RATIONALLY ARBITRARY DECISIONS IN ADMINISTRATIVE LAW

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A DOSSIER ABOUT ADMINISTRATIVE STATE

ABSTRACT: How should administrative law cope with genuine uncertainty, in which probabilities cannot be attached to outcomes? I argue that there is an important category of agency decisions under uncertainty in which it is rational to be arbitrary. Rational arbitrariness arises when no first-order reason can be given for the agency's choice, yet the agency has valid second-order reasons to make a particular choice. When these conditions obtain, even coin flipping may be a perfectly rational strategy of decision making for agencies. Courts should defer to rationally arbitrary decisions. There is a proper role for courts in ensuring that agencies have adequately invested resources in information gathering, which may dispel uncertainty. Yet in some cases the value of further investments in information gathering will be genuinely uncertain. If so, courts should defer to agencies' second-order choices about

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informational investments on the same grounds that justify deference to agencies' first-order choices under uncertainty.

KEYWORDS: Agencies; Uncertainty; First-Order Reasons; Second-Order Reasons; Arbitrariness.

RESUMO: Como o Direito Administrativo deve lidar com a incerteza genuína, em que as probabilidades não podem ser associadas aos resultados? Eu argumento que há uma importante categoria de decisões de agências sob incerteza na qual ser arbitrário é racional. A arbitrariedade racional surge quando nenhuma razão de primeira ordem pode fundamentar a escolha da agência, embora a agência tenha válidas razões de segunda ordem para fazer determinada escolha. Quando essas condições prevalecem, até mesmo um jogo de "cara ou coroa" pode ser uma estratégia perfeitamente racional de tomada de decisão para agências. Os tribunais devem adotar uma postura de deferência às decisões racionalmente arbitrárias. Há um papel próprio para as cortes de garantir que agências tenham recursos adequadamente investidos na coleta de informações, o que pode dissipar a incerteza. Ainda assim, o valor de investimentos adicionais na coleta de informações, em alguns casos, será genuinamente incerto. Se assim for, os tribunais devem ter deferência às escolhas de segunda ordem das agências sobre investimentos informacionais pelos mesmos fundamentos que justificam a deferência às escolhas de primeira ordem sob incerteza feitas por agências.

PALAVRAS-CHAVE: Agências; Incerteza; Razões de Primeira Ordem; Razões de Segunda Ordem; Arbitrariedade.

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If the [Board of Immigration Appeals] proposed to narrow the class of deportable aliens eligible to seek [legal] relief by flipping a coin—heads an alien may apply for relief, tails he may not—we would reverse the policy in an instant. That is because agency action must be based on non-arbitrary, "relevant factors."
Judulang v. Holder, 132 S. Ct. 476, 485 (2012), Judge Kagan.

The sense in which I am using the term ["uncertainty"] is that in which the prospect of a European war is uncertain, or the price of copper and the rate of interest twenty years hence, or the obsolescence of a new invention, or the position of private wealth-owners in the social system in 1970. About these matters there is no scientific basis on which to form any calculable probability whatever. We simply do not know. Nevertheless, the necessity for action and for decision compels us as practical men to do our best to overlook this awkward fact and to behave exactly as we should if we had behind us a good Benthamite calculation of a series of prospective advantages and disadvantages, each multiplied by its appropriate probability, waiting to be summed.
John Maynard Keynes, *The General Theory of Employment*, 51 THE QUARTERLY JOURNAL OF ECONOMICS 2 (1937), p. 214.

I. INTRODUCTION

How should law cope with genuine, Knightian uncertainty, in which probabilities cannot be attached to outcomes?[1] In the modern administrative state, the issue arises at two different levels. At the first

[1] *See* FRANK KNIGHT, RISK, UNCERTAINTY AND PROFIT. (1921). Al-Najjar suggests that there is a Bayesian translation for the points I wish to make here. *See* Nabil I Al-Najjar, *A Bayesian Framework for the Precautionary Principle*, 44 JOURNAL OF LEGAL STUDIES S-2 (2015). Although I happen to believe that the Bayesian approach in general rests on arbitrary foundations, in that there exists a large domain of regulatory and political questions as to which prior probabilities have no epistemic foundation or warrant whatsoever, the claims I make here do not depend on that belief, and I have no need to take a controversial stand within decision theory. I therefore have no quarrel with anyone who wishes to understand my claims in Bayesian terms.

level, agencies exercise delegated statutory authority to regulate, yet their regulatory decisions with some frequency must be taken under genuine uncertainty. At the second level, courts review agency decisions taken under uncertainty and must apply general administrative law requirements of rational decision making. At this level, the question is no what the correct decision under uncertainty would be but rather whether the agency has approached the decision in a rational way.

I will focus on the second level, asking how courts do and should review agency decisions under uncertainty.[2] Here are some recent, and real, examples of the relevant problems:

Threatened Species. The secretary of the interior, acting through the *Fish and Wildlife Service*, must decide whether to list the fat-tailed horned lizard as a threatened species under the *Endangered Species Act*. The problem is that the methodology previously used to estimate the number of lizards in a given area has been exposed as worthless, and newer methods are not yet operational. In short, no one has any rational basis for estimating how many lizards there are. What should the secretary do? What should the court say the secretary may, may not, or must do?[3]

Laboratory Safety. The Department of Energy wants to open a biosafety level-3 facility, handling pathogens like the severe acute respiratory syndrome (SARS) virus, at the *Lawrence Livermore National Laboratory*. How serious is the possibility that the pathogens will escape because of either accident or terrorist attack? How much analysis, or what kind of analysis, should courts require the department to conduct before allowing the facility to be built?[4]

Nuclear Power Plants. The *Nuclear Regulatory Commission* has to decide whether to license nuclear power plants. One of the issues in that decision is whether spent nuclear fuels stored at such plants pose a threat to health or to the environment. The timescales involved beggar the imagination, as some of the materials involved have half-lives running into the

[2] A different question is how nonjudicial reviewers, such as the Office of Information and Regulatory Affairs (OIRA), should address agency decision making under uncertainty. I believe that the problem is a pervasive one for OIRA, but there has been some tendency for OIRA reviewers to deny the very existence of genuine uncertainty, assuming instead—erroneously in my view—that epistemically warranted probabilities may be attached to any possible outcome. Addressing these matters here would take me too far afield, however; for now, I confine the topic to the problems of judicial review of agency decision making under uncertainty.

[3] *See Tucson Herpetological Society v. Salazar*, 566 F. 3d 870 (9th Cir., 2009).

[4] *See Tri-Valley Cares v. U.S. Department of Energy*, 671 F. 3d 1.113 (9th Cir., 2012).

hundreds of thousands of years. How should the commission assess the possible harms? Should reviewing courts require the agency to use cautious or conservative assumptions about those harms?[5]

Fixed Indexed Annuities. The *Securities and Exchange Commission* (SEC) must decide whether fixed indexed annuities should count as annuities within the meaning of the federal securities laws. Statutes require the commission to consider the effects of its decision on efficiency and competition. The commission believes that the worst possible state of affairs is legal uncertainty about whether fixed indexed annuities count as annuities; either decision on that question will promote competition. But the question remains: which way should it decide?[6]

My thesis is that courts with some frequency misconceive their role in such cases, in part because they make conceptual mistakes about what it means to make rational decisions under uncertainty. Procedurally, courts sometimes demand reasons that cannot be given. Under conditions of genuine uncertainty, reasons run out and a relentless demand for further reason giving becomes pathological.[7] There is a category of agency decisions in which it is rational to be arbitrary, in the sense that no first-order reason can be given for an agency's choice within a certain domain, yet some choice or other is inescapable, legally mandatory, or both. In some cases, even coin flipping may be a perfectly rational strategy of decision making for agencies. (It is unclear whether Justice Elena Kagan's opinion quoted in the epigraph should be understood to say that coin flipping is per se invalid or just that coin flipping would have been an invalid approach in the case at hand; I will return to that subject later[8])

Substantively, courts sometimes err by assuming that uncertainty demands worst-case reasoning. Courts, that is, assume that under uncertainty some version of worst-case (*maximin*) or (more generally) highly conservative assumptions are the only rational course. On the contrary, in the face of uncertainty a rational decision maker may set the α-value—the parameter that captures pessimism or optimism—anywhere within a range defined by the worst-case and best-case

[5] *See Baltimore Gas & Electric Co. v. Natural Resources Defense Council, Inc.*, 462 U.S. 87 (1983).

[6] *See American Equity Investment Life Insurance Co. Securities and Exchange Commission*, 613 F. 3d 166 (2010).

[7] For broader explorations of similar themes, beyond the subject of administrative law, *see* NEIL DUXBURY, RANDOM JUSTICE: ON LOTTERIES AND LEGAL DECISION-MAKING (2002); JON ELSTER, SOLOMONIC JUDGMENTS: STUDIES IN THE LIMITATIONS OF RATIONALITY (1989); and GUIDO CALABRESI & PHILIP BOBBITT, TRAGIC CHOICES (1978).

[8] *See Judulang v. Holder*, 132 S. Ct. 476, 485 (2012).

scenarios; courts should defer to agency choices about how pessimistic to be. There is an inescapable element of arbitrariness in the choice of an α-parameter, yet courts cannot improve the situation by demanding of agencies reasons that they cannot give or by requiring agencies to use maximally pessimistic assumptions—itself an arbitrarily chosen criterion.

There is a proper role for courts in ensuring that agencies have adequately invested resources in information gathering, which may resolve uncertainty, perhaps by transforming it into risk or even certainty. Yet the procedural and substantive problems I have identified may recur at the metalevel, for in some cases the value of further investments in information gathering will itself be genuinely uncertain. If so, courts should defer to agencies' second-order choices about informational investments on the same grounds that justify deference to agencies' first-order choices under uncertainty.

II. UNCERTAINTY, RATIONALITY, AND LAW

I will begin with some legal background. In American administrative law at the federal level, requirements of administrative rationality flow from several sources, principally the Due Process Clause of the Fifth Amendment and the *Administrative Procedure Act* (APA).[9] In many of the cases and areas I will discuss, furthermore, the *National Environmental Policy Act* (NEPA) indirectly strengthens these requirements by mandating consideration of environmental values that might otherwise be excessively discounted.[10] The due-process rationality requirement is minimal and, in administrative law, has largely been superseded by the more demanding requirements of the APA and framework statutes like NEPA.[11]

[9] *See Administrative Procedure Act* (APA), 5 U.S.C. 500-559 (2006).

