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Book Review

Leo Katz, *Why the Law is So Perverse*. Chicago: University of Chicago Press, 2011, pp. 239, \$35 (cloth).

Reviewed by Peter H. Huang

Introduction

There is much to like about Professor Leo Katz's third and latest thought-provoking book. It is breezily written, delightful and ingenious. His two previous engaging books analyzed philosophical conundrums and puzzles in criminal law.¹ This book is an imaginative tour of legal paradoxes that are related to the field of social choice, which studies the aggregation of preferences. In a non-technical and accessible way, Katz discusses many complex and subtle ideas, using the language of legal cases, doctrines and theories. As he notes on page 6, some legal scholars have applied social choice theory to analyze diverse and fundamental legal issues.² Two recent examples are how social choice illuminates the reasonable person standard in torts and other areas of law³ and the notion of community standards underlying the doctrine of good faith performance in contract law.⁴

Leo Katz is a brilliant and creative legal scholar and I am delighted and honored to review this book. He and I were colleagues from 1997 to 2004.⁵ In December, 1998, over dinner at Fuji Mountain restaurant in Philadelphia, we started a multi-year series of conversations about the interpretations and legal

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1. Leo Katz, *Bad Acts and Guilty Minds: Conundrums of the Criminal Law* (Univ. Chicago Press 1987); Leo Katz, *Ill-Gotten Gains: Evasion, Blackmail, Fraud, and Kindred Puzzles of the Law* (Univ. Chicago Press 1998).
2. D. Daniel Sokol, *Explaining the Importance of Public Choice for Law*, 109 Mich. L. Rev. 1029 (2011) (reviewing Maxwell L. Stearns & Todd J. Zywicki, *Public Choice Concepts and Applications in Law* (West 2009)).
3. Alan D. Miller & Ronen Perry, *The Reasonable Person*, 87 N.Y.U. L. Rev. 323, 370-91 (2012).
4. Alan D. Miller & Ronen Perry, *Good Faith Performance*, 98 Iowa L. Rev. 689, 727-44 (2013).
5. Peter H. Huang, *Tiger Cub Strikes Back: Memoirs of an Ex-Child Prodigy About Legal Education and Parenting*, 1 Brit. J. Am. Legal Stud. 297 (2012).

implications of the impossibility theorems of 1972 economics Nobel Laureate⁶ Ken Arrow, mathematical economist⁷ Graciela Chichilnisky, philosopher Allan Gibbard,⁸ economist Mark Satterthwaite,⁹ and 1998 economics Nobel Laureate¹⁰ Amartya Sen.

Katz's book explicates four fundamental legal paradoxes as the logical consequence of the perspective that legal doctrines entail multi-criteria decision-making. This means that each of these foundational doctrines is logically related to a voting paradox and its corresponding literature in social choice. Katz aptly describes the four legal puzzles he analyzes by choosing as titles to the four parts of his book these four questions: Why does law prohibit certain win-win transactions? Why are there so many loopholes in the law? Why does so much of law have a dichotomous nature? Why does the law not criminalize all that society morally condemns?

Katz makes clear the foundational nature of these four questions by making four observations about how law professors typically teach law students. First, many of those who teach first-year law classes ask their students the first question above when legal doctrine forbids an outcome that the parties themselves would have chosen. Examples of such bans discussed in the book include limits on assumption of risk and prohibitions against indentured servitude, organ sales, prostitution, surrogacy contracts and unorthodox property rights. Second, many upper-level statutory law classes focus on how lawyers restructure a client's legal affairs to achieve his or her goals by exploiting loopholes in the law. Such legal gamesmanship is commonplace for business lawyers engaged in transactional practice and tax planning for institutional and wealthy clients.¹¹ Third, many law professors often pose questions in first-year classes about hypothetical boundary cases that are hard to place under the scope of a particular legal doctrine. Fourth, many law issues revolve around the relationship between legal doctrine and morality, there being many acts that are not punishable under criminal law despite society finding those acts to be morally reprehensible.

6. The Prize in Economics 1972, The Official Web Site of the Nobel Prize, *available at* http://www.nobelprize.org/nobel_prizes/economics/laureates/1972/press.html (Sir John Hicks also received the 1972 economics Nobel). My applied mathematics Ph.D. principal thesis advisor was Ken Arrow.
7. Graciela Chichilnisky, *available at* <http://chichilnisky.com/>. I took during the first year of graduate school a course titled A Mathematical Approach to General Equilibrium that Graciela Chichilnisky taught.
8. Allan Gibbard, *available at* <http://www-personal.umich.edu/~gibbard/>.
9. Mark A. Satterthwaite, Kellogg School of Management Academics and Faculty, *available at* <http://www.kellogg.northwestern.edu/faculty/bio/satterthwaite.htm>.
10. The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 1998, The Official Web Site of the Nobel Prize, *available at* http://www.nobelprize.org/nobel_prizes/economics/laureates/1998/.
11. *See generally* Victor Fleischer, Regulatory Arbitrage, 89 Tex. L. Rev. 227 (2010); Jordan M. Barry, On Regulatory Arbitrage, 89 Tex. L. Rev. See Also 69 (2010).

I. Eating Peas for Money and Then for Love

Katz concludes his book by recounting an incident from the youth of Rick Beyer, who is a well-known author, award-winning documentary producer and professional speaker. As a child, Rick despised peas. Knowing this, his mother did not insist that he eat them. One day his mother and grandmother took him shopping and to lunch at the Biltmore Hotel, which eight-year old Rick thought was “just about the fanciest place to eat in all of Providence.”¹² Rick ordered an entrée that came with peas on the side. His grandmother told Rick to eat his peas. Rick’s mother explained that Rick did not like peas and asked his grandmother to leave Rick alone. Instead, the grandmother offered Rick five dollars to eat the peas. Five dollars was an unheard of sum to Rick and he forced himself to eat all the peas. Rick’s mother was furious at his grandmother for being smug and at Rick for being easily bought. A few weeks later, Rick’s mother got her revenge. She made peas and told Rick: “You ate them for money. You can eat them for love.” With no effective counterargument, Rick felt compelled to eat peas that day and thereafter when his mother cooked them, even though he still hated them.

This tale illustrates a logical paradox related to all four of the legal perversities that are a focus of the book. Rick’s mother argues that Rick cannot refuse to eat peas for love since he already had eaten peas for money. The logical structure of this argument is the same as many arguments Katz makes in the first part of his book to explain the limits that laws impose on consent. The common structure is one where rankings over two alternatives change upon introduction of a third alternative. Decision theorists and game theorists refer to such preferences as menu dependent: the ranking of alternatives depends on the alternatives available. Such menu dependence often results from the introduction of what are viewed as (seemingly) irrelevant alternatives.

Menu dependence is an example of a context effect, which has been defined as “the phenomenon in which the setting of the question changes the nature of the answer.”¹³ As behavioral economics emphasizes,¹⁴ individual preferences are not exogenously fixed and stable objects that can be inferred by observing people’s choice behavior or elicited by having people answer hypothetical survey questions. Instead, individual preferences are constructed endogenously by acts of choice and elicitation. Preferences are also formed over time and with repeated experience. The most famous context effects are the framing effects and preference reversals that Tversky and Kahneman documented in their no longer politically correct “Asian disease” experiments.¹⁵

12. Rick Beyer, Rick Beyer: Biography, available at <http://rickbeyer.net/index.php?page=bi&display=36>.

13. Kevin Karty, Context Effects: When Setting Changes Everything, available at <http://www.affinnova.com/blog/bid/89285/Context-Effects-When-Setting-Changes-Everything>.

14. See generally Claire A. Hill, The Rationality of Preference Construction (and the Irrationality of Rational Choice), 9 Minn. J.L. Sci. & Tech. 689 (2008).

15. Amos Tversky & Daniel Kahneman, The Framing of Decisions and the Psychology of Choice, 211 Science 453, 453 (1981).

Economist Amartya Sen provides this example of menu dependence:¹⁶ a host offers his guest the choice of a medium-sized slice of cake or a small slice of cake. The guest loves cake but chooses the small slice because she thinks it would be unseemly to choose the bigger slice. The host then remembers that he also has a large slice and offers that option as well. The guest now believes it is socially acceptable to choose the medium-sized slice over the small slice because there is a large slice that she can have but does not choose. Sen points out that the guest's selection depends on the menu of choices offered. For each menu, she has a well-defined ordering: she wants the biggest slice available subject to the social norm of not choosing the largest slice offered.

It is helpful to explicitly analyze the menu dependence and preference reversal that is implicit in the peas incident. Let A = Rick does not eat peas, B = Rick gets five dollars, C = Rick demonstrates his love for his mother. Under Rick's original preference ordering, his love for his mother was not enough to get him to eat peas. In symbols, $A > C$, which is read as Rick preferred A to C. Rick's grandmother's introduction of alternative B resulted in Rick getting five dollars to eat peas. In symbols, this is written as $B > A$, and read as Rick preferred B to A. Because Rick demonstrating his love for his mother is worth more to Rick than getting five dollars, this means that in symbols, $C > B$, which is read as Rick preferred C to B. Because $C > B$ and $B > A$, then it follows by transitivity that $C > A$, meaning that Rick eats peas to demonstrate his love for his mother. Thus, the introduction by Rick's grandmother of the (seemingly) irrelevant alternative B resulted in a reversal of Rick's preferences between the two alternatives of A: Rick does not eat peas and C: Rick demonstrates his love for his mother.

Katz proposes in the second part of his book that exploiters of loopholes introduce a seemingly irrelevant alternative precisely to cause a preference reversal between a pair of relevant alternatives. He draws the analogy between exploitation of loopholes and manipulation of voting rules, arguing that loopholes are the logically unavoidable consequence of law involving multiple criteria decision-making. In other words, because the law strives to balance partly conflicting objectives, society cannot eliminate the presence of loopholes. As he observes on page 211, it follows from the seminal result of social choice—Arrow's impossibility theorem¹⁷—that society cannot eradicate agenda manipulation in otherwise desirable voting procedures.

