaged in a process of collecting data and aggregating it into something of value. And they all use Google to do it.

There is another important commonality that spans across these cases of information analysis—that being, the risk of shallowness. The student, for example, who searches only for "Vikings" and subsequently hands in a World History report asserting that the Vikings hail from Minnesota (which in fact they do, but only if one is interested in the National Football League team, rather than the seafaring Scandinavians—which the student's teacher most probably is not.) Reducing this risk of shallow analysis, in turn, emerges from being rigorous in the analysis process.

Given the many contexts in which information analysis occurs, the question arises, what does it mean to be rigorous? Moreover, how do analysts go about achieving acceptable levels of rigor in their analysis processes? And how might we help them to be more rigorous? Our research with professional information analysts explores these questions. First, by suggesting a model of analytical rigor that frames the concept as an emergent multi-attribute measure of sufficiency ("Has the analyst done enough?") rather than as it is commonly framed, as a measure of process adherence ("How rigidly has the analyst followed a particular method?"). And second, by revealing that insight into the analysis process influences both perceptions of and judgments about the quality of an analysis (Zelik, Patterson, & Woods, 2007c).

Findings from a recent study with a diverse group of professional intelligence analysts identified eight attributes of rigorous analysis that contribute to the assessment of the quality and the sufficiency of an analysis (Zelik, Patterson, & Woods, 2007a). The figure below shows two sample analyses mapped onto the eight attributes. These analyses, developed for the previously mentioned research study, are similar in that they were completed by similar analysts addressing the same research question. Yet, as revealed through the representation, they differ substantially in the extent to which different aspects of the analysis processes contributed to an overall assessment of rigor for each of the cases.

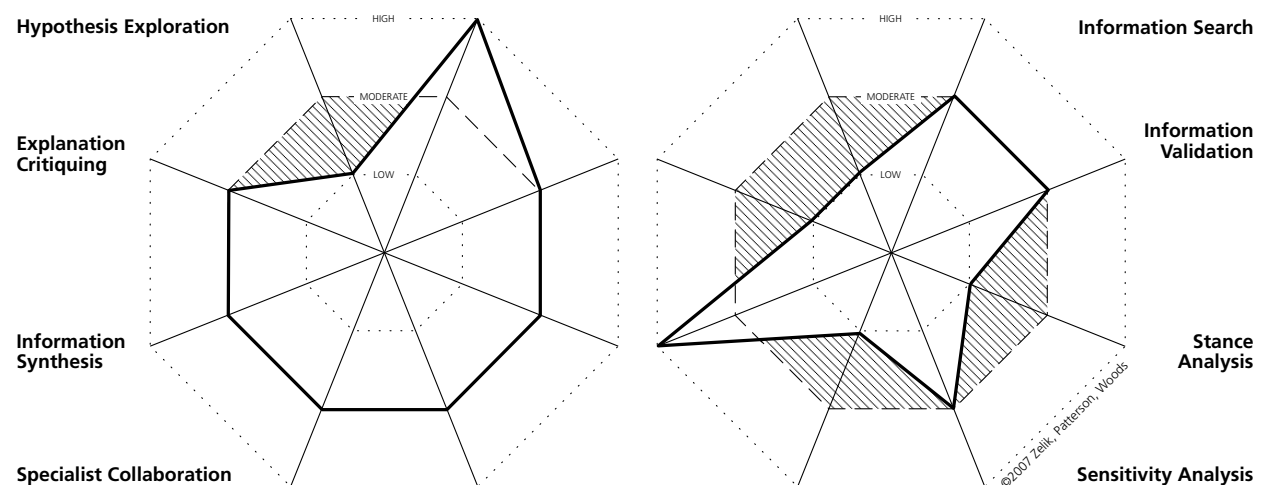


Figure: A representation of an attribute-based framing of rigor. (From Zelik, Patterson, & Woods, 2007a.)

This research suggests that supporting the judgment of analytical rigor is about revealing insight into the analysis process, the figure illustrating but one of many possible attribute-based representations of an analysis process. Partnering with Google offers an opportunity to connect these explorations of information analysis with data collected from real people engaged in real analysis tasks. Accordingly, we propose that merging the expertise of Google with the insights that emerged from our recent work with professional intelligence analysts shows promise in the development of novel and innovative methods and tools for supporting the people who use the internet to support information analysis.

We conceptualize the emergence of a tool that captures and represents the analysis process via an intuitive visual interface that not only allows people to better understand their own processes—and to better judge when analyses are sufficient for a given context—but that also allows them to meaningfully share their analysis processes with others... a tool that allows the teacher of the middle school student to quickly identify how the student went off course and to offer targeted suggestions for improving the student's academic research process, not just for improving one assignment... a tool that allows the parents of the high school graduate to advise their son or daughter as to what important factors were overlooked in preparing for the purchase of a new vehicle, grounded in an understanding of what factors the recent grad actually did consider... a tool that allows the busy parent to easily communicate with a spouse about what alternatives were considered in selecting the vacation destination, about why it represents a good value for the family, and—perhaps most importantly—about what steps were taken to ensure that the family does not end up spending a less than relaxing week at a questionable resort that "looks nothing like the pictures on the website." In short, we envision a tool that communicates the process, not just the product, of analysis (Zelik, Patterson, & Woods, 2007b).

The objective of this proposal is to define the high-level design requirements for such a tool. Using the rigor attribute model as a starting point, the project will grow from early collaborations with one or more Google experts aimed at identifying the characteristics of analysis process that can be, or already are, conducive to automated versus manual collection. This discovery effort will guide the development of (1) a framework that specifies the critical inputs to a process-based representation of rigorous analysis and (2) design seeds that illustrate potential approaches for visualizing basic information analysis processes. The final output of the project will be a written report summarizing the rigor assessment framework and will include animock representations of the design seed concepts.

We hope the potential connection between Google's interests and our current research directions seems as promising to you as they do to us. Current Google tools like Web History, in fact, already begin to implement the concepts of archiving and making available a captured process, though the potential exists to go farther. Innovating new and more effective forms of representing information analysis—grounded in an understanding of how professional analysts judge analytic rigor—offers direction for coping with the present-day deluge of available data, for avoiding the trap of shallow analysis, and for developing tools capable of conveying a meaningful understanding of analytical process. It is our belief that a collaborative effort with Google will yield positive steps toward developing a dynamic information analysis support tool for capturing and sharing analysis process... a tool for revealing rigor and for creating process insight for the professional and casual analyst alike.

References:

- Zelik, D., Patterson, E. S., & Woods, D. D. (2007a, June). *Understanding rigor in information analysis*. Paper presented at the 8th International Conference on Naturalistic Decision Making, Pacific Grove, CA.
- Zelik, D., Patterson, E. S., & Woods, D. D. (2007b, August). *Supporting the assessment of rigor: Representing analysis to create process insight*. Paper presented at the 2nd Annual Workshop on Meta-Information Portrayal, Washington, DC.
- Zelik, D., Patterson, E. S., & Woods, D. D. (2007c, October). *Judging sufficiency: How professional intelligence analysts assess analytical rigor*. Paper presented at the Human Factors and Ergonomics Society 51st Annual Meeting, Baltimore, MD.

Cost: \$65K to support one graduate student and faculty release or advising time for one year.