[10] *See National Environmental Policy Act* (NEPA), 42 U.S.C. 4321-47 (2006).

[11] In *Motor Vehicle Manufacturers Association of the United States, Inc. v. State Farm Mutual Automobile Insurance Co.*, 463 U.S. 29, 43 n.9 (1983), the Court noted that "the presumption of constitutionality afforded legislation drafted by Congress" is stronger than "the presumption of regularity afforded an agency in fulfilling its statutory mandate."

1. *Administrative Procedure Act*

As relevant here, the APA requires that agencies must act within the bounds of their delegated statutory mandates, must provide "substantial evidence" or at least a reasoned evidentiary basis for their factual findings, and, most crucially for my purposes, must offer reasons for their policy choices that connect the facts found to the choices made. The last requirement stems most directly from section 706(2)(A) of the act, requiring courts to set aside agency action that is "arbitrary, capricious, [or] an abuse of discretion." The resulting obligation goes by many names—"arbitrary and capricious review" and "hard look review" are both popular in different administrative law subcommunities—but I will use the most generic label, "rationality review." To explain the interaction between rationality review and uncertainty, I will begin by framing the legal issues.

Statutory Authorization. In order to isolate the issue of rational policy making, I will assume throughout that the agency's delegated statutory authority allows it to make a range of decisions under uncertainty. Under the prevailing legal framework constructed in two famous administrative law decisions, *Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc*. (1984) and *United States v. Mead Corp*. (2001), agencies making rules or engaged in formal adjudication are usually taken to have statutory discretion whenever the relevant statutes are silent or ambiguous—and in the regulatory state, that is the usual state of affairs.[12]

There is of course no legal requirement that this be so. In matters where the Constitution does not apply, Congress may specify exactly what the agency is to do, under conditions of uncertainty or otherwise. Statutes may require agencies to use *maximin* assumptions under uncertainty, or not; they may require agencies to collect a certain amount of information, or not; everything is up to Congress. But instructions of that sort are not the ordinary case in administrative law. The ordinary case is that agencies acting under uncertainty possess discretion, because the relevant statutes do not clearly specify, one way or another, what the agency must or may or may not do. And that is the sort of case I will assume to obtain for purposes of discussion here.

Current Doctrine. Assuming that the agency possesses statutory discretion, what does rationality review require under conditions of genuine uncertainty? The law is unclear, in part because courts are chronically hazy about the differences among risk, uncertainty, and

[12] *See Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984); and *United States v. Mead Corp.*, 533 U.S. 218 (2001).

ignorance and as a consequence use loose terminology that confuses the issues. In a recent decision, *New York v. Nuclear Regulatory Commission* (D.C. Cir., 2012), the Court of Appeals for the District of Columbia Circuit—the nation's premier administrative law tribunal—went so far as to use language incautiously suggesting that an agency assessing the environmental consequences of its action must articulate an expected harm analysis that "examine[s] both the probability of a given harm occurring and the consequences of that harm if it does occur."[13] This was to ignore the genuine uncertainties spectacularly on display in the case before the court; at issue was the long-standing problem of how to dispose of spent nuclear fuel, a substance that remains potentially harmful, by the court's own account, for "time spans seemingly beyond human comprehension".[14] No human actor, in my view, has any epistemic justification for attaching probabilities to events that may or may not occur eons in the future. Yet there is probably less here than meets the eye. I do not think we need to impute to the DC Circuit some sort of principled Bayesian view that uncertainty does not exist or presents no distinctive problems. Rather, the judicial grasp of the distinction between risk and Knightian uncertainty is shaky.

A number of general and well-settled administrative law principles are useful for structuring rationality review in situations of uncertainty. One is that reviewing courts are to be at their "most deferential" when agencies make "predictions, within [their] area[s] of special expertise, at the frontiers of science".[15]Another principle is that when experts disagree, agencies are entitled to rely on the reasonable opinions of their own

[13] *See New York v. Nuclear Regulatory Commission*, 681 F. 3d 471, 482 (D.C., Cir. 2012).

[14] *See New York v. Nuclear Regulatory Commission*, 681 F. 3d 474 (D.C., Cir. 2012).

[15] *See Baltimore Gas & Electric Co. v. Natural Resources Defense Council*, 462 U.S. 87, 103 (1983). In the context of arsenic regulation, and more generally, Sunstein argues that sometimes "agencies must decide in the midst of considerable scientific uncertainty and on the basis of judgments of value on which reasonable people can differ. If agencies have been both open and reasonable, the judicial role is at an end." Cass Sunstein, *The Arithmetic of Arsenic*, 90 GEORGETOWN LAW JOURNAL 7 (2002), p. 2.259. However, Sunstein adds that "[o]f course, courts should invalidate arbitrary or indefensible judgments". Cass Sunstein, *The Arithmetic of Arsenic*, 90 GEORGETOWN LAW JOURNAL 7 (2002), p. 2.259. I disagree in part. Given the dilemmas of decision making under uncertainty, there are conditions under which courts should not invalidate even agency judgments that are arbitrary, in a sense I will define.

qualified internal experts.[16] As I will show, courts violate these principles with some frequency, not because the judges do not think the principles applicable, but because judges make conceptual mistakes about what counts as rational decision making under uncertainty. I will argue, for example, that the best reading of these settled principles implies that courts should defer to agencies in situations of brute uncertainty, in which well-defined facts about the world relevant to the decision cannot be ascertained (at acceptable cost); strategic uncertainty, in which interdependent choices create multiple equilibria; and model uncertainty, in which the very analytic framework to be used to assess uncertain choices is itself unclear. Furthermore, the principles imply that agencies are under no obligation to make cautious or worst-case assumptions under uncertainty, contrary to a meme that is surprisingly persistent in the lower courts. As I will show, however, the Supreme Court to its credit has rejected the meme on at least two occasions, in *Baltimore Gas & Electric* (1983) and in *Robertson v. Methow Valley Citizens Council* (1989).[17] In all of these situations, law should leave room for rationally arbitrary decisions—decisions such that no first-order reason can be given for them one way as opposed to another, within a certain domain, even if there is excellent reason for making a decision within that domain.

2. National Environment Policy Act

The NEPA is an environmental statute that cuts across all areas of public law. Its basic requirement—a procedural rather than substantive obligation—is that federal agencies must consider whether any of their actions will have significant effects on the environment. If the agency performs an environmental assessment and believes that the action will have no significant effects, it may file a finding saying so; courts will uphold the finding so long as the agency has taken a "hard look" at the issues and has offered "convincing reasons" in support of its finding[18], a standard that more or less duplicates ordinary APA rationality review. If

[16] *See Lands Council v. McNair*, 537 F. 3d 981 (9th Cir., 2008); and *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360 (1989). On the conceptual issues surrounding this principle, *see* Adrian Vermeule, *The Parliament of the Experts*, 58 DUKE LAW JOURNAL 8 (2009).

[17] *See Baltimore Gas & Electric Co. v. Natural Resources Defense Council*, 462 U.S. 87 (1983); and *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 352 (1989).

[18] *See Foundation on Economic Trends v. Weinberger*, 610 F. Supp. 829, 838 (D.C. Cir., 1985).

the agency cannot meet that test, it becomes obliged to do a more extensive review, called an "environmental impact statement," that considers all potentially relevant environmental risks and harms.[19]

For my purposes here, the interesting feature of this legal framework—NEPA combined with the APA—is that it authorizes courts to require agencies to invest in further information gathering about environmental problems. In the theory of rational decision making, under either uncertainty or risk, one question is what it is rational to decide given some set of information; a distinct and logically prior question is how much information it is rational to gather before making a decision. As I will show, uncertainty may enter the picture either at the first level (what to do) or at the second level (how much information to collect before deciding what to do).

At the level of judicial review of agency action, hard questions arise about how much information courts may or should require agencies to collect. I will suggest that under administrative law principles and NEPA principles rightly understood, the existence of an uncertain problem implies that, sometimes, the very question of whether collecting further information will be cost justified is itself uncertain. In cases like that, courts must leave room for agencies to make rationally arbitrary decisions about when to cut off the process of information gathering.

III. WHEN REASONS RUN OUT

I turn now to one sort of mistake that courts can commit when agencies face decisions under genuine uncertainty. I bracket for the time being the question of whether the situation genuinely is one of uncertainty or whether instead further cost-justified investments in information gathering might resolve the uncertainty, transforming it into risk or certainty. I will take up that question later; for now, I assume that the uncertainty is stipulated to be genuine by all concerned, including the reviewing judges, and that all cost-justified information has already been gathered. I also assume, for the time being, that agencies are acting in good faith to maximize overall welfare. Later I will ask what courts should do if they worry that agencies are invoking uncertainty in a pretextual fashion to shield decisions made on illegitimate grounds.

The mistake at issue in some of the cases, I suggest, is the belief that it

[19] *See Foundation on Economic Trends v. Weinberger*, 610 F. Supp. 829, 838 (D.C. Cir., 1985).

is always possible for agencies to give first-order reasons for their choices. By a first-order reason, I mean a reason that justifies the choice relative to other choices in the agency's feasible set. A second-order reason is a reason to make some choice or other in the feasible set, even if no first-order reason can be given. In situations of uncertainty, agencies will often have perfectly valid second-order reasons even when no first-order reason is possible. In other words, there is a domain of agency decisions that are necessarily and unavoidably arbitrary in a first-order sense. Reviewing courts must not press their demands for reasons and reasoned decision making beyond the point at which the possibility of reason is exhausted.

1. Brute uncertainty

One type of uncertainty, brute uncertainty, arises from the sheer cost of acquiring facts about the world.[20] The fat-tailed horned lizard is "a small, cryptically colored iguanid... that is restricted to fats and valleys of the western Sonoran desert".[21] The secretary of the interior has a statutory obligation to decide, in light of the best available scientific data, whether to list the lizard as a threatened species. The details are unnecessary, but the statute constrains the secretary's ability to wait until more information comes to light; it requires a decision now.[22]

How many fat-tailed horned lizards are there? No one knows, and for the time being the knowledge cannot be obtained. In litigation between the secretary and environmental groups, "both parties acknowledge that the formerly common 'scat count' method of estimating lizard population size has been discredited"[23], destroying the evidentiary basis for extant assessments. On the other hand, a newer method, in which lizards are

[20] *See* Jon Elster, *Excessive Ambitions*, 4 CAPITALISM AND SOCIETY 2 (2009).