Here is a quick introduction to Arrow's theorem. A website about innovative applications of mathematics also presents an insightful synopsis of Arrow's theorem.¹⁸ The appendix of this review contains a more in-depth discussion of the theorem and other social choice scholarship. A little bit of notation will make it easier to describe Arrow's theorem. Suppose there

16. Amartya Sen, *Internal Consistency of Choice*, 61 *Econometrica* 495, 501 (1993).

17. Kenneth J. Arrow, *A Difficulty in the Concept of Social Welfare*, 58 *J. Pol. Econ.* 328 (1950).

18. *Arrow's Impossibility Theorem*, available at http://www.whynomath.org/node/voting/Arrow's_Impossibility_Theorem.html.

are $N > 2$ voters with preference rankings over a finite set F of candidates. A voting procedure can be thought of as a computer program or algorithm that accepts as inputs the profile of N individual rankings over F and produces as its output a social ranking over F . One can imagine many possible voting procedures. For example, dictatorship by voter i is the voting procedure where the social ranking over F coincides with voter i 's individual ranking over F , regardless of all other voters' rankings over F . Arrow's theorem demonstrates that any voting procedure that satisfies a particular set of minimally desirable conditions must be a dictatorship by some voter.

Philosopher Alfred F. MacKay introduced an ingenious and intuitive analogy between social choice and the scoring of multi-event sports competitions:¹⁹ voters correspond to athletic events, alternatives correspond to athletes, individual rankings over alternatives by voters correspond to individual performances by athletes in events, voting procedures correspond to scoring procedures and the social rankings over alternatives correspond to overall rankings of athletes. Arrow's theorem states that any scoring system that satisfies a particular set of desirable conditions must rank athletes in the order they finish in just one specific event regardless of how the athletes finish in all other events.

To appreciate the multiple criteria decision-making version of social choice, view the individual athletic events as different multiple criteria. Katz's book in essence develops the implications of realizing that laws exemplify multiple criteria decision-making. Sometimes, laws are explicit about requiring the consideration of multiple criteria. For example, the Securities Act of 1933 requires that the Securities and Exchange Commission not only protect investors, but also "promote efficiency, competition and capital formation."²⁰ At other times, laws are only implicit about requiring consideration of multiple criteria. Examples of the multiple criteria that laws may require considering include accountability, deterrence, efficiency, equity, fairness, happiness, incentives, insurance, justice, objective well-being, precedent, predictability, punishment, retribution, reversibility, risk-allocation, sustainability, transparency and uncertainty. Some laws and public policies involve often delicate balancing of multiple criteria. Other laws involve the consideration of several elements or multiple factors.

Katz draws connections in the third part of his book between the usually binary nature of law and Chichilnisky's impossibility theorems proving the prevalence of discontinuities in preference aggregation.²¹ Katz connects discontinuities in social choice with menu dependence by observing that drawing a sharp line between two polar endpoints of a continuum is only

19. Alfred F. MacKay, *Arrow's Theorem: The Paradox of Social Choice: A Case Study in the Philosophy of Economics* 14-20 (Yale Univ. Press 1980).

20. 15 U.S.C. § 77b (b).

21. Graciela Chichilnisky, *Social Choice and the Topology of Spaces of Preferences*, 37 *Advances in Mathematics* 165, 170, 174 (1980).

necessary when considering how to rank some third intermediate alternative relative to each of the pair of endpoint alternatives (211). When society draws that somewhat arbitrary sharp line a discontinuity in the social ranking will result.

In the fourth part of his book (206-08), Katz relates how menu dependence can explain under-criminalization. It should not be surprising that how society and criminal codes rank a pair of alternative blameworthy acts can depend on whether and which other blameworthy acts are also being ranked. He analyzes non-felonious villainies which entail acts of misconduct that do not appear to be so immoral when viewed in light of the whole spectrum of all possible wrongdoing and yet will seem quite immoral when compared to a particularly innocuous offense.

II. Normative and Interpretive Concerns

One characteristic feature of the book is Katz's introduction of many examples from numerous areas of law and life. For example, he details how scoring anomalies occur in the apparently unexpected and seemingly unrelated context of international women's ice figure-skating competitions (96-102).²² He also explains how the determination of student exam grades based on at least two distinct criteria, such as content and presentation, can depend on so-called irrelevant alternatives (118-21). No review of the book can do justice to each and every one of the author's wide-ranging examples of legal perversities and related extra-legal perversities. Rather this review merely notes another example of multi-criteria ranking familiar to law professors, the *U.S. News & World Report* ranking of law schools—the annual spring ritual that has become contested,²³ deleterious,²⁴ infamous²⁵ and usually misunderstood.²⁶

Two more substantive concerns are about how Katz makes use of renowned social choice impossibility theorems. The first is a normative concern and the second is an interpretive concern. Both are about what lawyers and the legal system can and should make of several foundational voting paradoxes. The central thesis of the book is that many seemingly puzzling and unrelated aspects of law have parallels to voting anomalies. On this point, Katz is undoubtedly correct. His book amply demonstrates that all the legal perversities that he

22. Brian Cazeneuve, Sneaking Away with Gold: How Hughes Impossibly Vaulted Ahead of Kwan, Slutskaya, *Sports Illustrated* (Feb. 22, 2002), available at http://sportsillustrated.cnn.com/olympics/2002/figure_skating/news/2002/02/21/cazeneuve_explainer/.

23. Brian Leiter, Brian Leiter's Law School Rankings, available at <http://www.leiterrankings.com/>.

24. Wendy Espeland & Michael Sauder, Rankings and Diversity, 18 *Rev. L. & Soc. Just.* 587 (2009).

25. Brian Z. Tamanaha, Law Schools Fudge Numbers, Disregard Ethics to Increase Their Ranking, *The Daily Beast*, available at <http://www.thedailybeast.com/articles/2012/06/17/law-schools-fudge-numbers-disregard-ethics-to-increase-their-ranking.html>.

26. Theodore P. Seto, Understanding the U.S. News Law School Rankings, 60 *SMU L. Rev.* 493 (2007).

considers are logically related to at least one and often several well-known results in social choice theory.

My reading of the book raises three questions. First, does Katz draw the appropriate normative conclusions about legal perversities based on their connections to social choice theory? In other words, what are the legal ethics and professionalism implications of his book? Second, how does each of the legal perversities in the book follow from a particular social choice theory result? In other words, what is the precise theoretical connection between each of the legal perversities discussed and the impossibility theorem in social choice theory? Third, can we reinterpret our understanding of the seemingly dismal and negative impossibility theorems from social choice in a constructive and positive way to suggest how society can make the best of legal perversities? In other words, what are benign interpretations and positive versions of the social choice impossibility theorems and their implications for how society can deal with what Katz calls legal perversities?

On the first question, the author draws the normative conclusion that because loopholes are logically unavoidable features of multi-criteria legal doctrines, their use cannot be “convincingly criticized” and “[t]o take lawyers to task for availing themselves of this fact of logic is like calling a chess player unethical for making a strategic sacrifice” (211).

As for the second question, Katz mentions on page x in the Acknowledgements section of his book that economic theorist Andrew Postlewaite²⁷ vigorously pressed him “on the exact connection between Arrow’s theorem and loopholes” (x). This is because Katz does not precisely do so in his book. What he does (108-09) is to offer a cogent explanation of Arrow’s impossibility theorem in the multi-criteria decision-making context. He also provides details about how menu dependence is the root cause of these four specific examples of loopholes: contrived defenses, obtaining political asylum by subterfuge, asset protection and tax shelters (109-18). Nonetheless, the book may be exasperating to readers trained in social choice from an economics or mathematics perspective. Almost all economics graduate students learn about Arrow’s theorem in the spring semester of the required first-year core microeconomics course.²⁸ Many second-year economics graduate students learn more about social choice in an optional course that is part of any subfield of economics related to advanced microeconomics or mathematical economics. Those with training in (mathematical) economics are likely to find the book frustrating because it does not follow the format and set-up of notation, definition, axiom, theorem and proof—the accepted style of presentation in modern economic and social choice theory.²⁹

27. Andrew Postlewaite Homepage, available at <http://www.ssc.upenn.edu/~apostlew/>.

28. See, e.g., David M. Kreps, *Microeconomic Foundations I: Choice and Competitive Markets* 166-72 (Princeton Univ. Press 2012).

29. Birendra K. Rai, Chiu Ki So, & Aaron Nicholas, A Primer on Mathematical Modelling in Economics, 26 *J. Econ. Surv.* 594, 608-10, 614-15 (2012).

On the third question, Donald Saari,³⁰ a major contributor to social choice theory and a prolific mathematical social scientist, offers novel insights about what causes negative conclusions about voting rules by explaining how these impossibility propositions result from an axiom essentially requiring voting procedures to ignore explicitly stated and useful information about individual preferences.³¹ This informational perspective allows Saari to provide benign interpretations and positive versions of these impossibility theorems.³²

The rest of this book review addresses these three questions.

III. Legal Ethics and Professionalism Implications

Katz introduces his discussion of loopholes with a humorous comic strip by the cartoonist and Harvard Law School-educated lawyer Ken Fisher, also known by his pseudonym of Ruben Bolling (71). Bolling's cartoon (72) depicts an episode from the legal practice of Harry Richards, Esq., who is a lawyer for children. Harry's legal specialty is advising and representing kids in playground disputes. In this cartoon, pony-tailed Suzy consults Harry when she finds a long line of kids waiting in front of the ticket window of a movie theater showing *Day of the Chipmunk*. Suzy asks her friend Amanda to let her cut in line. Amanda does not agree to let her cut in ahead of her but is willing to let Suzy cut in behind her. The child behind Amanda objects. Suppose there is a "no backsies" rule, which forbids cutting in line in front of a child unless that child agrees. Suzy thus consults with attorney Richards to ask if Suzy can do anything besides going to the back of the line. Harry suggests that, because "frontsies" is a perfectly legal transaction, Suzy can and should convince Amanda to let her cut in front of Amanda because—immediately upon doing so—Suzy will then let Amanda cut in front of Suzy. In this roundabout manner, Suzy will be able to use two perfectly legal "frontsies" to effectively achieve the one "backsie" to which the child behind Amanda objects. Harry tells Suzy that he is in fact writing a law review article that is titled: "Double Frontsies as a Creative Solution to the 'No Backsies' Rule" for the *Journal of Juvenile Jurisprudence*. Suzy finds Harry's legal advice to be a brilliant strategy to nullify the prohibited rule and believes that Richards is worth his fee. The first frame of the cartoon notes that Harry only accepts cash and specifically does not accept gum, pets or siblings for payment.

