argument), methinks so much protest—here and elsewhere—signifies the futility of the search for a weak link in the Bayesian argument. A theory which does not expect a coherent decision maker to stick to a strategy chosen in advance will certainly be unattractive for everyday normative use, if not chaotic. Defining consequences inadequately clouds the argument but does not refute it.

9. Savage (*Foundations*, Section 5.5) explicitly recognized that a small-world consequence depends on grand-world decisions, probabilities, and more fundamental consequences.

10. On one strictly peripheral point I disagree with both Savage and Shafer: people are regularly taken in by pseudomicrocosms that focus on one risk when others, even negatively correlated ones, are present but unmentioned. For example, to someone negotiating for the right to use a patented production process, a fixed payment may seem less risky than royalties, but the picture reverses when profits are looked at, because higher sales accompany higher royalties.

CONCLUSIONS

Talking about the behavior of a mythical ideally consistent person may still be the best way to convince people—and many still need convincing—that subjected expected utility is uniquely normative. Resisting this idea plays only a regressive role, and obstructs a sound understanding and appraisal of alternative tools. The Bayesian view helps one to distinguish what's important, trivial, ad hoc, fundamental, non-

sensical, misleading, irrelevant, or misguided in areas of statistics from sequential stopping to ridge regression to hypothesis testing to unbiased or parameterization-invariant estimation. In problems of decision and inference under uncertainty, other arguments may sometimes be simpler and good enough, but they are never more cogent.

No new rationality has found widespread acceptance since Savage, nor should have. It is no revision of rationality to adopt short cuts, approximations, or even deliberate irrationality according to taste and circumstances, or to recognize that the main concerns often lie elsewhere. Other routes to Bayesian rationality may have advantages, but once it is accepted, even with amendments, the jig is up and the rest is tactics (or strictly for philosophical specialists).

Read literally, Shafer does not contradict most of my numbered remarks. But if he accepts them, and accepts that they are far from novel, what does all his sound and fury signify? If he does not, we live in different worlds.

I am sorry to sound so nasty. For some reason, statisticians who work in the foundations of the field often seem nicer in person than in writing. Shafer does, and I hope I do too.

ADDITIONAL REFERENCES

BELL, D. E. (1982). Regret in decision making under uncertainty. *Oper. Res.* **30** 961–981.

PRATT, J. W., RAIFFA, H. and SCHLAIFER, R. (1964). The foundations of decision under uncertainty: An elementary exposition. *J. Amer. Statist. Assoc.* **59** 353–375.

Rejoinder

Glenn Shafer

The main thesis of my article was that Savage did not establish the unique normativeness of subjective expected utility. It appears that three of the commentators, Robin Dawes, Phil Dawid, and Peter Fishburn, agree, while two, Dennis Lindley and John Pratt, disagree. In my rejoinder, I will concentrate on this central issue of normativeness. I will also respond, briefly, to the question about alternatives to subjective expected utility.

Fishburn gently notes that aspects of my constructive viewpoint are not altogether new. He adds that the idea of using subjective expected utility constructively was not altogether absent from Savage's own thinking. The points could be put more strongly. My viewpoint has, I hope, all the triteness of common sense. Common sense and historical perspective also tell us that Savage, like everyone else, expected to use

subjective expected utility in the constructive direction, from probabilities and utilities to preferences between acts.

One aspect of my constructive viewpoint is the idea that one deliberately compares a problem to a scale of canonical examples involving chance. This aspect is scarcely new. It can be found in Bertrand (1907, page 26) and in Ramsey (1931, page 256). Pratt, Raiffa, and Schlaifer (1964) very effectively incorporated it into their alternative axiomatization of subjective expected utility.

I did not venture, in my article, to survey the many alternative axiomatizations of subjective expected utility that have followed Savage's. Had I done so, I would have had an opportunity to agree with the widespread opinion that Pratt, Raiffa, and Schlaifer's is the most attractive of these. Making explicit the