[21] *See Tucson Herpetological Society v. Salazar*, 566 F. 3d 873 (9th Cir., 2009), quoting *Federal Register*, Vol. 58, 227, Nov. 29, 1993, p. 62.624-62.625.

[22] I put aside the technical complication that the agency, forced to make a decision, may decide that listing is "warranted but precluded" on the ground that the risks to other species have a higher priority. *See* Kristina Alexander, *Warranted but Precluded: What That Means under the Endangered Species Act (ESA)*, CONGRESSIONAL RESEARCH SERVICE, CRS Report 7-5700 (2010). That is itself just one sort of decision, and it is a decision that goes to the merits of the issue, finding that listing is substantively warranted. So a decision of that sort does not somehow escape the dilemma I address.

[23] *See Tucson Herpetological Society v. Salazar*, 566 F. 3d 873, 879 (9th Cir., 2009).

captured, marked, and perhaps recaptured (with the rate of recapture of marked lizards conveying information about population size), has not yet yielded reliable information. The number of lizards is an unknown that is known to be unknowable, at least in the short run.

How, then, should the secretary decide whether to list the lizard as a threatened species? How should a reviewing court decide whether the secretary's decision is arbitrary and capricious or instead rational? For convenience, let us suppose that the secretary may find the number of lizards to be high or low. In the actual case, the secretary in effect chose "high"; he made a finding that lizard populations remained viable throughout the lizard's extant range. The appellate court rejected that conclusion, holding that "if the science on population size and trends is underdeveloped and unclear, the Secretary cannot reasonably infer that the absence of evidence of population decline equates to evidence of persistence... We thus conclude that the administrative record does not support the secretary's determination that lizard populations persist throughout most of the species' current range".[24]

The problem with the court's conclusion is that the administrative record failed to support the opposite conclusion either. A counterfactual finding by the secretary, that the lizard populations did not remain viable in the lizard's range, would have been equally unfounded. Judge John Noonan, dissenting, got it right. "It's anybody's guess," he wrote, "whether the lizards are multiplying or declining. In a guessing contest one might defer to the government umpire".[25]

By way of fancying up Judge Noonan's point, the agency was presented with a choice it had second-order reasons to make—indeed a second-order obligation to make—but no possible first-order grounds for making one way or another. I say a choice rather than a finding because the facts of the matter were, for the actors involved, epistemically unattainable. The secretary had to decide in which direction to take a leap of faith, and it is a kind of pathological hyperrationalism to demand that the secretary give reasons for taking it in one direction rather than the other.

A natural reaction to the lizards case, and to uncertainty generally, is to use some sort of default reasoning.[26] If we do not know how many lizards there are, perhaps we should err on the side of caution. The problem is that there are many ways to interpret that injunction. The secretary might decide that the type I error, listing the lizard as

[24] *See Tucson Herpetological Society v. Salazar*, 566 F. 3d 873, 877 (9th Cir., 2009).

[25] *See Tucson Herpetological Society v. Salazar*, 566 F. 3d 873, 883 (9th Cir., 2009).

[26] *See* JOSEPH HALPERN, REASONING ABOUT UNCERTAINTY (2005).

threatened when it really is not, is less costly than the type II error, failing to list the lizard as threatened when it really is, so that caution requires an aggressive listing strategy. On the other hand, the secretary might decide that erring on the side of caution means not listing species as threatened if there is a very real possibility—how real none can say—that they are not. There are multiple substantive, problem-relevant default positions that the secretary might invoke.

Given this, Judge Noonan suggests a different form of default-based reasoning. The environmental petitioners—in effect the plaintiffs—are challenging the secretary's finding. The APA is quite clear that the burden of proof lies on them to show that the finding is arbitrary.[27] If the facts that would enable such a showing are unattainable, then the secretary wins by virtue of the legal default, even if the secretary could not prove his position correct either, were the positions reversed. A tie goes to the government umpire.

The view I am suggesting cheerfully concedes that the secretary's finding is arbitrary at the first order. But that is a point about arbitrariness in a decision-theoretic sense, not about arbitrariness in the legal sense. In legal terms, I mean to argue that decisions in which first-order reasons have run out should not count as arbitrary within the meaning of the APA. It is not legally arbitrary to make an unavoidable decision, resting on valid second-order reasons, even if the decision is arbitrary in a first-order sense.

2. Strategic uncertainty

Let me now turn from brute uncertainty—about epistemically unattainable facts that in some sense lie out there—to a different form of uncertainty arising from the strategic interdependence of actors' choices. This is the province of game theory rather than decision theory. Game theory is rife with multiple equilibria, especially in indefinitely repeated games but also more generally.[28] Some games have no unique solution in pure strategies, so that rational parties will at least partly randomize their behavior; some games have no unique solution even with mixed strategies. And players of the game may have insufficient experience with the behavior of other players to form epistemically well-grounded beliefs about what those others are able or likely to do, which gives rise to

[27] *See Administrative Procedure Act* (APA), 5 U.S.C. 556(d), 706(2)(E) (2006).

[28] *See* Drew Fudenberg & Eric Maskin, *The Folk Theorem in Repeated Games with Discounting or with Incomplete Information*, 54 ECONOMETRICA 3 (1986).

genuine strategic uncertainty.

One domain in which strategic uncertainty constantly arises is the counterterrorism problem. In *Tri-Valley Cares*, the court considered the question whether the Department of Energy should create a level-3 biohazard research facility at *Lawrence Livermore National Laboratory*.[29] How should reviewing courts have evaluated the rationality of the department's decision? One problem with creating the facility was that pathogens might escape by accident; another was that the facility might become the target of a terrorist attack. There was a fair amount of accumulated experience with such facilities elsewhere, and a fair sense of how to construct and operate such facilities so as to minimize the possibility of accidents. But the proposed *Lawrence Livermore* facility had some unique features. At the time of construction it was the only level-3 facility to occupy the same complex as a nuclear weapons research facility[30], and it was built after 9/11, raising difficult questions about counterterrorism risks stemming from either domestic or international sources.

The department decided in favor of building the facility. Petitioners challenged the decision under NEPA and the APA, arguing that the department had not given adequate consideration to terrorism risks and the resulting harms to people and the environment should pathogens escape. In making its assessment, the department relied on a model developed by the army to assess the risks of releases of pathogens after a natural disaster or mechanical accident. The model suggested that the maximum credible harms from a release were modest and that the chance of a release in the first place, although impossible to quantify, was remote. Plaintiffs' experts, however, argued that such a model was inapposite to the problem, which involved the risk of deliberate attacks by terrorists. The difference between disaster or accident risks, on the one hand, and terrorism risks, on the other, was, in this case, also a form of model uncertainty; the very framework for assessing the problem was itself contested by the parties.[31]

The plaintiffs' view might or might not be correct. The issue was genuinely uncertain, in part because it had a strategic dimension. Terrorists would presumably be able to know or guess something about what model the department was using; after all, the court's decision explaining the issues is a matter of public record. The consequence is that the department's choice of a model would itself endogenously affect the

[29] *See Tri-Valley Cares v. U.S. Department of Energy*, 671 F. 3d 1.113 (2012).

[30] *See Tri-Valley Cares v. U.S. Department of Energy*, 671 F. 3d 1.113, 1.119 (2012).

[31] *See Tri-Valley Cares v. U.S. Department of Energy*, 671 F. 3d 1.113, 1.125 (2012).

risk being modeled—the bite of strategic uncertainty. Supposing that the model showed that the possibility of a terrorist attack was low, one might imagine that the model was self-undermining, because its use suggested that the department was complacent and, thus, gave terrorists increased incentives to focus on *Lawrence Livermore* relative to other possible targets. One might instead imagine that the model was self-confirming, because it showed terrorists that the expected benefit (from their point of view) of an attack on the facility was in fact low. Absent more information about the terrorists' likely response, a question that is essentially a guessing game, it is irreducibly unclear whether the department's model raised, reduced, or had no effect on the chance of a terrorist incident at the facility. In circumstances of strategic uncertainty, reasons run out, within the broad boundaries set by the agency's statutory authority.

The court upheld the department's decision to build the facility, principally on the ground that if experts disagree about the proper model to be applied to a problem, the agency is entitled to rely upon the model favored by its own experts.[32] That holding was, in effect, the same as Judge Noonan's reasoning in the lizards case, albeit applied to strategic rather than brute uncertainty. Under the irreducible uncertainty created by strategic indeterminacy, there is no reason to favor one model or another, at least within the broad boundaries of professionally respectable opinion.

I am extrapolating or embellishing a bit. The court's actual opinion merely adverted to the model's uncertainty and the controversy among experts, and then awarded victory to the agency, without explaining the deep sources of the uncertainty that caused the controversy. Whatever the adequacy of the court's explanation, however, I believe that it had the right instincts and reached the correct outcome. The question whether it was sensible to build a biohazard facility at *Lawrence Livermore* was a decision at the frontier where the knowable passes into the unknowable and where agencies may or may not take a leap of faith, depending on how robust their appetite for risk may be. Once such a frontier has been reached, courts who demand further reasons are asking for the impossible.

3. Recognizing when reasons have run out

Finally, there is the question how reviewing courts are supposed to know that they (or, more accurately, the agency) face a decision of the

[32] *See Tri-Valley Cares v. U.S. Department of Energy*, 671 F. 3d 1.113, 1.119 (9th Cir., 2012).

type in which it is rational to be arbitrary. Such situations do not come labeled by God, and if the agency has a comparative informational advantage over the reviewing court, how is the court supposed to make the logically antecedent determination that a case for rationally arbitrary decision making has even arisen?[33]

In the nature of things, it is impossible to be sure, but there are a number of rules of thumb the reviewing court might use. First, a hallmark of problems calling for a rationally arbitrary decision is a kind of mirror-image reversibility. If the agency chooses A over B, and the court overturns that decision as arbitrary, it will also be the case that the agency's choice of B over A could be overturned on exactly the same ground. Indeed, any choice the agency makes could be overturned for lack of first-order reasons. Recognizing this, the reviewing court should realize that the agency may be facing a situation in which no nonarbitrary choice is feasible.