The whimsically amusing nature of this example of creative lawyering and exploitation of a loophole (accomplishing a prohibited "backsie" by two legal "frontsies") belies the typically much more serious and ethically disturbing or morally questionable nature of exploiting legal loopholes. The stakes involved

30. Don Saari's Home Page, available at <http://math.uci.edu/~dsaari/>; Interview by Deanna Haunsperger with Donald G. Saari, Saari, with No Apologies, at Mathfest 2003, available at <http://math.uci.edu/~dsaari/cmj-interview.pdf>.

31. See, e.g., Donald G. Saari, Chaotic Elections! A Mathematician Looks at Voting 122-23 (Am. Mathematical Soc. 2001).

32. See generally Donald G. Saari, *Disposing Dictators, Demystifying Voting Paradoxes: Social Choice Analysis* (Cambridge Univ. Press 2008).

are usually much higher than in this comic strip and the consequences more substantial. The idea of achieving the outcome of a transaction that is forbidden or prohibitively costly through an equivalent series of permitted transactions lies behind the practice of what is known as financial engineering and the concept that is known as financial arbitrage. The notion of constructing an equivalent portfolio of securities for the sole purpose of replicating the financial payoff of another security is the key insight behind the derivation of the acclaimed Black-Scholes options valuation formula.³³ It is also the crucial step in the proof of the well-known cornerstone of modern corporate finance known as the Modigliani-Miller theorem about optimal corporate capital structure.³⁴

My niece K when she was a bit younger proposed her own clever and original arbitrage. One Saturday, K, her mother, her two brothers, S and D, and her aunt J went shopping at Target. Aunt J accompanied them to look after S and D, while K's mom took K to buy her something for her personal wardrobe. In the interest of fairness, K's mom decided that S and D would each get a toy. K wanted a particular Barbie doll that was also for sale, so she asked if she could also get that. K's mother, however, said that each child would get just one item. K cleverly asked two questions of Aunt J. First, could Aunt J buy the doll for K and keep it at Aunt J and Uncle Peter's home? Second, could K then please borrow the doll from Aunt J indefinitely? Aunt J said that she (Aunt J) would have to ask K's mom both questions. K's response was that K's mom, who is the younger sister of Aunt J, is not the boss of Aunt J, thus, in effect, raising jurisdictional concerns and procedural issues.

These stories are amusing and do not involve the large financial stakes that are common when financial derivatives are used to engage in regulatory arbitrage,³⁵ or the serious consequences that can occur when attorneys engage in the practice of "loophole lawyering."³⁶ A definition of loophole lawyering is that it "occurs when an attorney is concerned less with applying the whole law than with finding a way to accomplish the goals of the client by exploiting a perceived ambiguity in the language of the rule or statute."³⁷ Loophole lawyering is "generally accepted by commentators when an attorney is interpreting a federal or state statute that dictates the requirements and limitations on a corporation's or individual's commercial activities."³⁸ An

33. Fischer Black & Myron Scholes, *The Pricing of Options and Corporate Liabilities*, 81 J. Pol. Econ. 637 (1973).

34. Richard MacMinn, *Theorems in Corporate Finance*, available at <http://macminn.org/fin374/theorems/theorems.html>. See also Peter H. Huang & Michael S. Knoll, *Corporate Finance, Corporate Law, and Finance Theory*, 74 S. Cal. L. Rev. 175 (2000).

35. See generally Frank Partnoy, *Financial Derivatives and the Costs of Regulatory Arbitrage*, 22 J. Corp. L. 211 (1997).

36. W. Bradley Wendel, *Lawyers and Fidelity to Law* 66-72 (Princeton Univ. Press 2010).

37. David A. Green, *Balancing Ethical Concerns Against Liberal Discovery: The Case of Rule 4.2 and the Problem of Loophole Lawyering*, 8 Geo. J. Legal Ethics 283, 286 (1995).

38. *Id.* at 286-87.

example of the acceptance of loophole lawyering in the case of business or financial planning is that “many people hire attorneys or accountants for the sole purpose of finding ‘loopholes’ in the tax codes; such a practice is not heavily criticized.”³⁹ In light of Arrow’s impossibility theorem implying that legislative intent and statutory intent are problematic notions,⁴⁰ it is ironic that “the apparent rationale for accepting loophole lawyering is that the legislature intended to leave open certain possibilities. The assumption is that if legislators did not intend to leave open these certain possibilities, they can easily amend laws to prohibit these actions.”⁴¹ To counter the negative popular culture portrayals and tainted public images of lawyers,⁴² “there must be a concerted effort to eliminate the opportunities for loophole lawyering.”⁴³ The practice of loophole lawyering contrasts with the interpretive attitude of professionalism, under which “a lawyer has an obligation to apply the law to her client’s situation with due regard to the *meaning* of legal norms, not merely their formal expression.”⁴⁴

Interestingly, Katz does not define the word loophole anywhere in his book. He states:

[W]hat constitutes a loophole is not among the questions I seek to answer. That is because when I speak of loopholes I mean pretty much what everybody else means—seeming glitches in the formulation of a law (it could be either statutory or case law) that allow clever lawyers to help their clients do things that appear to subvert its purpose. But although we don’t need a precise definition of loopholes before we can try to explain them, we do need some good examples, both to clarify what we are talking about and to serve as test cases against which to evaluate different explanations of the loophole phenomenon (73).

He offers these six examples of loopholes: asset protection, contrived defenses, forum shopping, litigation-proofing, obtaining political asylum by subterfuge and tax shelters (73-77).

Katz sets himself the task of addressing these three questions about loopholes: “Why are they there? Given how much offense they give, why have they not been eradicated? And finally, what about lawyers who exploit them—are they doing something dishonorable, unethical or illegal?” (77) He answers all three questions based on the realization (107) that there is a connection between legal doctrines and multi-criteria decision-making. And he explains

39. *Id.* at 287, n.18.

40. *But see*, Arthur Lupia & Matthew McCubbins, Lost in Translation: Social Choice Theory is Misapplied Against Legislative Intent, 14 J. Contemp. Legal Issues 576 (2004-2005).

41. *Id.* at 287.

42. *See generally* David Ray Papke et al., Law and Popular Culture: Texts, Notes, and Questions 71-100 (LexisNexis, 2d ed. 2012).

43. *Id.* at 311.

44. W. Bradley Wendel, Professionalism as Interpretation, 99 Nw. U. L. Rev. 1167, 1168 (2005).

(136) how two particular types of voting manipulation, agenda manipulation and strategic voting have as their counterparts loopholes that are legal versions of killer amendments and intentional fouls, respectively.

Katz's normative conclusion that lawyers cannot be blamed for exploiting loopholes because loopholes are the unavoidable consequence of laws balancing and synthesizing multiple criteria does not squarely engage the reasons most people take to task lawyers who exploit loopholes. It is not the presence or even logical necessity of loopholes that people find troubling per se. There are all sorts of reasons that explain why lawyers who exploit loopholes trouble many people. At its core, the exploitation of loopholes appears unseemly because it seems unfair that lawyers use legal technicalities to subvert justice. People are troubled by the exploitation of a particular loophole for a particular gain to a particular client by a particular lawyer. Whether and how much people are troubled by the exploitation of a loophole depends on the nature of the legal matter involved, identity and reputation of the client, identity and reputation of the lawyer, nature and size of the client's gain or loss avoided and nature of the loophole involved. The logical fact that legal loopholes must exist because of the multiple criteria nature of laws does not address their exploitation. Ultimately why people find loophole exploitation troubling is a question that can only be answered empirically and perhaps experimentally.

Three examples from popular cultural portrayals of lawyers and their legal practice illustrate the fact that people do not find every instance of exploitation of a loophole objectionable or ethically questionable. First, there is the decision by Mitch McDeere, the character that Tom Cruise portrays in the movie, *The Firm*,⁴⁵ to find and turn over evidence to the Federal Bureau of Investigation that every lawyer of Bendini, Lambert & Locke, the mob law firm that employed him, was guilty of overbilling. McDeere chose to do this despite knowing that some of the firm's lawyers are laundering money for the mob and involved in the murder of two associates. He saw it as better to cooperate with the FBI over a legal technicality, reach an agreement with the Morolto mobster brothers and not break any laws in doing so. Earlier in the movie, Mitch is advised by a senior mentor partner to "bill everything, even when he is thinking about client matters in the shower."⁴⁶

Second, the pilot episode of the USA Network television series "Suits,"⁴⁷ introduces the show's quirky and unlikely premise. Harvey Specter, a cutthroat, sharp-tongued ace closer and senior partner at Pearson Hardman, one of Manhattan's top white shoe corporate law firms, hires Mike Ross, a brilliant college dropout who has an eidetic memory, encyclopedic legal knowledge and passion for the law and passed the bar exam without attending law school. Because Pearson Hardman only hires Harvard law school graduates, Harvey and Mike both lie about Mike being a Harvard law school graduate. Mike

45. *The Firm* (Paramount Pictures 1993).

46. Papke et al., *supra* note 42, at 91.

47. *Suits* (USA Network, television broadcast, June 23, 2011).

is the central protagonist, naïve hero, and principal character of the series and often exploits loopholes to manipulate the law to help morally deserving individuals.

