Why Design and Planning is so Difficult, and What to Do About it

∼∼A Tour of Info-Gap Decision Theory∼∼

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Abstract

Knowledged-based decisions are made by engineers, scientists, economists, physicians and others. Indeed, people use reasoned thought to make decisions in all areas. Organizations and animals also make decisions in ways which can be described by rational models. One central challenge in decision making is the severe uncertainty—deficient knowledge and imperfect understanding—which arises in many areas. In this talk we will use info-gap decision theory to explore the implications of severe uncertainty. Outline:

• We will use Pascal's Wager to introduce the limitations of probabilistic reasoning.

• Nonetheless, probability theory is very useful, though underlying info-gaps sometimes need to be managed. We illustrate the combination of info-gap theory with probability by examining the protection of London from flooding of the Thames.

• We will now begin to understand the limitations of the optimization paradigm, and to appreciate the strategic advantage of satisficing, as illustrated by foraging behavior of animals.

• Info-gap robust satisficing underlies successful decisions in many additional domains, including medicine, environmental protection, and homeland security, illustrated by cholesterol therapy, by managing climate change, and by the analysis of profiling strategies.

• Robust satisficing may even provide an alternative understanding of quantum uncertainty which reclaims something of the classical concept of causality.

• Finally, we will speculate on the bearing of uncertainty on the usefulness of closed logical systems of thought. We will suggest that meaning must support logic in responsible decision making under uncertainty.

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