A stylized example may be drawn from the case of the fixed indexed annuities. As described above, the SEC had to decide whether such instruments should count as annuities under the federal securities laws and had a statutory obligation to consider the effects of its decision on competition and efficiency.[34] For present purposes, let us suppose the SEC rationally believed that a decision either way would promote competition and efficiency by reducing legal uncertainty for regulated firms; whichever substantive decision would be best, a decision either way would be better than an ongoing muddle. Yet it was also irreducibly uncertain which first-order decision would do more than the other to promote competition and efficiency.

In such a situation, whether or not the SEC chose to count fixed indexed annuities as annuities, it was obliged to decide one way or another. Yet the problem was that a reviewing court might overturn either decision on the ground that reducing legal uncertainty was not a

[33] It is tempting to call this the "step zero" issue for rationally arbitrary decisions, by analogy to the inquiry whether the Chevron standard applies. *See* Cass Sunstein, Chevron *Step Zero*, 92 VIRGINIA LAW REVIEW 2 (2006). Tempting but, I believe, inaccurate. Chevron step zero is a toggle switch between two different legal standards of review and determines which standard governs. Here, by contrast, the standard of review never changes; it is always "arbitrary and capricious" review under section 706(2)A of the Administrative Procedure Act. The reviewing court's task is just to understand what sort of problem the agency faced in order that the arbitrary and capricious standard may be applied in a sensible way.

[34] *See American Equity Investment Life Insurance Co. v. SEC*, 613 F. 3d 166 (2010).

sufficient rationale to explain why the SEC chose one way rather than the other. After all (the fallacious reasoning runs), the SEC could have reduced legal uncertainty by making the other decision too.[35] The court's failure to recognize that the problem was subject to mirror-image reversibility ensured the worst possible outcome by perpetuating legal uncertainty.

A second rule of thumb is that problems calling for a rationally arbitrary decision will often produce intractable disagreement among experts,[36] as in the case of the biosafety facility at *Lawrence Livermore*. Expertise will certainly be necessary to reach the uncertainty frontier at which rationally arbitrary decisions lie, but expertise will be finally unable to prescribe a unique choice among the feasible options. This is hardly a watertight inference, because disagreement among experts may arise for other reasons as well, but the existence of such disagreement is some positive evidence that the uncertainty frontier has been reached.

Finally, the court might ask the agency for a clear statement that a problem calling for a rationally arbitrary decision has arisen. The possibility that the agency will claim falsely, or pretextually, that such a case has arisen is a real one—I take up such issues later—but the clear statement will serve as a kind of reputational bond. Agencies in a repeat-play relationship with reviewing courts will be reluctant to take the risk of making a false claim that might later be exposed.

IV. OPTIMISM, PESSIMISM, AND UNCERTAINTY

I turn now to a related problem—a particularly important special case of reasons running out. Under genuine uncertainty, what assumptions should decision makers use? In particular, how optimistic or pessimistic should they be? There is a pervasive folk meme to the effect that under uncertainty, worst-case assumptions have a kind of priority. "Err on the side of caution"; "better safe than sorry"; the proverbs are legion.

One problem is that the advice to err on the side of caution will sometimes or often be indeterminate. The "dismal theorem"[37] shows that

[35] *See American Equity Investment Life Insurance Co. v. SEC*, 613 F. 3d 166, 177-178 (2010).

[36] Al-Najjar makes an analogous point in a Bayesian framework. *See* Nabil I Al-Najjar, *A Bayesian Framework for the Precautionary Principle*, 44 JOURNAL OF LEGAL STUDIES S-2 (2015).

[37] *See* Martin Weitzman, *On Modeling and Interpreting the Economics of Catastrophic Climate Change*, 91 REVIEW OF ECONOMICS AND STATISTICS 1 (2009).

given certain assumptions about the distribution of the risks of climate change—the existence of a fat tail—catastrophic harms of staggering magnitude are a real possibility and should overwhelm other considerations, dominating the decision problem. But this does not necessarily mean that we should immediately curtail economic activity in a bid to avert catastrophic climate change; there might equally be a dismal theorem about the catastrophic fat-tail risks of doing that.[38] Perhaps the resulting contraction of the economy might become so severe as to cause global conflicts that radically reduce standards of living or even wipe out the human population. The example generalizes. A chronic difficulty with *maximin* strategies for coping with uncertainty is that worst-case scenarios often lie on all sides of the problem. Where that is true, the idea of taking precautions may be indeterminate.[39]

Yet there is also a second, analytically distinct problem. Even where a precautionary approach is conceptually determinate, it is just not the case that under uncertainty, only maximally pessimistic assumptions are rational. In the standard Arrow-Hurwicz framework[40], rational decision making under uncertainty may be based on the worst case, the best case, or a weighted combination of the two extremes.[41] *Maximin*, which attempts to choose the outcome with the best worst-case payoff, is not the uniquely rational approach. Equally rational is *maximax*, which attempts to choose the outcome with the best best-case payoff.[42] A standard generalization of Arrow-Hurwicz, the *α-maximin* framework, models decision makers as choosing a parameter that may range from maximal pessimism to maximal optimism.[43] There is no basis in the theory of decision making for courts to single out one extreme on this spectrum—the maximally pessimistic extreme—and elevate it into a sort of universal

[38] *See* Gary Yohe & Richard Tol, *Precaution and a Dismal Theorem: Implications for Climate Policy and Climate Research*, WORKING PAPER FNU, No. 145 (2007).

[39] *See* CASS SUNSTEIN, RISK AND REASON: SAFETY, LAW, AND THE ENVIRONMENT (2002); and CASS SUNSTEIN, WORST-CASE SCENARIOS (2007).

[40] *See* Kenneth Arrow & Leonid Hurwicz, *An Optimality Criterion for Decision-Making under Ignorance*, *in*. UNCERTAINTY AND EXPECTATIONS IN ECONOMICS: ESSAYS IN HONOUR OF G.L.S. SHACKLE (C.F. Carter & J.L. Ford, eds., 1972).

[41] *See* Richard Woodward & Richard Bishop, *How to Decide When Experts Disagree: Uncertainty-Based Choice Rules in Environmental Policy*, 73 LAND ECONOMICS 4 (1997).

[42] David Kelsey & John Quiggin, *Theories of Choice under Ignorance and Uncertainty*, 6 JOURNAL OF ECONOMIC SURVEYS 2 (1992), p. 136-137.

[43] For a review of the literature, with legal and regulatory applications, *see* Daniel Farber, *Uncertainty*, 99 GEORGETOWN LAW JOURNAL 4 (2011).

fallback requirement for situations of uncertainty.[44]

Is there a general basis in law for such a fallback requirement? Particular statutes might, of course, enforce caution in particular settings, but does administrative law generally require courts to enforce conservative assumptions on agencies? In 1978 the *Council on Environmental Quality* (CEQ), an executive body charged with promulgating regulations to enforce NEPA, specifically required agencies to address worst-case scenarios in their environmental impact statements (EIS), if relevant information about possible environmental harms was nonexistent or too costly to obtain.[45] The consequence was that agencies were obliged, or felt obliged, to address a suite of highly

[44] Here I am on treacherous ground, venturing beyond my area of competence. Yet it does not seem that there is any intrinsic connection between uncertainty and pessimism. In models with nonunique priors, the *maxmin* criterion of Gilboa and Schmeidler approaches equivalence with *maximin* as the range of admissible probability distributions grows. *See* Itzhak Gilboa & David Schmeidler, *Maxmin Expected Utility with a Non-Unique Prior*, 18 JOURNAL OF MATHEMATICAL ECONOMICS 2 (1989). The *maxmin* criterion, however, is derived from an axiom of uncertainty aversion. Itzhak Gilboa & David Schmeidler, *Maxmin Expected Utility with a Non-Unique Prior*, 18 JOURNAL OF MATHEMATICAL ECONOMICS 2 (1989), p. 144. The axiom itself is not a requirement of rationality, and other axioms might be used instead. A similar point holds as to the literature on robust optimization, which tends to use Wald's *maximin* criterion as a default assumption. *See* Abraham Wald, *Statistical Decision Functions Which Minimize the Maximum Risk*, 46 ANNALS OF MATHEMATICS 2 (1945). The extreme conservatism of Wald's *maximin* creates a "price of robustness", which means that other default assumptions are equally respectable. *See* Dimitris Bertsimas & Melvyn Sim, *The Price of Robustness*, 52 OPERATIONS RESEARCH 1 (2004). The same point holds for models of partial uncertainty, in which the decision maker is able to construct an ordinal ranking of likelihood of possible states; optimistic or *maximax*-type behavior is just as permissible as pessimistic or *maximin*-type behavior. David Kelsey, *Choice under Partial Uncertainty*, 34 INTERNATIONAL ECONOMIC REVIEW 2 (1993), p. 301–302. Overall, there is a floating tendency in the literature to say that pessimistic decision rules like *maximin* have some kind of intuitive priority—a conversation stopper for those who do not share the relevant intuition, at least not systematically and across the board. David Kelsey & John Quiggin, *Theories of Choice under Ignorance and Uncertainty*, 6 JOURNAL OF ECONOMIC SURVEYS 2 (1992), p. 137.

[45] *See Federal Register*, Vol. 43, 55.741, Nov. 29, 1978, p. 55.978-55.984; and Carla Mattix & Kathleen Becker, *Scientific Uncertainty under the National Environmental Policy Act*, 54 ADMINISTRATIVE LAW REVIEW 3 (2002).

speculative and implausible scenarios.[46] In 1986 the council rescinded its worst-case requirement and replaced it. "The regulation now requires agencies to get incomplete or unavailable information in an EIS when getting it does not come at an exorbitant cost and it is 'relevant to reasonably foreseeable significant adverse impacts.' If the information cannot be obtained because it is too expensive or the means to obtain it are not known, then the CEQ regulations require an agency to state this fact, along with a summary of the relevance of the information, and a summary of the existing credible evidence on the matter".[47] The Supreme Court upheld the change in *Methow Valley* (1989), observing that the worst-case requirement threatened to "[distort] the decisionmaking process by overemphasizing highly speculative harms," thereby diverting agencies' limited time and cognitive resources from consideration of more substantial environmental risks.[48]

I conclude that neither law nor canons of rationality generally require that agencies choose safe or cautious assumptions under uncertainty and that in some cases the very idea of making cautious assumptions is indeterminate anyway—where, for example, there are fat-tail risks on both sides of the decision-making ledger. Hence there is no basis for courts to foist a requirement of conservatism on agencies through judicial implementation of rationality review under the APA, or the NEPA either. Yet sometimes lower courts seem to bridle when agencies make anything but pessimistic assumptions under conditions of uncertainty, despite the admonition in the Supreme Court's *Methow Valley* decision. I will confine myself to one recent example out of the many that decorate the pages of the law reports.