Third, in 1931, Alphonse “Al” Capone, the Chicago gangster, mobster, racketeer and leader of a Prohibition-era criminal syndicate, was indicted, convicted and sentenced to eleven years in prison on federal charges of income tax evasion and failure to file income tax returns. Capone had successfully been defended in earlier investigations alleging racketeering charges. Elmer L. Irey, the chief of the enforcement branch of the United States Treasury Department’s Bureau of Internal Revenue, assigned a Treasury Department Intelligence Unit agent and a former accountant, Frank J. Wilson, to investigate Capone’s criminal dealings because Irey believed that Capone could be successfully prosecuted under a Supreme Court decision holding that any income from criminal activities is subject to federal income tax.⁴⁸

Many commentators found it disconcerting that Capone’s infamous criminal career came to an end over tax fraud, which seems relatively minor when compared with the many other crimes that Capone allegedly committed, which include bootlegging liquor, bribing government officials, gambling, murder, prostitution and smuggling.⁴⁹ To critics, the United States government used federal tax law as a pretext for punishing a publicly vilified individual for more serious crimes. One can view the use of tax law to be an example of exploiting a loophole because Congress did not enact the Internal Revenue Code to enforce crimes that did not involve tax law.⁵⁰ Much of the public and the media, however, likely believed that any exploitation of tax laws to catch Capone served justice and was perfectly fine. Audiences usually cheer when Capone, portrayed by Academy Award winning actor Robert De Niro, gets his due in the courtroom scene from the blockbuster film, *The Untouchables*.⁵¹

Much of popular culture depicts—and much of the public sees—most lawyers as able and willing to exploit loopholes on behalf of their clients. Non-lawyers are more likely to criticize those lawyers who exploit loopholes to subvert justice or increase the substantial financial positions of their already wealthy individual or institutional clients. One definition of a legal loophole is “an imperfection in the linguistic formulation of a legal text whereby a literal interpretation of that text does not conform to the definitive interpretation dictated by good-faith application of formal legal reasoning techniques.”⁵² Another similar definition of a loophole is “that place where the letter of the rule underenforces the spirit” of the law.⁵³ Perhaps more familiarly, “a loophole

48. *United States v. Sullivan*, 274 U.S. 259, 263 (1927).

49. Boris I. Bittker, *Taxing Income from Unlawful Activities*, 25 *Case W. Res. L. Rev.* 130 (1974).

50. *Commissioner v. Tellier*, 383 U.S. 687, 691 (1966).

51. *The Untouchables* (Paramount Pictures 1987).

52. Daniel T. Ostas, *Legal Loopholes and Underenforced Laws: Examining the Ethical Dimensions of Corporate Legal Strategy*, 46 *Am. Bus. L.J.* 487, 509 (2009).

53. Lynn A. Baker & Mitchell N. Berman, *Getting off the Dole: Why the Court Should*

provides an opportunity to live to the letter of the law, at the expense of the spirit of the law.”⁵⁴ Finally, *Black’s Law Dictionary* defines loophole as “a way to avoid a rule without violating its literal requirements.”⁵⁵

On March 19, 2012, I attended a session featuring Enron’s former chief financial officer Andrew Fastow in his first university lecture after serving a six-year sentence in federal prison.⁵⁶ Fastow focused on his and Enron’s exploitation of what he termed loopholes, as the word is defined in *Black’s Law Dictionary*. Fastow told students from the Leeds School of Business and the Law School at the University of Colorado-Boulder that he was guilty, but not of securities fraud, despite having pleaded guilty on January 14, 2004, to two counts of conspiracy to commit securities and wire fraud.⁵⁷ Fastow stated that he was guilty instead because he “used the rules to subvert the rules,” and that complex and vague rules created “a business opportunity” and “[t]here are people who look at the rules and find ways to structure around them. The more complex the rules, the more opportunity.”⁵⁸ He claimed that what he and Enron did had the full approval and complete knowledge of Enron’s attorneys, accountants and board of directors, adding that “I thought we were freakin’ geniuses.”⁵⁹ He concluded by remarking that what “I should have asked is not what is the rule, but what is the principle.”⁶⁰

Fastow acknowledged that, although he did not think he was committing fraud, “the net effect of all these deals was to create a misrepresentation of the company.”⁶¹ To a securities lawyer, Fastow’s distinction is nonsensical because Rule 10b-5 promulgated under Section 10(b) of the Securities Exchange Act of 1934⁶² prohibits deceit, fraud and misrepresentation or omission of material facts in connection with the purchase or sale of a security.⁶³ The financial health of a company is clearly a material fact, defined as one whose “disclosure would

Abandon Its Spending Doctrine, and How a Too-Clever Congress Could Provoke it to Do So, 78 Ind. L.J. 459, 508 (2003).

54. Don Mayer, *Legal Loopholes, Business Ethics, and Corporate Legal Strategy: A Reply to Professor Ostas*, 48 Am. Bus. L.J. 713, 732 (2011).
55. *Black’s Law Dictionary* 1028 (West, 9th ed. 2009).
56. Leeds Students Recognize Fastow Visit as Unique Learning Opportunity, Leeds School of Business (April 2012), *available at* <http://leeds.colorado.edu/video/135>.
57. Press Release, Department of Justice, Former Enron Chief Financial Officer Andrew Fastow Pleads Guilty to Conspiracy to Commit Securities and Wire Fraud, Agrees to Cooperate with Enron Investigation (Jan. 14, 2004), *available at* http://www.justice.gov/opa/pr/2004/January/04_crm_019.htm.
58. Mark Jaffe, *Andrew Fastow Draws on Enron Failure in Speech on Ethics at CU*, Denver Post, Mar. 20, 2012, *available at* http://www.denverpost.com/business/ci_20210676.
59. *Id.*
60. *Id.*
61. *Id.*
62. 15 U.S.C. § 78j(b).
63. 17 C.F.R. 240.10b-5.

change the total mix of facts available and there is a substantial likelihood that a reasonable shareholder would consider the facts important to her investment decision.”⁶⁴

Fastow said that his son asked him why he went to jail. Instead of saying he was guilty of securities fraud, Fastow told his son he was guilty of violating the spirit—but not the letter—of the law. And he told this hypothetical story: Suppose that the son asked him if he could go to a party and Fastow said yes on condition his son promised that he would not drink alcohol during the party. Fastow’s son agreed and drove to the party. Once he arrived, his friends offered him alcohol. The son declined as he had promised.

Suppose that one of Fastow’s son’s friends then offered him a newly developed “beer pill”—a solid that is chewed. Assume that the beer pill has the same intoxicating effects as drinking beer. Fastow asked his adolescent son whether he would accept the pill. The son answered, “Of course not.” Fastow then asked, “Why not?” since chewing the pill does not break the promise not to drink alcohol. Fastow’s son explained that chewing a beer pill would violate the intent of his promise, and thus was prohibited under the promise that he had made. Fastow’s point was that his adolescent son understood that violating the spirit of a promise in effect nullifies the promise—even though the “letter of the law” was not violated.

Earlier that evening, Fastow said he regretted that his imprisonment meant not being present as a father as his two sons grew up. Ironically, at least one of Fastow’s sons seemed to have learned an ethical lesson in his absence. Fastow apparently did not learn that lesson at Tufts University, in business school at Northwestern University’s Kellogg School of Management and at the start of his business career while working on then innovative asset-backed securities at Continental Illinois National Bank and Trust Company.

Loren Steffy, the business columnist for the *Houston Chronicle*, observed that⁶⁵ Fastow “didn’t quite seem to convey the larger truth to the UC-Boulder students. No one who was involved in as many questionable deals as he was could believe they were simply being clever if they were being honest with themselves. Fastow wasn’t, and it appears he still isn’t.”⁶⁶ It was a fascinating performance to watch—one likely rooted in self-denial to avoid cognitive dissonance.

It was disheartening to hear some of the students who attended Fastow’s talk state afterwards that what they learned was that one should not get caught and be more clever and judicious than Fastow in choosing which loopholes to exploit and how to do it. The purported “lessons” that some students learned

64. *Basic Inc. v. Levinson*, 485 U.S. 224, 231-32 (1988).

65. Lawrence Weiss, *If the Auditors Sign Off, Does That Make It Okay?*, HBR Blog Network (May 1, 2012), available at http://blogs.hbr.org/cs/2012/05/if_the_auditors_sign_off_on_it.html.

66. Loren Steffy, *The Return of Andrew Fastow*, *Houston Chronicle* (Mar. 20, 2012), available at <http://blog.chron.com/lorensteffy/2012/03/the-return-of-andrew-fastow/>.

from Fastow's lecture are troubling and partly explain the controversy over universities inviting felons who are convicted of white-collar crimes to speak on campus about ethics.⁶⁷

What some students learn in law school also explains why noted legal scholar and critical race theorist Richard Delgado believes that lawyers who engage in excessive formalism and/or purposefully inflict various types of what Delgado deems as violence do not deserve to be happy.⁶⁸ The types of violence that Delgado argues some lawyers intentionally inflict include obfuscation,⁶⁹ ordinary violence,⁷⁰ narrative violence⁷¹ and punishment.⁷² As Delgado notes, many "[l]awyers' favorite argument is drawing the line—i.e., making things as unclear as possible in order to reap advantage from the confusion."⁷³ Delgado also points out how a small number of law students are happy to learn that law practice can offer them "an outlet for wheedling, cheating, bluffing and taking small advantage."⁷⁴ He is concerned for the happiness of those other lawyers who at least in their first few weeks of law school were "highly principled students, steeped in the best ideas of Western civilization."⁷⁵

The most recent infamous example of an ultimately unsuccessful attempt at exploiting a loophole also involves ambiguity of language and the divisive nature of modern American presidential politics.⁷⁶ It is, of course, "President Clinton's lawyer-like attempt to get around acknowledging his sexual indiscretions by claiming in his deposition, 'It all depends on what the meaning of "is" is,' and his lawyer-like definitional dance around whether oral sex was, in fact, 'sexual relations.'"⁷⁷ Most Americans found Clinton's evasive word play desperate, funny, sad, and/or slimy. Clinton's hyper-technical parsing of the English language instead of acknowledging its common sense plain meaning exemplifies the stereotypical image of lawyers behaving badly

67. My Ethics Professor Is a Criminal, *Le Monde/Worldcrunch* (June 21, 2012), available at <http://worldcrunch.com/my-ethics-professor-criminal/5600>.

68. Richard Delgado, Recent Writing on Law and Happiness, 97 *Iowa L. Rev.* 913, 926-30 (2012).

69. Pierre Schlag, This Could Be Your Culture—Junk Speech in a Time of Decadence, 109 *Harv. L. Rev.* 1801, 1816 (1996) (reviewing Ronald K. L. Collins & David M. Skover, *The Death of Discourse* (Westview Press 1996)).

70. Jacques Derrida, Force of Law: The "Mystical Foundation of Authority," 11 *Cardozo L. Rev.* 919, 1015 (Mary Quaintance trans., 1990).

