Evaluating the Reliability of Expert Opinion

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Governments, businesses and ordinary citizens around the world are constantly seeking the advice of those they regard as experts across a wide range of circumstances and issues.

In 2005, Philip Tetlock published the results of his longitudinal study of political and economic experts. He found that like ordinary human beings experts are subject to cognitive limitations and predispositions (see Wastell et al 2011). He emphasized that it is not only what experts think but how they think that is critical to understanding and evaluating their advice. The value and confidence that can be placed in expert advice is thus an extremely important subject that needs systematic and empirical investigation. It is with this task in mind that Piers Duncan (DSTO) and I recently received a grant from the Royal Society of Great Britain to investigate the quality and process of expert opining. Our UK collaborators are Professor Herbert Huppert FRS (Cambridge University) and Professor Willy Aspinall (Bristol University).

The task of comparing experts is not entirely new. Roger Cooke (1991) developed a method of assessing experts that has been applied to a number of domains such as ice sheet melting and sea level rise, volcanology, the nuclear industry and ecology. The method cannot eliminate uncertainty but is designed to manage and quantify it. A set of seed questions about accepted knowledge within the particular field is put to a panel of experts and from their answers each expert is assigned a coefficient score. This coefficient is then used to weight the individual expert’s probability estimates about the actual question being explored.

Importantly the final aggregated group probability is not influenced by reputation or the level of assertiveness displayed by members of the group.

While the Cooke method is popular as a way to manage uncertainty (Aspinall, 2010) it is not without some concerns. The method does not identify which information the experts prioritized in forming their estimates. Nor does it provide feedback to the experts that might enable them to perform better with the information available from the environment. The research supported by the Royal Society will examine the relationship between knowledge acquisition and use and the Cooke metric to reveal which units of information are associated with the best performance on an estimation task.

The access and combination of the information units will be carried out using the Analysis Simulation Project—SINTELLA (henceforth ASP-SINTELLA) methodology. ASP-SINTELLA was originally conceived to investigate the information processing behavior of military and law enforcement intelligence analysts. This emphasis came about as a result of the inquiries into
the performance of intelligence agencies concerning the 2001 terrorist attacks on the United States and subsequent invasion of Iraq. The project set out to develop an experimental method (called “SINTELLA”) that could track the information acquisition and utilization behaviour of experimental participants in any knowledge domain where there was uncertainty and an overabundance of information.

Through our ASP-SINTELLA methodology we have already been able to track how participants in our simulation studies select and use information to make decisions: from identifying a murder suspect (Wastell et al 2012), to advising a government delegation on the risk level in a foreign country (Wastell et al 2013). This time we will be using this method to study the information processing behaviour of experts and the differences between experts.

One of the most pressing issues in this domain is what to do when experts disagree. How is the non-expert to deal with divergent conclusions and recommendations and move forward to deal with the problem at hand? The aim of our research is to identify the information bases and processes used by experts and so support comparison of divergent opinions by examining the reliance and emphasis they place on the available information. This empirical work has not been undertaken before.

Our ASP-SINTELLA methodology is applicable to any domain where there is uncertainty and large quantities of information. For the non-expert it is usually the amount and technicality of the relevant information that makes it so difficult to choose between divergent expert opinions. Our method tracks exactly what information each expert uses, and this can support discussions to tease out their weightings and priorities across the knowledge base. A non-expert can see those items that are used differently by some experts and ask for justifications for that variance, and can check that the expert is capable across the range of knowledge required. By mapping the knowledge base and developing a number of criteria for assessing expert advice the outcome of this project will enable improvements in expert selection and levels of confidence that can be placed on expert advice.

The overall benefits of our research are aimed at enabling better framed and informed decisions to be made by government, industry and individuals. Provision and use of expert advice is critical to government and industry when planning for disaster response and typically extends across disciplines – making it more difficult to assess competing opinions about the economic and security implications. Our collaboration under the Royal Society funding aims at gaining fundamental insights into the basis and breadth of expert advice for such problems. This will enable the targeted, more nuanced use of expert input in a wider range of disciplines and circumstances.
References