The example also comes from the law of endangered species. Yellowstone grizzly bears were listed as a threatened species in 1975, but their numbers have since increased to the point where the *Fish and Wildlife Service* attempted to delist them.[49] In the delisting decision, a key question was whether the bears would be threatened by declines in the prevalence of whitebark pine, a tree that provides them with an important source of food. All parties acknowledged the potential for such a threat, in part because of climate change, which has spurred the growth of parasites and diseases that kill the whitebark pine, and in part because of a well-

[46] *See* Carla Mattix & Kathleen Becker, *Scientific Uncertainty under the National Environmental Policy Act*, 54 ADMINISTRATIVE LAW REVIEW 3 (2002).

[47] *See* Carla Mattix & Kathleen Becker, *Scientific Uncertainty under the National Environmental Policy Act*, 54 ADMINISTRATIVE LAW REVIEW 3 (2002), p. 1.133.

[48] *See Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 356 (1989).

[49] *See Greater Yellowstone Coalition, Inc. v. Servheen*, 665 F. 3d 1.015, 1.019 (9th Cir., 2011).

documented correlation between reductions in whitebark pine and grizzly mortality.[50] But the agency discounted the seriousness of the overall threat to the grizzlies on several grounds: grizzlies are notoriously flexible and adaptable about their sources of food (if whitebark pine fails, more picnic baskets will be stolen); whitebark pine has always been a highly variable resource, one that the bears have proven they can go without; and other populations of grizzlies have flourished despite the loss of whitebark pine.[51] Overall, the agency concluded, "the specific amount of decline in the whitebark pine distribution and the rate of this decline are difficult to predict with certainty. The specific response of grizzly bears to declines in whitebark cone production is even more uncertain".[52]

The court, however, declared the agency's position arbitrary, citing the lizards case discussed earlier.[53] "It may be that scientists will compile data demonstrating grizzly population stability in the face of whitebark pine declines. Such information, however, simply is not in the record before us. The lack of any data showing a population decline due to whitebark pine loss is not enough".[54] But of course the whole point was that there was no information in the record either way, and (I am assuming for now) there was no cost-justified procedure for obtaining such information. The court's reasoning in effect required the agency to make a conservative or pessimistic assumption about the admittedly uncertain consequences of whitebark pine losses, whereas the agency had chosen an optimistic assumption. The former has no analytic or legal priority over the latter, so the court ought to have left the agency's decision in place.

It is certainly fair play for policy makers to criticize agencies for excessive optimism, or excessive pessimism for that matter. Policy makers, such as the president and legislators, are entitled to set α-parameters as they see fit in particular domains, through executive orders or through legislation. Statutes sometimes, though infrequently, require agencies to make cautious substantive assumptions in the face of

[50] *See Greater Yellowstone Coalition, Inc. v. Servheen*, 665 F. 3d 1.015, 1.025 (9th Cir., 2011).

[51] *See Greater Yellowstone Coalition, Inc. v. Servheen*, 665 F. 3d 1.015, 1.027 (9th Cir., 2011).

[52] *See Greater Yellowstone Coalition, Inc. v. Servheen*, 665 F. 3d 1.015, 1.028 (9th Cir., 2011), quoting *Federal Register*, Vol. 72, 60, Mar. 29, 2007, p. 14.866-14.929.

[53] *See Greater Yellowstone Coalition, Inc. v. Servheen*, 665 F.3d 1.030 (9th Cir., 2011), quoting *Tucson Herpetological Society v. Salazar*, 566 F. 3d 870, 879 (9th Cir., 2009).

[54] *See Greater Yellowstone Coalition, Inc. v. Servheen*, 665 F.3d 1.030 (9th Cir., 2011).

uncertainty.[55] Procedurally, I have mentioned the prior NEPA regulations that required agencies to analyze worst-case scenarios.[56] But none of this implies that, under current law, courts have any basis for reading a de facto requirement of *maximin* decision making into the general rationality requirements of administrative law. There is no systematic reason to think that courts are better positioned than agencies to set α-parameters and no general reason to think that agencies will malfunction in doing so in ways that courts are able to oversee or correct. Rationality in the decision-theoretic sense does not require pessimism; nor should rationality in the legal sense.

Part of the judicial intuition, rarely articulated, must be that the choice of an α-parameter seems essentially arbitrary. Why should the agency set the parameter here rather than there, without explanation? Yet that does not explain why courts seem to gravitate toward *maximin* as opposed to *maximax* or any number of other decision rules compatible with the Arrow-Hurwicz result. That further tic of judicial behavior seems to occur because *maximin* resonates with pessimistic folk wisdom ("better safe than sorry") and thus supplies an apparently neutral and prudent benchmark criterion. But it is not neutral, nor is it necessarily any more prudent than the alternatives; after all, there is also folk wisdom about the value of optimism ("nothing ventured, nothing gained").

Nor should the agency be tasked with explaining the inexplicable. It is tempting to say that the agency's minimum obligation is to give reasons for setting the α-parameter here rather than there. But in decision making under genuine uncertainty, agencies operate at the frontiers of reason; agencies no less than firms or entrepreneurs will act more or less boldly depending on what Keynes called their "animal spirits".[57] Over time, public opinion and policy-making officials will judge whether agencies have acted with excessive optimism or pessimism; in the meantime, courts should leave the decision with the agency.

If this posture of judicial self-denial and toleration of rational arbitrariness seems implausible, even unattainable, the Supreme Court itself has given us a laudable counterexample. In a 1983 decision, *Baltimore Gas & Electric v. Natural Resources Defense Council* (1983), the question was whether the *Nuclear Regulatory Commission* could allow nuclear plants to be licensed on the optimistic assumption that there

[55] The *Clean Air Act*, for example, mandates consideration of worst-case accidental releases of hydrofluoric acid. *See Clean Air Act* (CAA), 42 U.S.C. 7412(n)(6) (2006).

[56] *See Federal Register*, Vol. 43, 55.741, Nov. 29, 1978, p. 55.978-55.984.

[57] *See* JOHN MAYNARD KEYNES. THE GENERAL THEORY OF EMPLOYMENT, INTEREST AND MONEY (1936), p. 161.

would be zero release of spent nuclear fuel from on-site storage facilities.[58] Despite the radical uncertainty surrounding the long-term environmental and health effects of storing nuclear fuel, the Court said emphatically that it was for the commission to make the sort of policy judgment embodied in the zero-release assumption and that there was nothing arbitrary or irrational about the commission's approach.[59] There are various ways of cabining or narrowing the Court's reasoning,[60] but the spirit of the decision is clear enough: judges are perfectly capable of recognizing that under uncertainty, pessimism has no rational or legal priority, assuming as always that relevant statutes are silent or ambiguous.

V. OPTIMAL INFORMATION GATHERING

So far I have been bracketing questions about information gathering. Such questions arguably lie at the heart of NEPA and the APA as well, insofar as those statutes require agencies to follow rational procedures for information gathering, both with respect to environmental effects and more generally. But what does that mean, exactly? Under uncertainty, what does optimal information gathering look like?

A standard line in the economics of information is that decision makers should invest in gathering information just up to the point at which the (increasing) marginal costs of doing so equal the expected marginal benefits of further information.[61] If there is no cost to reversing a decision once made, then there is no need to wait; any current decision may be undone if later information suggests that the agency erred. But if there is some positive cost to reversing decisions once made, then waiting for new information has an option value that increases with the cost of

[58] *See Baltimore Gas & Electric Co. v. Natural Resources Defense Council, Inc.*, 462 U.S. 87 (1983).

[59] *See Baltimore Gas & Electric Co. v. Natural Resources Defense Council, Inc.*, 462 U.S. 87, 105 (1983).

[60] For example, the Court observed that the optimistic assumption was embedded in a set of assumptions that were conservative overall and that the former was in part intended to offset the latter. *See Baltimore Gas & Electric Co. v. Natural Resources Defense Council, Inc.*, 462 U.S. 94, 105 (1983). This too, however, denies that pessimism has any paramount status.

[61] *See* George Stigler, *The Economics of Information*, 69 JOURNAL OF POLITICAL ECONOMY 3 (1961).

reversal.[62] The greater the option value, the greater the benefit of further information gathering before the agency decides.

That approach may be adequate for stable, familiar, relatively simple environments. In environments of that sort, decision makers can form epistemically justified probability distributions over the (expected) value of future information. Searching for consumer goods in a mall, I have a clear idea of the expected value of the information I will turn up by going to one more store. But many of the problems that agencies face are not like that at all. Where the environment is so unfamiliar, or so complex, that the marginal benefit of acquiring further information is itself genuinely uncertain, there may be prohibitive costs to gathering the information needed to form an epistemically justified probability distribution over the value of information.[63] An infinite regress looms: the decision maker must decide how much to invest in gathering information about the marginal benefit of further information gathering, and so on.[64]

As to firms in competitive markets, it has been observed that the "choice of a profit maximizing information structure itself requires information, and it is not apparent how the aspiring profit maximizer acquires this information, or what guarantees that he does not pay an excessive price for it".[65] The same point holds, with appropriate modifications, for agencies maximizing social welfare. Uncertainty may afflict not only the agency's first-order decision but also its second-order decisions about how much information to collect.[66] Critically, there just is no nonarbitrary solution to this infinite regress; it is a special type of optimal search problem in which any stopping rule is arbitrary within the boundaries of the relevant uncertainty.[67] At the frontiers of knowledge, what agencies do is "like going into a big forest to pick mushrooms. One may explore the possibilities in a certain limited region, but at some point one must stop the explorations and start picking because further

[62] *See* AVINASH DIXIT & ROBERT PINDYCK, INVESTMENT UNDER UNCERTAINTY (1994).

[63] *See* Jon Elster, *Excessive Ambitions*, 4 CAPITALISM AND SOCIETY 2 (2009).

[64] *See* HANS MELBERG, A CRITICAL DISCUSSION OF JON ELSTER'S ARGUMENTS ABOUT RATIONAL CHOICE, INFINITE REGRESS AND THE COLLECTION OF INFORMATION, (UNPUBLISHED THESIS, 1999).