71. Jean Stefancic & Richard Delgado, *How Lawyers Lose Their Way: A Profession Fails Its Creative Minds* 474 (Duke Univ. Press 2005).

72. Robert M. Cover, Violence and the Word, 95 *Yale L.J.* 1601 (1986).

73. Delgado, *supra* note 68, at 927.

74. *Id.* at 929.

75. *Id.* at 929.

76. Nan D. Hunter, *The Power of Procedure: The Litigation of Jones v. Clinton* (Aspen Law & Business 2002).

77. Papke et al., *supra* note 42, at 95.

and using legalese to obfuscate what they really mean. Many people have very low opinions of lawyers precisely because lawyers are trained to—and do—use jurisdictional challenges and what non-lawyers view as procedural technicalities to avoid losing on the merits of a case. There is a widespread belief that most lawyers are insincere, untrustworthy and more than willing to engage in deceit and subterfuge on behalf of their clients.⁷⁸

Each of the 50 American states is responsible for much of the discipline and self-imposed regulation of lawyers in the form of the rules of professional responsibility that states adopt and the sanctions that states impose for violations of those rules. The American Bar Association has promulgated and revised the Model Rules of Professional Conduct, most of which just about every state has chosen to adopt, with sometimes considerable variation. The preamble to the model rules states that “[a]s advisor, a lawyer provides a client with an informed understanding of the client’s legal rights and obligations and explains their practical implications. As advocate, a lawyer zealously asserts the client’s position under the rules of the adversary system.”⁷⁹ Two of the key phrases that appear in the preceding two sentences are “legal rights” and “under the rules of the adversary system” because those phrases demonstrate how the model rules bound attorney zealotry and constrain lawyers to be faithful to laws and rules.

A legal ethics scholar observes that, “[l]awyers wrongly believe that they are permitted or required to exploit legal loopholes.”⁸⁰ The comment following one model rule makes it clear that lawyers are “not bound, however, to press for every advantage that might be realized for a client. For example, a lawyer may have authority to exercise professional discretion in determining the means by which a matter should be pursued.”⁸¹ In particular, lawyers can “refer to relevant moral and ethical considerations in giving advice. Although a lawyer is not a moral advisor as such, moral and ethical considerations impinge upon most legal questions and may decisively influence how the law will be applied.”⁸² Another model rule states that lawyers “shall not counsel a client to engage, or assist a client, in conduct that the lawyer knows is criminal or fraudulent, but a lawyer may discuss the legal consequences of any proposed course of conduct with a client and may counsel or assist a client to make a good faith effort to determine the validity, scope, meaning or application of the law.”⁸³ Finally, a model rule warns that “[l]awyers are subject to discipline when they violate or attempt to violate the Rules of Professional Conduct, knowingly assist or

78. Lawrence M. Solan, *Lawyers as Insincere (But Truthful) Actors*, 36 *J. Legal Prof.* 487 (2012). See also *Law and Language, Law and Magic Blog* (July 5, 2011), available at http://lpcprof.typepad.com/law_and_magic_blog/law-and-language/.

79. Model Rules of Prof’l Conduct Preamble para. 2 (2002).

80. Wendel, *supra* note 36, at 8.

81. Model Rules of Prof’l Conduct R. 1.3 cmt. 1 (2002).

82. Model Rules of Prof’l Conduct R. 2.1 cmt. 2 (2002).

83. Model Rules of Prof’l Conduct R. 1.2(d) (2002).

induce another to do so or do so through the acts of another, as when they request or instruct an agent to do so on the lawyer's behalf."⁸⁴ As with much of day-to-day lawyering, decisions and judgments about exploiting loopholes are left for lawyers to make on a case-by-case basis as long as lawyers do everything they are obligated to do under the rules of professional conduct of the relevant state(s) and as long as they do not do anything that is prohibited by the rules of professional conduct of the relevant state(s). Professional decision-making and judgment are skills that improve with effort, exercise, experience, practice and mindfulness.⁸⁵ Loopholes differ by appropriateness, context, nature, situation and size. A junior associate and senior partner at some law firm may have quite different attitudes toward exploiting the same loophole with either one being more or less in favor of doing so. Because some loopholes can involve contested ethical and moral values, there is often quite a bit of "play in the joints" or "wiggle room" about exploiting loopholes. Such discretion provides lawyers with choices and responsibilities for those choices.

From the observation that Arrow's impossibility theorem implies that loopholes are unavoidable, it does not logically follow as Katz normatively concludes that exploiting loopholes is acceptable. The decision to exploit a particular loophole for a particular client in a particular case at a particular time is a particular choice that a particular lawyer makes. Like the rest of us, lawyers are responsible for the choices they make. To say that choices are unavoidable does not absolve us from the personal and professional responsibility that comes with making them.

At Fastow's talk, he answered a question about what it was like to be present at Enron generally and particularly at meetings of Enron's board of directors by saying that Enron was a heady place where the culture was to exploit aggressively all possible loopholes as much and as often as possible. It should not be surprising that corporate cultures, organizational expectations and social norms about what is deemed appropriate behavior can influence how people actually behave. People can be motivated to comply with cultures, expectations and norms to avoid guilt and shame from non-compliance or feel loyalty and pride from compliance.⁸⁶ Because of such motivational cascades and emotional contagion, the behavior of leaders can set examples that inspire or disillusion others in organizations and societies, causing those others to engage systematically and systemically in ethical or unethical behavior. In particular, those who teach legal ethics and professionalism to law students can discuss why achieving career satisfaction and life satisfaction are more compelling and positive motivations for ethical and professional behavior

84. Model Rules of Prof'l Conduct R. 8.4 cmt. 1 (2002).

85. Leonard L. Riskin, *Awareness and Ethics in Dispute Resolution and Law: Why Mindfulness Tends to Foster Ethical Behavior*, 50 *S. Tex. L. Rev.* 493 (2009). *But see* Ellen Waldman, *Mindfulness, Emotions, and Ethics: The Right Stuff?* 10 *Nev. L.J.* 513 (2010).

86. Peter H. Huang & Ho-Mou Wu, *More Order without More Law: A Theory of Social Norms and Organizational Cultures*, 10 *J.L. Econ. & Org.* 390 (1994).

than such negative and stressful motivations as the avoidance of guilt or the fear of being caught, disciplined, sanctioned or sued.⁸⁷

IV. Legal Perversities and Social Choice Impossibility Theorems

This section is intended to clarify the nature of the connection between what Katz calls “legal perversities” and the social choice impossibility theorems of Arrow, Sen, Chichilnisky, Gibbard and Satterthwaite. The Katz book focuses on legal manifestations of menu dependence and the related social choice phenomena of cycles, loopholes and discontinuities (see appendix for details). Katz explains (57-68) how Sen’s theorem on the impossibility of a Paretian libertarian is related to why laws often prohibit win-win transactions. He explains (62-65) how Sen’s theorem is related to what Katz calls the anti-fairness theorem, a result by two well-known law and economics scholars, Louis Kaplow and Steven Shavell.⁸⁸ Katz also explains (66) how Kaplow and Shavell’s proposition demonstrates that fairness-based legal doctrines and the Pareto principle lead to cycles. And he explains (124-5) how Kaplow and Shavell’s result involves the independence of irrelevant alternatives and implies the prevalence of loopholes.

The second part of the Katz book analyzes why the law is so full of loopholes. The author’s answer is that loopholes in the law are the result of menu dependence that arises from law involving multi-criteria decision-making. Cycles in social choice theory reflect intransitivity of the social preference that results from a voting procedure. A cycle that results from a voting rule opens up the possibility of manipulating the agenda of that voting procedure. Katz argues that exploiting loopholes is the legal equivalent of manipulating voting agendas (104-5). A more precise statement about how Arrow’s theorem in the multi-criteria decision-making context is related to legal loopholes than the author provides might help answer two important questions. First, how can policy makers design laws and statutes to avoid particular cycles and loopholes? Second, how can those who desire particular loopholes effectively lobby state legislatures and Congress to produce them?⁸⁹

Katz and Alvaro Sandroni, an economist and also a mathematician,⁹⁰ co-authored an unpublished working paper about why the law induces cycles in choices by a law-abiding decision-maker.⁹¹ They define a decision-maker’s

87. Lawrence S. Krieger, *The Inseparability of Professionalism and Personal Satisfaction: Perspectives on Values, Integrity and Happiness*, 11 *Clinical L. Rev.* 425, 435-45 (2005).

88. Louis Kaplow & Steven Shavell, *Any Non-welfarist Method of Policy Assessment Violates the Pareto Principle*, 109 *J. Pol. Econ.* 281, 283-84 (2001).

89. Ostas, *supra* note 52, at 521-24; Mayer, *supra* note 54, at 740-44.

90. Alvaro Sandroni, Kellogg School of Management Faculty Directory, available at http://www.kellogg.northwestern.edu/faculty/directory/sandroni_alvaro.aspx; Deborah Leigh Wood, Faculty Research: Alvaro Sandroni, MEDS: Assume Nothing, Kellogg World Alumni Magazine (Winter 2003), available at <http://www.kellogg.northwestern.edu/kwo/win03/departments/sandroni.htm>.