[65] *See* Sidney Winter, Jr., *Economic "Natural Selection" and the Theory of the Firm*, 4 YALE ECONOMIC ESSAYS 1 (1964), p. 262.

[66] *See* Cass Sunstein & Edna Ullmann-Margalit, *Second-Order Decisions*, 110 ETHICS 1 (1999).

[67] *See* Jonathan Baert Wiener, *Managing the Iatrogenic Risks of Risk Management*, 9 RISK: HEALTH, SAFETY AND ENVIRONMENT 1 (1998).

explorations as to the possibility of finding more and better mushrooms by walking a little bit further would defeat the purpose of the hike. One must decide to stop the explorations on an intuitive basis, i.e. without actually investigating whether further exploration would have yielded better results".[68]

The role of courts in reviewing the rationality of an agency's information gathering should be sensitive to these considerations.[69] In ordinary NEPA cases, for example, courts may be able to identify cases in which agencies have failed to make cost-justified investments in information gathering (I will give an example shortly). "Ordinary" means that agencies and courts have made decisions about similar problems, in similar environments, with sufficient frequency that the expected value of additional increments of information is rationally calculable. But in the sort of decision-making environments mentioned earlier—counterterrorism, nuclear fuel, endangered-species problems at the frontier of biological and ecological understanding—courts ought to stay their hand; agencies must have leeway to stop collecting information at a given point, even or especially when the location of that point cannot be justified on grounds that appear rational in a first-order sense. In informationally uncertain environments, "[a]t some point, the individual must assert in some noncalculating way how he will use resources to establish what he wants: He must, in effect, take a stab in the dark".[70]

In the case of the Yellowstone grizzlies, described earlier, the court seems to have misconceived its role, in effect requiring the agency to give reasons for the choice of a stopping rule in an informationally uncertain environment. "The [*Fish and Wildlife*] Service," wrote the court, "must

[68] LEIF JOHANSEN, LECTURES ON MACROECONOMIC PLANNING. PART 1: GENERAL ASPECTS. (1977), p. 144, quoting Jon Elster, *Excessive Ambitions*, 4 CAPITALISM AND SOCIETY 2 (2009), p. 5.

[69] Kraus and Raso make a similar suggestion in the context of judicial review of *Securities and Exchange Commission* decisions. *See* Bruce Kraus & Connor Raso, *Rational Boundaries for SEC Cost-Benefit Analysis*, 30 YALE JOURNAL ON REGULATION 2 (2013), p. 43-44.

[70] *See* Richard McKenzie, *On the Methodological Boundaries of Economic Analysis*, 12 JOURNAL OF ECONOMIC ISSUES 3 (1978), p. 635. A useful suggestion is that agencies should employ experimental rules designed to generate information. *See* Zachary Gubler, *Experimental Rules*, 55 BOSTON COLLEGE LAW REVIEW 1 (2014); and Yoon-Ho Alex Lee, *An Options Approach to Agency Rulemaking*, 65 ADMINISTRATIVE LAW REVIEW 4 (2013). But the suggestion does not fully come to grips with the problem. Given the presence of serious uncertainty, which way should the experimental rule be set? The decision on that question will inevitably have an arbitrary quality.

rationally explain why the uncertainty regarding the impact of whitebark pine loss on the grizzly counsels in favor of delisting now, rather than, for example, more study. Otherwise we might as well be deferring to a coin flip".[71] Under genuine uncertainty, however, no such reasons may be forthcoming; the choice of a stopping point will necessarily be arbitrary in a first-order sense, although some stopping point there must be. Halting the search for further information somewhere or other is not arbitrary at all, so there are perfectly good second-order reasons for the agency's behavior. (It is a separate question whether, on halting its information-gathering process, the agency should or should not have decided to delist the grizzlies; I addressed that issue earlier.) Because the shadow of infinite regress looms, courts should let agencies take a stab in the dark, at least when there is no evidence in the record suggesting that the uncertainty can be dispelled at low cost.

I do not argue for utter judicial abdication, because the qualification I have offered is a real one: agencies do sometimes fail to make cost-justified investments in information that would dispel uncertainty. An example comes from a case about the *Glacier Bay National Park and Preserve* in Alaska.[72] The issue, under NEPA, was whether the *National Parks Service* had to prepare a full EIS in order to assess the possible harms— to endangered and threatened species, to air quality, and on other margins—of increasing the number of cruise ships allowed into the bay. Putting aside the particulars of the case, the court got off on the wrong foot by announcing the general principle that "[p]reparation of an EIS is mandated where uncertainty may be resolved by further collection of data".[73] It is always true that uncertainty might be resolved by further collection of data. Then again, it might not. The dilemma is precisely that where there is genuine uncertainty at a second- or higher-order level, it is uncertain whether first-order uncertainty will be resolved by collecting further information, and it is thus analytically unclear whether to pay the price of doing so.

Nonetheless, on the facts of the case at hand, the court was justified in requiring the parks service to prepare an EIS. The details are unnecessary; suffice it to say that the record itself conclusively demonstrated that there existed low-cost studies that the agency could do to dispel the uncertainty.[74] In other words, the case was an example of first-order

[71] *See Greater Yellowstone Coalition, Inc. v. Servheen*, 665 F. 3d 1.015, 1.028 (9th Cir., 2011).

[72] *See National Parks & Conservation Ass'n v. Babbitt*, 241 F. 3d 722 (9th Cir., 2001).

[73] *See National Parks & Conservation Ass'n v. Babbitt*, 241 F. 3d 722, 732 (9th Cir., 2001).

[74] *See National Parks & Conservation Ass'n v. Babbitt*, 241 F. 3d 722, 732-733 (9th Cir., 2001).

uncertainty without second-order uncertainty. In the mushroom problem described earlier, if the hikers could, by paying a penny, be given a map of the locale with mushroom clusters marked on it, there would be a cost-justified step they could take to dispel the first-order uncertainty; thus, there would be no uncertainty at the second order.[75] The parks service in the *Glacier Bay* case was in the same position, and its refusal to undertake the relevant studies was genuinely irrational. The court was correct to force its hand.

VI. RATIONALLY ARBITRARY DECISIONS

My larger theme has been that, in the presence of uncertainty, administrative law must make space for agency decision making that is rationally arbitrary. Two distinctions are critical: first, the difference between arbitrariness in the decision-theoretic sense and in the legal sense and, second, the difference between the normative and positive theories of decision making under uncertainty. In light of these distinctions, my claims are that some decisions are rationally arbitrary in the decision-theoretic sense but should not count as arbitrary and capricious within the terms of the APA and that rationally arbitrary decisions are sometimes normatively proper, whether or not people (or agencies) actually make them and whether or not courts will in fact allow them to be made. I will distill these claims, consider what courts may do if they are concerned that agencies are invoking uncertainty pretextually, and then address the positive question of how courts actually approach these problems.

1. Uncertainty: an institutional solution

Sometimes agencies have excellent second-order reasons to make a decision on a certain topic, including an important set of cases in which law mandates a decision now rather than later. Yet even when such

[75] It is tempting to think that the value of the map must itself be uncertain before we examine its contents, so that the infinite regress of information gathering always obtains. I think this is false, however. One may have sufficient extrinsic knowledge of the mapmaker's credentials and abilities, or sufficient experience with the mapmaker's track record on other occasions, to be confident that the map will contain useful information, even without inspection. The infinite regress of information gathering is a possibility but not a necessity.

excellent reasons exist, it may also be the case that no first-order reasons can be given for making the relevant decision one way or another, or even for adopting optimistic or pessimistic assumptions to factor into the decision; genuine, Knightian uncertainty presents cases of that sort. In such cases, law must not adopt a cramped and erroneous conception of rationality, one that requires agencies to do the impossible by giving reasons as to matters where reason has exhausted its powers.

The logic may also apply to decisions about whether to collect further information before making a substantive decision—that is, to decisions about optimal stopping under uncertainty. Sometimes there is an infinite regress of uncertainty about how much information to collect before deciding how much information to collect, and so on. Where that occurs, there is no alternative but to cease collecting information at some arbitrary point and to take a stab in the dark.[76]

The APA does not recognize any category of decisions that are arbitrary and capricious yet also legally permissible; under the terms of the act, courts "shall... hold unlawful and set aside" agency action that is "arbitrary".[77] It does not follow, however, that any decisions that are rationally arbitrary, in the decision-theory sense, must also count as arbitrary in the legal sense.[78] Courts may and should instead conclude that rationally arbitrary decisions count as adequately reasoned for purposes of administrative law, when and insofar as those decisions rest on second-order reasons that are themselves valid, even when first-order reasons have run out.

Under this approach, courts would defer to some agency choices under uncertainty that do not even purport to be based on first-order reasons—even to coin flips, as I will discuss shortly. The dilemma of decision making under genuine uncertainty would be resolved institutionally, by allocating the power of arbitrary decision making across branches of government rather than through first-order reasoning.

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[76] *See* Richard McKenzie, *On the Methodological Boundaries of Economic Analysis*, 12 JOURNAL OF ECONOMIC ISSUES 3 (1978).

[77] *See Administrative Procedure Act* (APA), 5 U.S.C. 706 (2)(A) (2006).

[78] For a somewhat different distinction between two senses of arbitrariness, *see Hoctor v. U.S. Department of Agriculture*, 82 F. 3d 165, 170 (7th Circ., 1996), Judge Posner: "At the other extreme from what might be called normal or routine interpretation is the making of reasonable but arbitrary (not in the 'arbitrary or capricious' sense) rules that are consistent with the statute or regulation under which the rules are promulgated but not derived from it, because they represent an arbitrary choice among methods of implementation."

Courts seem uncomfortable with this sort of purely institutional solution, for reasons I will also discuss. But if there is no valid normative basis for that reaction, the judicial discomfort is merely a bad habit that the legal system should ignore or suppress rather than indulge.

2. How should agencies decide?

The institutional solution, in which courts allow agencies to make arbitrary decisions under uncertainty, does not directly address how agencies themselves should decide. In the nature of the case, where genuine uncertainty prevails, no method of decision making can be proven to be best. Nonetheless, it is possible to mention some approaches that sensible decision makers use more or less consciously under uncertainty, even if those approaches cannot be fully justified by first-order reasons. In the article I quoted in the epigraph, Keynes sketched several such approaches, describing them as devices that "[save] our faces as rational, economic men".[79]

Extrapolation. One may decide by assuming that the future will be like the present, ignoring our high degree of confidence that in fact the future will differ from the present in unpredictable ways.[80] The intuition must be that where the future might veer off in any direction at all, no particular direction has any priority over a simple straight-line extrapolation of the present.