91. Leo Katz & Alvaro Sandroni, *Why Law Breeds Cycles* (July 1, 2010) (manuscript on file with

motivations to be a ranking over alternatives. They do not assume that motivations can be inferred from observing choice behavior. In other words, motivations differ from the standard economic notion of preferences because neoclassical economics assumes that preferences are revealed by observed choices. They also introduce the idea that in addition to making a choice that satisfies any feasibility constraints, a decision-maker has to satisfy what they call a rationalization constraint. In other words, they assume that a decision-maker must justify her decision by some rationale from a set of possible rationales. Rationales include such quasi-ethical principles or social norms as abiding by the law, anti-discrimination, etiquette, honor and personal autonomy or freedom of choice. For example, Sen's menu dependence story of not eating the largest slice of cake that a party host offers illustrates the rationale of etiquette.⁹²

The rationale they focus on is being law-abiding. Using particular examples, they illustrate cycling in the choices by a law-abiding decision-maker with respect to the criminal law defenses of duress, necessity and self-defense and the tort law of negligence. Their examples illustrate their more general proposition that all legal rules and the Pareto principle lead to cycles. Their framework treats legal rights as constraints, much like philosopher Robert Nozick's view that rights are side-constraints.⁹³ Bruce Chapman, a law professor whose research includes applications of social choice theory to legal reasoning, analyzes the relationship between how rights are modeled and Sen's impossibility theorem.⁹⁴

Saari explains that cycles related to law are the result of problems with the coordination of piecemeal information concerning the parts versus the whole of a system.⁹⁵ More generally, Saari demonstrates that cycles arise from how local information about rankings is pasted or pieced together to form global information about rankings.⁹⁶ Saari presents a compelling example of a couple and their in-law caught in an emotional "cycle leading to continual squabbles and hurt feelings,"⁹⁷ based on a model by two UC Irvine mathematical psychologists, Louis Narens and R. Duncan Luce, about extended sympathy

the author). *See also* Vadim Cherepanov, Alvaro Sandroni & Tim Feddersen, Rationalization, Dauphine Workshop on Economic Theory (Nov. 25-26, 2010), available at http://leda.dauphine.fr/fileadmin/mediatheque/centres/leda/pole-ECOPUB/workshop_revealed-preference/submissions/sandroni-slides.pdf.

92. Sen, *supra* note 16.

93. Robert Nozick, *Anarchy, State, and Utopia* 29-35 (Basic Books 1974).

94. Bruce Chapman, Rights as Constraints: Nozick versus Sen, 15 *Theory & Decision* 1 (1983).

95. Donald G. Saari, *Decisions and Elections: Explaining the Unexpected* 117-20 (Cambridge Univ. Press 2001).

96. *See generally* Donald G. Saari & Katri K. Sieberg, Are Partwise Comparisons Reliable? 15 *Res. Eng'g Design* 62 (2004); Donald G. Saari, Source of Complexity in the Social and Managerial Sciences: An Extended Sen's Theorem, 37 *Soc. Choice & Welfare* 609 (2011).

97. Saari, *supra* note 95, at 122.

and interpersonal comparisons of utilities.⁹⁸ Saari also describes cycles related to democracies and majorities⁹⁹ and the apportionment methods of the United States Congress.¹⁰⁰ Saari uses the phrase “some assembly required” to capture the importance of using “connecting information” to transform the many individual parts of a system into a coherent and well-functioning whole.¹⁰¹ He offers examples of related unexpected part-whole phenomenon in gambling,¹⁰² medical testing,¹⁰³ public school accountability in California¹⁰⁴ and financial hedging.¹⁰⁵ Saari explains how all of these and other troublesome situations in many diverse and seemingly unrelated contexts¹⁰⁶ have a common mathematical and theoretical structure.¹⁰⁷

Part three of the Katz book focuses on why so much of the law has a dichotomous nature. The famous mathematical economist Graciela Chichilnisky introduced the condition of continuity on preference aggregation and in so doing, pioneered a field that has come to be known as topological social choice because of its use of the mathematical field known as topology that studies continuity in abstract settings. Chichilnisky offers two intuitive rationales to motivate the naturalness of her axiom that desirable voting rules be continuous.¹⁰⁸ First, a desirable voting rule should produce an outcome that is tolerant of small errors in measuring the preferences of individual voters. Second, a desirable voting rule should satisfy structural stability in the sense that small changes in the preferences of individual voters should lead to small changes in the social preference that voting rule produces. The discontinuity of a voting rule means that for some small changes in the preferences of individual voters, that voting rule produces large changes in the resulting social preference. Chichilnisky postulates that a society will and should avoid voting rules that can generate catastrophic jumps in the resulting social preferences.¹⁰⁹

98. Louis Narens & R. Duncan Luce, *How We May Have Been Misled into Believing in the Interpersonal Comparability of Utility*, 15 *Theory & Decision* 247 (1983).

99. Saari, *supra* note 95, at 123-28.

100. *Id.* at 130-35.

101. *Id.* at 103-05.

102. *Id.* at 106-08, 112-13.

103. *Id.* at 108-09, 113-14.

104. *Id.* at 110-11.

105. *Id.* at 114-15.

106. *Id.* at 139-50.

107. *Id.* at 128-30.

108. Chichilnisky, *supra* note 21, at 169.

109. In my second year of graduate school, I submitted to the Western Economic Association International annual conference a paper that applied Rene Thom's catastrophe theory to analyze discontinuities in social choice.

Katz explains that Chichilnisky's impossibility theorem has a profound implication for the credibility of law and, correspondingly, the foundations of justice in a society (176-81). He uses the phrase "sharp boundaries" to refer to the discontinuities that are the subjects of Chichilnisky's impossibility theorems. And he observes that in the typical situation where the law generates only one of a pair of two possible outcomes, Chichilnisky's theorem implies that two very similar legal cases may produce very different legal outcomes. For example, in the criminal law context, there can be two defendants who are so alike that most people are unable to distinguish between their cases and yet a court may find one defendant guilty and the other defendant not guilty. The possibility that comparable legal cases may result in such drastically different and even diametrically opposed outcomes makes the legal process appear to be arbitrary, capricious and unjust. Such legal discontinuities can jeopardize the rule of law by leading the public to question the authority, fairness and legitimacy of law.

The fourth part of Katz's book explains under-criminalization in terms of menu dependence. He also provides two additional social choice explanations of under-criminalization (204-6). First, any ranking of comparative guilt involves the two criteria of the harm done by and the mental state of a defendant. Different ways of synthesizing those two criteria will unsurprisingly result in different rankings of relative blameworthiness. Second, Katz considers a particular form of under-criminalization in which criminal law seems to grant volume discounts in the sense of imposing punishment for a series of crimes that is less than the sum of the punishments for each of the separate crimes (194-7). He explains how the volume discount problem is analogous to voting rules exhibiting what Katz terms non-monotonicity (133-34), which means that a voter will benefit from strategically voting counter to his or her true preferences, or what is also known as counter-preferential voting. The Gibbard-Satterthwaite theorem proves that insincere or tactical voting is a general problem.

Concluding Thoughts

Despite the qualms this review raises, Katz's book is definitely worthwhile and should be on the reading list of legal scholars, especially those interested in real-world examples from any of these subjects: bankruptcy law, civil procedure, constitutional law, contract law, criminal law, criminal procedure, economic analysis of law, environmental law, jurisprudence, legal ethics, legal philosophy, property law, statutory interpretation, tax law, tort law and voting rights law. Katz's mind is unique among legal scholars. His book offers a distinctive perspective about how to perceive, think about and view legal issues. He has the rare ability to connect many seemingly unrelated legal phenomena in an insightful and penetrating analysis.

The social choice theory literature that underlies and unifies the book is a powerful tool and prism through which to approach multi-criteria legal decision-making. In building on the prominent impossibility theorems of

Arrow, Sen, Chichilnisky, Gibbard and Satterthwaite, Katz truly is standing on the shoulders of intellectual giants. His speculation that other legal perversities are likely related to and the consequence of other social choice results likely is correct. He essentially calls on other scholars to discover other legal perversities and their connections to other social choice impossibility theorems (126). In this and many other ways, the book is provocative and only improves upon re-reading.

Reading—and re-reading—this book has provided the opportunity to reflect on how to make sense of the menu dependence that inevitably pops up in all instances of multi-criteria decision-making by societies, laws and individuals. The phenomenon of menu dependence and its close relatives, cycles, loopholes and discontinuities, raise deep questions about what rationality means and should mean. Arrow observed that “[a]n economist by training thinks of himself as the guardian of rationality, the ascriber of rationality to others and the prescriber of rationality to the social world.”¹¹⁰ Economists are trained to believe that a hallmark of rationality is transitivity of choice behavior. Conversely, economists view intransitivity of choice behavior as evidence of irrationality.¹¹¹ Casual empiricism suggests that if you point out to people that their choices are intransitive, they usually will change their choices to avoid intransitivity. It would be interesting to use the methods of experimental philosophy to investigate people’s intuitions about loopholes, menu dependence and the desirability of transitivity of individual choice behavior.

That people typically find voting paradoxes troubling is evidence that people usually view intransitivity as psychologically disturbing. Arrow’s theorem means that some configuration of individual preferences can lead under majority voting to an intransitive social ordering. Arrow’s theorem demonstrates that voting intransitivities are possible. Ever since Arrow proved his theorem, social choice theorists have proved that voting intransitivities are not just possible, they are likely, extensive and severe. For example, political scientist Richard McKelvey proved that majority voting over multi-dimensional spaces of alternatives can end up at almost every possible outcome via judicious agenda manipulation.¹¹² This result is known as McKelvey’s chaos theorem.

Despite the undeniably huge impact of Arrow’s impossibility theorem and its progeny on our collective understanding of the paradoxical outcomes that are unavoidable in social choice, people including some legal scholars continue to speak of and think about legislative or statutory intent as if those were coherent and sensible notions. More generally, people including some legal scholars continue to speak of and think about individual preferences as

110. Kenneth J. Arrow, *The Limits of Organization* 16 (W. W. Norton & Co. 1974).

111. *But see generally* Walter E. Block & William Barnett II, *Transitivity and the Money Pump*, 15 *Q.J. Austrian Econ.* 237 (2012).

112. Richard McKelvey, *General Conditions for Global Intransitivities in Formal Voting Models*, 47 *Econometrica* 1085, 1091-99 (1979).

if that was a well-defined and unproblematic notion. Perhaps the ultimate and most important contribution that Katz makes in this book is to convincingly persuade the reader that Arrow's theorem particularly and social choice generally have far-reaching implications about what it means for societies, laws and individuals to engage in multi-criteria decision-making.

Katz does for social choice theory in law what 2005 economics Nobel Laureate¹¹³ Thomas C. Schelling did for game theory in conflict resolution.¹¹⁴ Neither a social choice theorist nor a mathematical economist, Katz is a law professor and noted scholar of criminal and corporate law. He admirably succeeds at explaining and illustrating why menu dependence is ubiquitous in law and so prevalent even in multi-criteria decision-making by an individual (109). He even develops implications of his analysis of legal loopholes (121-23) for the propriety of lawyers being partisan advocates engaging in professional persuasion. His argument in that context (123) applies more generally to the behavioral law and economics critique that human decision-making is irrational in the sense that it is subject to framing effects. The perspective that people are irrational when their behavior exhibits menu dependence loses coherence and surprise when you realize that menu dependence is an unavoidable feature of multiple criteria decision-making.

Appendix: A Brief Social Choice Primer for Legal Scholars

This appendix provides legal scholars a guide to social choice in general and four distinguished impossibility theorems in particular. It offers motivating examples and precise statements of those impossibility theorems. The conventional interpretations for these theorems and the field of social choice are negative in the sense that most commentators view social choice theory as mathematically proving that no voting procedure is fair. These commentators include legal scholars applying impossibility theorems and concluding that difficulties are unavoidable with all collective or group decision-making processes. There is a vast social choice literature full of extensions and refinements of these and other impossibility theorems. Current social choice research tends to be philosophical or technical. Katz's book mostly eschews the technical and emphasizes the philosophical. This appendix does the opposite, while still avoiding mathematical details and emphasizing conceptual understanding. Additionally, it highlights research by Donald Saari and his coauthors that explains what goes wrong in these impossibility theorems and provides benign interpretations and positive versions of them.

Ken Arrow published his Ph.D. dissertation as the book *Social Choice and Individual Values* and proved what is now known as Arrow's impossibility

113. The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2005, The Official Web Site of the Nobel Prize, available at http://www.nobelprize.org/nobel_prizes/economics/laureates/2005/ (Robert J. Aumann also received the 2005 economics Nobel).
114. Robert V. Dodge, *Schelling's Game Theory: How to Make Decisions* (Oxford Univ. Press 2012); Robert Dodge, *The Strategist: The Life and Times of Thomas Schelling* (Hollis Pub. Co. 2006).

theorem.¹¹⁵ In so doing, he pioneered the modern theory of social choice, which has been described as “a rigorous melding of social ethics and voting theory with an economic flavor.”¹¹⁶ In the foreword to the most recent and third edition of Arrow’s path-breaking work,¹¹⁷ Eric S. Maskin, 2007 economics Nobel Laureate¹¹⁸ and a former student of Arrow, points out that there was “a sporadic literature on the subject before Arrow, going back (at least) to Jean-Charles Borda and the Marquis de Condorcet in the late eighteenth century. But the earlier essays lacked the generality and power of Arrow’s approach and the subject did not take off until *Social Choice*.” Maskin continues: “by the time the second edition was published, in 1963, there were already several hundred works building on the book. A recent count on Google Scholar turned up over ten thousand citations.”¹¹⁹ Maskin concludes his foreword by cogently observing that:

A book’s importance can be crudely gauged by how many other works cite it. But perhaps a better measure is its longevity: how long it continues to inspire new work. By that criterion, *Social Choice and Individual Values* is an amazing success: having passed its sixtieth birthday, it continues to generate a steady stream of original research. I suspect that the same will be true when it reaches one hundred.¹²⁰

Arrow also co-authored a monograph that includes a multi-criterion decision-making version of his impossibility theorem.¹²¹ Arrow’s numerous contributions to social choice appear in the first volume of his collected works.¹²² An interdisciplinary peer-referred journal titled *Social Choice and Welfare*,¹²³ and a professional organization with the name Society for Social Choice and Welfare,¹²⁴ are both devoted to positive and normative aspects

115. Kenneth J. Arrow, *Social Choice and Individual Values* (Yale Univ. Press, 3d ed. 2012) (1951).

116. Gennaro Amendola & Simona Settepanella, *Optimality in Social Choice*, 36 *J. Mathematical Soc.* 44 (2012).

117. Arrow, *supra* note 115, at vi.

118. The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2007, The Official Web Site of the Nobel Prize, *available at* http://www.nobelprize.org/nobel_prizes/economics/laureates/2007/ (Leonid Hurwicz and Roger B. Myerson also received the 2007 economics Nobel).

119. Arrow, *supra* note 115, at vi.

120. *Id.* at ix.

121. Kenneth J. Arrow & Hervé Raynaud, *Social Choice and Multicriterion Decision-Making* 18-23 (MIT Press 1986).

122. Kenneth J. Arrow, *Collected Papers of Kenneth J. Arrow, Volume 1: Social Choice and Justice* (Belknap Press of Harvard Univ. Press 1984).

123. *Social Choice and Welfare*, *available at* <http://www.springer.com/economics/economic+theory/journal/355>.

124. The Society for Social Choice and Welfare, *available at* <http://www.unicaen.fr/recherche/mrsh/scw/>.

of social choice and welfare economics. There is a new interdisciplinary field named computational social choice,¹²⁵ which, for example, relates Arrow's theorem and computability.¹²⁶ Social choice research today includes empirical, experimental and theoretical work by economists, mathematicians, operations researchers, philosophers, political scientists and sociologists. Social choice examines the aggregation of individual preference orderings into a social preference ordering. A preference ordering denoted by $>$ is a binary relation over a space of alternatives that satisfies two properties. First, $>$ is complete, which means that for any two alternatives A and B , $A > B$, or $B > A$, or both. The string of symbols " $A > B$ " is read: "alternative A is (weakly) preferred under the preference ordering $>$ to alternative B ." Second, $>$ is transitive, which means that for any three alternatives A , B , and C , if $A > B$ and $B > C$, then $A > C$.

The simplest example to illustrate the problem that lies at the heart of and motivated Arrow's theorem is the majority voting paradox attributable to Marquis de Condorcet, a mathematician and French Enlightenment philosopher. Suppose there are three voters named K , S , and D faced with a choice among three alternative movies that all three of them will see together: A (*Katy Perry: Part of Me*), B (*Battleship*), and C ("Comic Character Film"). Assume that K 's preference ranking is $A > B > C$, S 's preference ranking is $B >> C >> A$, and D 's preference ranking is $C >>> A >>> B$. The social preference ranking $>>>>$ is determined by the result of pairwise majority voting. Because both K and S prefer B to C , $B >>>> C$. Because both K and D prefer A to B , $A >>>> B$. Because both S and D prefer C to A , $C >>>> A$. This voting cycle means that the resulting social preference $>>>>$ fails to satisfy the condition of transitivity even though each individual preference ordering satisfies transitivity.

Arrow was moved to build his famed theorem by a desire to understand political parties and national interests. His initial interest was in developing a theory of the corporation;¹²⁷ he wanted to determine how stockholders with differing expectations come to agree on a particular corporate investment. Arrow quickly realized that paradoxical cycles like the one in the last paragraph are possible with pairwise majority voting. Arrow's next interest related to his theorem occurred in the context of voters having preferences over political parties.¹²⁸ His third and final impetus was his desire to explain the concept of a nation's interests.¹²⁹

125. The COMSOC Website, Computational Social Choice, available at <http://www.illc.uva.nl/COMSOC/>.

126. H. Reiju Mihara, Arrow's Theorem and Turing Computability, 10 *Econ. Theory* 257 (1997).

127. Kenneth J. Arrow, Amartya Sen, & Kotaro Suzumura, Kenneth Arrow on Social Choice Theory, in 2 *Handbook of Social Choice and Welfare* 3, 9-10 (Kenneth J. Arrow, Amartya Sen & Kotaro Suzumura eds., North-Holland 2011).

128. *Id.* at 12.

129. *Id.* at 13-14.

Arrow introduced a set of axioms on voting systems that reflect a set of normative criteria or ethical desiderata. Unrestricted Domain (UD) means that the set of possible individual preference rankings over the set of alternatives is not restricted in any manner. Non-Dictatorship (ND) means that the social preference ranking cannot simply be the preference ordering \succ of a particular individual unless all other voters also have the same preference ordering \succ . Pareto Efficiency (PE) means that if all voters rank some alternative A above another alternative B, then so does the social ranking. Independence of Irrelevant Alternatives (IIA) means that if each voter's preference ranking between any two alternatives, A and B, stays the same, then so does the social preference ranking between A and B, even if voters' preference rankings between other pairs of alternatives, such as A and C, B and C or C and D, change. Notice that by requiring that the preference aggregation process results in a social preference ranking, transitivity (and completeness) of the social binary relation over the space of alternatives also is required. With these definitions, Arrow's impossibility theorem can be stated formally.

Arrow's theorem: If there are two or more voters and three or more alternatives, there is no voting system that aggregates individual preference rankings into a social preference ranking that also will satisfy UD, ND, PE, and IIA.

Arrow's introduction of an axiomatic approach permitted the simultaneous analysis of all voting procedures at once as opposed to examining particular voting rules one at a time as had been the prior method of studying voting. Arrow's theorem also created a tradition in modern social choice of proving impossibility theorems to demonstrate that certain sets of apparently desirable and seemingly reasonable axioms about aggregation procedures are logically incompatible. Many of the well-known results in social choice theory are in the form of such impossibility propositions about groups of conditions that voting procedures are unable to satisfy simultaneously.

The standard negative interpretation of Arrow's theorem is that no voting method is fair or perfect, in the sense that any voting method will fail to satisfy at least one normatively attractive criterion. A particularly provocative way to state Arrow's theorem is that any voting procedure satisfying the apparently desirable conditions of UD, PE, and IIA must be dictatorial. This means that any such voting procedure generates a social preference ranking that coincides with the individual preference ranking of just one voter, independent of the individual preference rankings of all the other voters. Because the social preference ranking is that of just one individual voter, that individual is called a dictator.

Donald Saari offers this alternative benign and non-dictatorial explanation of Arrow's theorem: IIA is not consistent with the assumption that voters' individual preference rankings are transitive.¹³⁰ More precisely, IIA causes voting procedures to ignore the intensity of pairwise rankings that is a

130. Donald G. Saari, *Basic Geometry of Voting* 87-88 (Springer 1995).

crucial part of the information already contained within the given individual preference rankings.¹³¹ Saari's insight also implies how to provide a positive version of Arrow's theorem, namely modify IIA to allow voting procedures to make use of the preference intensity information that IIA excludes.¹³² Saari's informational explanation of Arrow's theorem also applies to explain other impossibility theorems.