Status Quo Default. Where there is a choice between doing something and doing nothing, one may decide to do nothing, reasoning that any change from the *status quo* incurs transition costs for only speculative and unclear gains. This is an application of default reasoning, as discussed earlier.

Conventional Judgment. This is Keynes's term for individually rational conformism in which, "[k]nowing that our own individual judgment is worthless, we endeavor to fall back on the judgment of the rest of the world which is perhaps better informed. That is, we endeavor to conform with the behavior of the majority or the average".[81] But if others are also

[79] John Maynard Keynes, *The General Theory of Employment*, 51 THE QUARTERLY JOURNAL OF ECONOMICS 2 (1937), p. 214.

[80] John Maynard Keynes, *The General Theory of Employment*, 51 THE QUARTERLY JOURNAL OF ECONOMICS 2 (1937).

[81] John Maynard Keynes, *The General Theory of Employment*, 51 THE QUARTERLY JOURNAL OF ECONOMICS 2 (1937), p. 214.

using the same strategy, information cascades may arise, and the information conveyed to us by the decisions of others may be as worthless as the information conveyed to others by our decision.[82] However individually rational conformism may be, at the group level the result is "a society of individuals each of whom is endeavoring to copy the others".[83]

Randomization. The problem with the methods of decision making Keynes canvasses is not that they are wrong but that they are seriously incomplete, at least as applied to the choice of public policies by agencies. There is a nontrivial, indeed outright important, set of agency decisions in which none of Keynes's methods comfortably fits the case. Extrapolation may be inapposite if the problem is not (wholly) one of prediction, as where the agency's problem is precisely that there is uncertainty about what the present state of affairs actually is. So too, using the *status quo* as a default will not work if the law requires the agency to make a new decision, one way or another, so that nonregulation is not an option—as when the *Endangered Species Act* requires the agency to make a finding, by a certain time, about whether a species is or is not threatened or endangered. Rational conformism may work in market settings or other settings with large numbers of similarly situated decision makers making similar decisions, but will be inapposite where the decision has particular features and is confined to a particular agency.

Under such circumstances, there is no reason why randomization should not be in the agency's suite of decision-making tools.[84] Two types of cases make coin flipping most attractive. In some cases, coin flipping can supply an entirely neutral and impartial tiebreaker between options where there is no other ground for choice, as when a tied election is decided randomly. In other cases, randomization reduces decision costs, including in such costs both the opportunity costs of delay and the positive collateral harms—to the litigants or to third parties—of the very procedures needed to resolve the uncertainty. In other words, randomization is perfectly sensible when it is itself genuinely uncertain whether more procedure and more information gathering would make

[82] *See* DAVID EASLEY & JON KLEINBERG, NETWORKS, CROWDS AND MARKETS: REASONING ABOUT A HIGHLY CONNECTED WORLD (2010).

[83] John Maynard Keynes, *The General Theory of Employment*, 51 THE QUARTERLY JOURNAL OF ECONOMICS 2 (1937), p. 214.

[84] Keynes does not mention coin flipping as a self-conscious strategy for making decisions under uncertainty, although it is fair to say that his references to animal spirits implicitly embody some notion that there is an irreducible element of chance to choice under uncertainty.

things better or worse. As to child custody decisions, it has been argued, very plausibly, that the accuracy benefit of allocating custody to the better parent may often be far less than the damage that a protracted legal dispute itself inflicts on the child. If so, flipping a coin to allocate custody, right at the outset, might be the best feasible decision-making procedure.[85]

Both of these cases have plausible applications to agency decision making. For an example of the first case, suppose the agency has to decide whether the extant number of fat-horned lizards is high or low, yet there is no available method for assessing that number that possesses any more validity than consulting an astrological chart. Why not flip a coin? The agency will have to guess anyway, and coin flipping at least has the virtue of impartiality; the agency's guess will at least be genuinely random, not influenced by subconscious favoritism or ideological bias.[86]

For an example of the second case, suppose the agency must decide whether to install a certain precautionary measure against terrorism at a nuclear plant, and suppose further that it is uncertain—in the strong sense—whether further investigation of the issue will reduce the risk or instead increase it by alerting potential terrorists to the vulnerability of the target. For the same reasons as in the child custody case, it seems perfectly sensible for the agency to flip a coin now to decide whether to proceed with the measure under consideration rather than travel farther down the path of a process that may, for all anyone knows, turn out to be disastrously counterproductive.

The suggestion is definitely not that coin flipping is always a valid means of decision making, even under uncertainty. In *Judulang v. Holder* (2012), the opinion written by Justice Kagan and quoted in the epigraph, the problem seems to have been that the criteria on which the *Board of Immigration Appeals* proposed to make decisions were not "tied, even if loosely, to the purposes of the immigration laws".[87] That is not a valid description of the sort of cases I have addressed, in which an agency, focused entirely on the purposes of the laws it administers, nonetheless

[85] *See* JON ELSTER, SOLOMONIC JUDGMENTS: STUDIES IN THE LIMITATIONS OF RATIONALITY (1989); and Robert Mnookin, *Child-Custody Adjudication: Judicial Functions in the Face of Indeterminacy*, 39 LAW AND CONTEMPORARY PROBLEMS 3 (1975).

[86] *See FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 549 (2009), Justice Breyer, dissenting: "An (imaginary) administrator explaining why he chose a policy that requires driving on the right-side, rather than the left-side, of the road might say, 'Well, one side seemed as good as the other, so I flipped a coin.'" Breyer, however, denies that a coin flip would suffice as a rationale for changing the original policy.

[87] Cf. *Judulang v. Holder*, 132 S. Ct. 476, 485 (2012).

reaches an uncertainty frontier at which first-order reasons for making choices in light of those purposes simply run out, yet choices must somehow be made. In such cases randomization ought to be one perfectly acceptable mode of proceeding, among the other modes I canvassed earlier. It is unclear whether *Judulang v. Holder* (2012) means to condemn all agency coin flipping, but there is a narrower reading of the opinion that leaves open the argument I have offered.

3. Uncertainty, pretext, and inconsistency

A valid concern for law, and a concern that some judges probably hold, is that agencies will invoke uncertainty pretextually or inconsistently, using it to justify choices made covertly on illegitimate grounds—political favoritism, ideological bias, simple shirking, or the like. Perhaps agencies will claim that the situation is one of uncertainty when it is really one of risk; perhaps agencies are too lazy to calculate the relevant risks or fear that doing so would produce uncongenial results and make them too obvious to reviewing courts, and likewise for particular assumptions under uncertainty. Perhaps an agency will adopt optimistic assumptions if the population of an endangered species is uncertain just because the agency has an ideological distaste for the endangered species laws; perhaps agencies will be inconsistent across cases, adopting either optimistic or pessimistic assumptions as necessary to promote their political objectives.

Although these concerns are valid, they are not particularly tied to agencies' claims of uncertainty. Pretext and inconsistency are general problems with agencies' decision making, whether under uncertainty, risk, or, for that matter, certainty. If an agency claims that a given decision is justified by an ordinary risk analysis, such that the relevant project has asserted probabilities of asserted payoffs, the agency may actually be motivated by political favoritism or ideological bias. Perhaps the agency is even describing the situation as one of risk when it is actually one of uncertainty, to give a false patina of scientific determinacy to its decision. The problem of the science charade is orthogonal to the distinction between risk and uncertainty.[88]

So the concern about pretext sweeps very broadly, well beyond the domain of uncertainty and well beyond any of the methods for decision

[88] *See* Wendy Wagner, *The Science Charade in Toxic Risk Regulation*, 95 COLUMBIA LAW REVIEW 7 (1995).

making under uncertainty that were mentioned earlier. Suppose the agency claims to have flipped a coin and reached result X, where X is ideologically congenial to the agency but Y would not be. The court may be worried that the agency is lying and that it never really randomized at all. (If so, the court might demand that the coin flip happen in the court's presence.) But the agency could be lying in lots of other cases as well, having nothing to do with randomization or uncertainty; it could be lying about its motives for making up a new policy or for granting a waiver from an old rule. The usual methods for exposing an agency's real motives involve techniques like mandating that the agency make decisions on a formal record, mandating that the agency respond specifically to comments even if there is no formal record, allowing cross-questioning of an agency's experts, and checking the fit between the agency's findings and its conclusions. These methods may be applied as well, or as poorly, to agency decisions in situations of uncertainty as to other types of decisions.

So too with inconsistency. It is a stock problem in administrative law whether and to what extent agencies have an obligation of consistency, across cases or rules, in the reasons they give and the legal interpretations they offer.[89] There is nothing unique to uncertainty in such cases. If and to the extent that agencies have an obligation of consistency across cases and decisions, then that obligation should extend to the choice of assumptions for uncertainty, but the issue is a far broader one.

4. From normative to positive

Nothing I have said was intended to offer any positive claims about how agencies and courts will in fact behave or on what grounds they will actually make decisions. How do agencies and courts decide when uncertainty is so severe that first-order reasons run out? In some cases, agency decision makers may consciously pick between options rather than attempt to choose between them in a fully rational fashion.[90] Randomizing mechanisms might be, but never are, used for picking, probably because courts—for reasons I will mention shortly—are implacably hostile to randomization. In other cases, agency decision makers may erroneously believe they have good and sufficient first-order

[89] *See* Yehonatan Givati & Matthew Stephenson, *Judicial Deference to Inconsistent Agency Statutory Interpretations*, 40 JOURNAL OF LEGAL STUDIES 1 (2011).

[90] *See* Edna Ullmann-Margalit & Sidney Morgenbesser, *Picking and Choosing*, 44 SOCIAL RESEARCH 4 (1977).

reasons for their choices when, in fact, uncertainty implies that those reasons are not conclusive or could be countered by equally good arguments running in another direction. Where that occurs, from the standpoint of the analyst, agencies will in effect decide as though they are randomizing over the uncertain options, even if, subjectively, agency decision makers believe themselves to be making decisions that are fully rational in a first-order sense. The intuitions, prejudices, and animal spirits of an agency's decision makers will in effect dictate how optimistic or pessimistic their assumptions may be, how quickly the agency will cut off the search for further information, and so on. I do not believe that there is anything objectionable about such a situation; although it might be better *sub specie aeternitatis* for agency officials to know that they are in effect randomizing over uncertain choices, the regulatory system can limp on without full self-knowledge on their part.