Katz's book alludes to and makes use of three other renowned impossibility theorems. The first one is from economist Amartya Sen.¹³³ Katz discusses this well-known example and story that Sen used to illustrate his theorem: suppose that there are two individuals, Ms. Prude and Mr. Lascivious, with preference rankings over who reads a risqué book, such as *Lady Chatterly's Lover*. These are the three possible social alternatives: P = Ms. Prude reads the book, L = Mr. Lascivious reads the book, and N = nobody reads the book. Ms. Prude's preference ordering denoted by $>$ ranks the alternatives: $N > P > L$, and Mr. Lascivious' preference ordering denoted by $>>$ ranks the alternatives: $P >> L >> N$. L should not be chosen because Ms. Prude and Mr. Lascivious both rank P above L. It seems reasonable to assume that each person should have the right to decide whether to read the book. Then, Ms. Prude cannot be forced to read the book, so P cannot be chosen. Similarly, Mr. Lascivious cannot be forbidden to read the book, so N cannot be chosen. Thus, neither P nor N can be chosen. Hence, none of the three alternatives P, L, or N can be chosen.

Sen's framework envisions that a benevolent social planner chooses one alternative from those available using information about individual preference rankings. Sen defines a social choice function to have as inputs profiles of individual preference rankings and as its outputs particular social alternatives, which a social planner selects. A social choice function satisfies Unrestricted Domain (UD) if the set of possible individual preference rankings over the set of alternatives is not restricted in any manner. A social choice function satisfies Pareto Efficiency (PE) if it never chooses an outcome when there is another alternative that everybody strictly prefers. A social choice function satisfies Minimal Liberalism (ML) if two individuals exist whose preferences can veto some social alternatives. The motivation for the ML condition is a fundamental tenet of liberalism that certain decisions and issues are personal and should naturally fall within a single individual's purview. Oft-cited examples are what a person wears or the kind of music that a person listens to in his or her car. With these definitions, here is a formal statement of the impossibility theorem of Sen.

Sen's theorem: If there are at least two people with preference rankings over a set of at least three social alternatives, there is no social choice function that satisfies UD, PE and ML.

131. Donald G. Saari, Hidden Mathematical Structures of Voting, in *Mathematics of Democracy* 221, 224 (Bruno Simeone & Friedrich Pukelsheim eds., Springer 2006).

132. *Id.*, at 225.

133. Amartya Sen, The Impossibility of a Paretian Liberal, 78 *J. Pol. Econ.* 152 (1970).

Donald Saari demonstrates that Sen's ML condition is incompatible with the assumption that voters' individual preference rankings are transitive.¹³⁴ More precisely, ML causes social choice functions to ignore the information about transitivity of the given individual preference rankings.¹³⁵ Saari's insight also implies how to provide a positive version of Sen's theorem, namely modify PE to allow social choice functions to make use of the information about individual preference rankings being transitive that ML excludes.¹³⁶

The second other impossibility theorem that Katz refers to is from mathematical economist Graciela Chichilnisky, who generalized Arrow's theorem from a finite set of alternatives to a multi-dimensional space of alternatives.¹³⁷ In doing so, Chichilnisky created the field of topological social choice theory. Chichilnisky's framework draws upon differential geometry, differential topology and algebraic topology, three subfields that are part of the standard first-year graduate mathematics curriculum. The connection between local and global perspectives toward information about preferences explains why topological methods play such prominent roles in social choice theory. Differential topology is a branch of mathematics that uses differential calculus types of methods to analyze local properties of an object and combine those local approximations into a global understanding of the object. For example, there is a mathematical construction known as partitions of unity that "can be used to patch together objects defined locally."¹³⁸

The simplest example that illustrates Chichilnisky's theorem involves two people choosing where to have a party or picnic on a beach that is a circle around a lake.¹³⁹ Without loss of generality, assume the radius of this circle is one. Each of the two people picks any point on this unit circle as their most preferred location for the beach party. A social aggregation rule takes the two chosen points and selects a point on the unit circle where the beach party will be located. An example of a social aggregation rule is the one that selects the same location for the beach party for all possible pairs the two people pick. Such a social aggregation rule chooses a constant fixed location independent of what the two people pick. Another example of a social aggregation rule is one that selects as the beach party location whatever person one picks regardless what person two picks. Such a social aggregation rule amounts to dictatorship

134. Donald G. Saari, Connecting and Resolving Sen's and Arrow's Theorems, 15 *Soc. Choice & Welfare* 239, 239-40 (1998).

135. *Id.* at 240-47. See also Lingfang Li & Donald G. Saari, Sen's Theorem: Geometric Proof, New Interpretations, 31 *Soc. Choice & Welfare* 393 (2008).

136. Saari, *supra* note 134, at 259-60. See also Donald G. Saari & Anne Petron, Negative Externalities and Sen's Liberalism Theorem, 28 *Econ. Theory* 265 (2006).

137. Chichilnisky, *supra* note 21, at 170, 174 (1980). See also Graciela Chichilnisky, Social Aggregation Rules and Continuity, 97 *Quart. J. Econ.* 337, 340, 349 (1982).

138. Todd Rowland, Partition of Unity, mathworld.com, available at <http://mathworld.wolfram.com/PartitionofUnity.html>.

139. Saari, *supra* note 32, at 26-28, 51-57, 218-30.

by person one. Neither the constant nor dictator social aggregation rule is interesting because each completely ignores the most preferred location of at least one voter.

Consider these conditions on social aggregation rules. A social aggregation rule respects Anonymity (A) if only the most preferred locations of the two individuals matter and not which person prefers which location. A social aggregation rule satisfies Continuity (C) if small changes in the most preferred locations of the individuals lead to small changes in the point that the social aggregation rule selects as the location of the beach party. A social aggregation rule respects Unanimity (U) if, when both individuals' most preferred locations for the beach party coincide, that point also is chosen by the social aggregation rule. With these definitions, one of Chichilnisky's impossibility theorems can be formally stated for this particular example.

Chichilnisky's theorem: There is no social aggregation rule which maps pairs of points on the unit circle onto points on the unit circle that satisfies C and respects A and U.

Saari provides a benign interpretation of Chichilnisky's theorem and explains how the continuity of a social aggregation rule is a technical condition that assures behavior at one point is like the behavior near that point.¹⁴⁰ The mere requirement of continuity implies that a social aggregation rule treats the space of individual preferences as essentially a line or more generally a space that satisfies a topological property known as being a contractible space. In the above beach example, the space of individual preferences is a unit circle, which is not contractible.

Chichilnisky and economist Geoffrey Heal prove that social choice paradoxes arise if and only if the underlying space of individual preferences is not contractible.¹⁴¹ An equivalent way of stating this result is that a social aggregation rule that satisfies A, C, and U exists if and only if the underlying space of individual preferences is contractible, which means that it is topologically trivial because it can be continuously deformed to just a single point. The space of individual preferences being contractible in essence limits the degree of permissible diversity in preferences. Chichilnisky introduces a precise measure of social diversity in terms of initial endowments and preferences and proves that a society can allocate resources efficiently by markets or social choice if and only there is not excessive social diversity.¹⁴² On the other hand, mathematical social scientist Scott Page introduces a mathematical economic theory of diversity and provides conditions under

140. Donald G. Saari, Informational Geometry of Social Choice, 14 *Soc. Choice & Welfare* 211, 221-26 (1997). See also Jason Kronewetter & Donald G. Saari, From Decision Problems to Dethroned Dictators, 44 *J. Math. Econ.* 745 (2008).

141. Graciela Chichilnisky & Geoffrey Heal, Necessary and Sufficient Conditions for a Resolution of the Social Choice Paradox, 31 *J. Econ. Theory* 68 (1983).

142. Graciela Chichilnisky, Social Diversity, Arbitrage, and Gains from Trade: A Unified Perspective on Resource Allocation, 84 *Am. Econ. Rev.* 427, 431-33 (1994).

which diverse perspectives, heuristics, interpretations and mental models improve the accuracy of collective predictions and the ability of groups to solve diverse problems.¹⁴³ These two mathematical economic theories about diversity imply that there are costs and benefits to diversity that a society has to balance in determining a socially optimal amount of diversity.

The third other impossibility theorem to which Katz alludes is due independently to philosopher Allan Gibbard¹⁴⁴ and economist Mark Satterthwaite.¹⁴⁵ All three of the impossibility theorems thus far assume that individuals vote according to their true preferences. The Gibbard-Satterthwaite theorem proves that voters often have incentives to vote tactically instead of according to their preference rankings. Real-world examples of the Gibbard-Satterthwaite theorem happen when people choose not to waste their votes on a candidate who has no chance of winning. This was the case with some of the supporters of these independent candidates in U.S. presidential elections: Ralph Nader in 2000, Ross Perot in 1996 and 1992, Jesse Jackson in 1988 and 1984, and John B. Anderson in 1980.¹⁴⁶

Each of a finite number of individuals reports a preference ranking over a finite set of alternatives. A voting system uses the reported individual preference rankings to select one winning alternative. A voting system is susceptible to strategic manipulation if a voter with complete knowledge about how other voters are going to vote and of the voting system has an incentive to vote in a way that does not reflect her true preferences. A voting system is dictatorial if one voter can determine the winning alternative independent of how others vote. With these definitions, the Gibbard-Satterthwaite impossibility theorem can be formally stated.

Gibbard-Satterthwaite's theorem: If there are more than two alternatives, any voting system that is not susceptible to strategic manipulation must be dictatorial or it eliminates particular eligible alternatives from ever winning.

Satterthwaite demonstrates a formal equivalence between Arrow's theorem and the Gibbard-Satterthwaite theorem.¹⁴⁷ Saari details how the IIA condition from Arrow's theorem is related to strategic voting.¹⁴⁸ Saari also provides a geometric explanation of the Gibbard-Satterthwaite theorem.¹⁴⁹

143. See generally Scott E. Page, *The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools, and Societies* (Princeton Univ. Press 2008).

144. Allan Gibbard, *Manipulation of Voting Schemes: A General Result*, 41 *Econometrica* 587 (1973).

145. Mark A. Satterthwaite, *Strategy-Proofness and Arrow's Conditions: Existence and Correspondence Theorems for Voting Procedures and Social Welfare Functions*, 10 *J. Econ. Theory* 187 (1975).

146. Saari, *supra* note 95, at 22-23.

147. Satterthwaite, *supra* note 145, at 203-08.

148. Saari, *supra* note 95, at 136-38.

149. Saari, *supra* note 130, at 231-33.