What the regulatory system does need, however, is a recognition by courts of the limits of first-order reason.[91] It is damaging when courts overturn agency decisions for lack of first-order reasons when such reasons cannot be supplied and where the opposite decision by the agency could have been overturned on the very same grounds. The judicial decision is then a sort of deadweight loss that cannot even in principle improve the decision but can only force the agency to cough up an epistemically unjustified rationale for what is essentially an arbitrary decision, and rationally so.

Many have noted that courts are hostile to randomization and more broadly tend to demand first-order reasons even when such reasons cannot be supplied.[92] The culture of law, which celebrates reason giving; a related and entirely misguided assumption that the rule of law requires first-order reasons for every choice; the need to justify decisions in the language of reason to officials in other branches and to the general public; and the aversion to uncertainty and ambiguity that judges share with other humans—all these conspire to produce judicial hyperrationalism. Yet I believe that there are seeds, within administrative law itself, of a more capacious and enlightened view, under which the rule of law will rest satisfied with second-order reasons, at least where first-order reasons run out. I have shown that the Supreme Court has several times admonished lower courts for imposing excessive constraints on agency decision making under uncertainty, recognizing that agency action at the

[91] For an exploration of the same theme in constitutional settings, *see* ADRIAN VERMEULE, LAW AND THE LIMITS OF REASON (2009).

[92] *See* NEIL DUXBURY, RANDOM JUSTICE: ON LOTTERIES AND LEGAL DECISION-MAKING (2002).

frontiers of knowledge is not to be reviewed as stringently as agency action comfortably within the frontiers.[93] Structurally, the court and its justices are as much lawmakers as they are reviewers of decisions made by others, and this may instill in them a somewhat more sympathetic understanding of the dilemmas that face decision makers under conditions of uncertainty. It is not inconceivable that the court would someday acknowledge the existence of a category of decisions that are rationally arbitrary—and thus not arbitrary at all, in the law's sense, anyway.

VII. CONCLUSION: AGENCIES AT THE UNCERTAINTY FRONTIER

In the 1960s and 1970s, federal agencies faced a policy landscape in which there were lots of easy decisions to be made; rivers were so polluted that they were catching on free.[94] The landscape no longer looks like that, in either the literal or figurative sense. Many (not all) of the easy problems have been addressed, and some increasing fraction of what agencies do lies at or beyond the scientific frontier, where all problems are hard. The arc of the administrative state bends toward uncertainty.

Given this, courts would do well to relax their requirements of first-order reason giving. As agencies approach the uncertainty frontier, there will be more and more cases in which relentless judicial demands for first-order reasons are pathological and damaging, forcing agency decision makers to make up reasons that they may or may not actually believe and that will chronically fail to actually justify their decisions—leaving open the possibility of costly judicial remands for further rounds of reason giving and so on, *ad infinite*. In the current circumstances of the administrative state, then, it is imperative that law should recognize a category of rationally arbitrary agency decisions.

[93] *See Baltimore Gas & Electric Co. v. Natural Resources Defense Council, Inc.*, 462 U.S. 87 (1983); and *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332 (1989).

[94] *See* David Stradling & Richard Stradling, *Perceptions of the Burning River: Deindustrialization and Cleveland's Cuyahoga River*, 13 ENVIRONMENTAL HISTORY 3 (2008).

VIII. REFERENCES

Abraham Wald, *Statistical Decision Functions Which Minimize the Maximum Risk*, 46 ANNALS OF MATHEMATICS 2 (1945).

ADRIAN VERMEULE, LAW AND THE LIMITS OF REASON (2009).

_____. *The Parliament of the Experts*, 58 DUKE LAW JOURNAL 8 (2009).

AVINASH DIXIT & ROBERT PINDYCK, INVESTMENT UNDER UNCERTAINTY (1994).

Bruce Kraus & Connor Raso, *Rational Boundaries for SEC Cost-Benefit Analysis*, 30 YALE JOURNAL ON REGULATION 2 (2013).

Carla Mattix & Kathleen Becker, *Scientific Uncertainty under the National Environmental Policy Act*, 54 ADMINISTRATIVE LAW REVIEW 3 (2002).

Cass Sunstein, *The Arithmetic of Arsenic*, 90 GEORGETOWN LAW JOURNAL 7 (2002).

_____. RISK AND REASON: SAFETY, LAW, AND THE ENVIRONMENT (2002).

_____. Chevron *Step Zero*, 92 VIRGINIA LAW REVIEW 2 (2006).

_____. WORST-CASE SCENARIOS (2007).

Cass Sunstein & Edna Ullmann-Margalit, *Second-Order Decisions*, 110 ETHICS 1 (1999).

Daniel Farber, *Uncertainty*, 99 GEORGETOWN LAW JOURNAL 4 (2011).

DAVID EASLEY & JON KLEINBERG, NETWORKS, CROWDS AND MARKETS: REASONING ABOUT A HIGHLY CONNECTED WORLD (2010).

David Kelsey, *Choice under Partial Uncertainty*, 34 INTERNATIONAL ECONOMIC REVIEW 2 (1993).

David Kelsey & John Quiggin, *Theories of Choice under Ignorance and Uncertainty*, 6 JOURNAL OF ECONOMIC SURVEYS 2 (1992).

David Stradling & Richard Stradling, *Perceptions of the Burning River: Deindustrialization and Cleveland's Cuyahoga River*, 13 ENVIRONMENTAL HISTORY 3 (2008).

Dimitris Bertsimas & Melvyn Sim, *The Price of Robustness*, 52 OPERATIONS RESEARCH 1 (2004).

Drew Fudenberg & Eric Maskin, *The Folk Theorem in Repeated Games with Discounting or with Incomplete Information*, 54 ECONOMETRICA 3 (1986).

Edna Ullmann-Margalit & Sidney Morgenbesser, *Picking and Choosing*, 44 SOCIAL RESEARCH 4 (1977).

FRANK KNIGHT, RISK, UNCERTAINTY AND PROFIT. (1921).

Gary Yohe & Richard Tol, *Precaution and a Dismal Theorem: Implications for Climate Policy and Climate Research*, WORKING PAPER FNU, No. 145 (2007).

George Stigler, *The Economics of Information*, 69 JOURNAL OF POLITICAL ECONOMY 3 (1961).

GUIDO CALABRESI & PHILIP BOBBITT, TRAGIC CHOICES (1978).

HANS MELBERG, A CRITICAL DISCUSSION OF JON ELSTER'S ARGUMENTS ABOUT RATIONAL CHOICE, INFINITE REGRESS AND THE COLLECTION OF INFORMATION, (UNPUBLISHED THESIS, 1999).

Itzhak Gilboa & David Schmeidler, *Maxmin Expected Utility with a Non-Unique Prior*, 18 JOURNAL OF MATHEMATICAL ECONOMICS 2 (1989).

JON ELSTER, SOLOMONIC JUDGMENTS: STUDIES IN THE LIMITATIONS OF RATIONALITY (1989).

_____, *Excessive Ambitions*, 4 CAPITALISM AND SOCIETY 2 (2009).

Jonathan Baert Wiener, *Managing the Iatrogenic Risks of Risk Management*, 9 RISK: HEALTH, SAFETY AND ENVIRONMENT 1 (1998).

John Maynard Keynes, *The General Theory of Employment*, 51 THE QUARTERLY JOURNAL OF ECONOMICS 2 (1937).

JOHN MAYNARD KEYNES. THE GENERAL THEORY OF EMPLOYMENT, INTEREST AND MONEY (1936).

JOSEPH HALPERN, REASONING ABOUT UNCERTAINTY (2005).

Kenneth Arrow & Leonid Hurwicz, *An Optimality Criterion for Decision-Making under Ignorance*, *in*. UNCERTAINTY AND EXPECTATIONS IN ECONOMICS: ESSAYS IN HONOUR OF G.L.S. SHACKLE (C.F. Carter & J.L. Ford, eds., 1972).

Kristina Alexander, *Warranted but Precluded: What That Means under the Endangered Species Act (ESA)*, CONGRESSIONAL RESEARCH SERVICE, CRS Report 7-5700 (2010).

LEIF JOHANSEN, LECTURES ON MACROECONOMIC PLANNING. PART 1: GENERAL ASPECTS. (1977).

Martin Weitzman, *On Modeling and Interpreting the Economics of Catastrophic Climate Change*, 91 REVIEW OF ECONOMICS AND STATISTICS 1 (2009).

Nabil I Al-Najjar, *A Bayesian Framework for the Precautionary Principle*, 44 JOURNAL OF LEGAL STUDIES S-2 (2015).

NEIL DUXBURY, RANDOM JUSTICE: ON LOTTERIES AND LEGAL DECISION-MAKING (2002).

Richard McKenzie, *On the Methodological Boundaries of Economic Analysis*, 12 JOURNAL OF ECONOMIC ISSUES 3 (1978).

Richard Woodward & Richard Bishop, *How to Decide When Experts Disagree: Uncertainty-Based Choice Rules in Environmental Policy*, 73 LAND ECONOMICS 4 (1997).

Robert Mnookin, *Child-Custody Adjudication: Judicial Functions in the Face of Indeterminacy*, 39 LAW AND CONTEMPORARY PROBLEMS 3 (1975).

Sidney Winter, Jr., *Economic "Natural Selection" and the Theory of the Firm*, 4 YALE ECONOMIC ESSAYS 1 (1964).

Wendy Wagner, *The Science Charade in Toxic Risk Regulation*, 95 COLUMBIA LAW REVIEW 7 (1995).

Yehonatan Givati & Matthew Stephenson, *Judicial Deference to Inconsistent Agency Statutory Interpretations*, 40 JOURNAL OF LEGAL STUDIES 1 (2011).

Yoon-Ho Alex Lee, *An Options Approach to Agency Rulemaking*, 65 ADMINISTRATIVE LAW REVIEW 4 (2013).

Zachary Gubler, *Experimental Rules*, 55 BOSTON COLLEGE LAW REVIEW 1 (2014).

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