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Justice Improved: The Unrecognized Benefits of Aggregation and Sampling in the Trial of Mass Torts†

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& Peter David Blanck**

Commentators of every persuasion agree that mass torts, particularly trials of asbestos-induced diseases, confront the justice system with serious problems for which it has yet to find solutions.¹ While merely disposing of these cases has proven a formidable burden to courts, actually doing justice in them seems daunting. A procedure is evolving in the trial of these cases whereby samples of cases are tried and the resulting damages are then applied to the remaining population of cases.

In this article, we discuss two aspects of this issue. First, we evaluate collective trials of mass torts under several theories of justice. Though the use of aggregation and sampling is sometimes criticized for failing to approximate the justice afforded by traditional case-by-case determinations, we conclude that the perception that aggregation provides inferior adjudication is largely illusory. The perception proceeds from relying on the traditional bilateral trial as the touchstone of due process. In fact, aggregation adds an important layer of process which, when done well, can produce more precise and reliable outcomes. Paradoxically, the procedural innovation of aggregation provides a quality of justice that surpasses what courts have, until now, been capable of in any kind of case.²

Second, using sampling theory and inferential statistics, we discuss a

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1. See generally *Symposium on Problems in Disposition of Mass Related Cases and Proposals for Change*, 10 REV. LITIG. 209 (1991). Judge Edward Becker of the Third Circuit Court of Appeals has remarked that asbestos cases have presented courts with "the most serious crisis the federal court system has faced in its history." ASBESTOS LITIG. REP. (Andrews) 11,480, 11,481 (Jan. 17, 1986).

2. See Part III *infra*.

number of factors the ideal aggregation procedure should consider to achieve its potential and minimize its pitfalls.³

Before presenting these analyses, however, we examine the problem of mass injury litigation.⁴ We then illustrate the aggregation solution by describing the first case in which it was used.⁵

I. THE PROBLEM

In September 1990, the Chief Justice of the United States appointed the ad hoc Committee on Asbestos Litigation to search for solutions to the enormous backlog of asbestos cases overwhelming the federal docket. The following March, the Committee presented its report to the Judicial Conference of the United States and the Conference transmitted a copy to Congress.⁶ Concluding that the situation had "reached critical dimensions and is getting worse,"⁷ the Committee noted:

What has been a frustrating problem is becoming a disaster of major proportions to both the victims and the producers of asbestos products, which the courts are ill-equipped to meet effectively. . . .

The ensuing five years have seen the picture worsen: increased filings, larger backlogs, higher costs, more bankruptcies and poorer prospects that judgments—if ever obtained—can be collected.

It is a tale of danger known in the 1930s, exposure inflicted upon millions of Americans in the 1940s and 1950s, injuries that began to take their toll in the 1960s, and a flood of lawsuits beginning in the 1970s.⁸

In 1990, federal asbestos filings averaged 1140 per month. For every case resolved, two new ones were filed. The present federal asbestos caseload is equal to one third of the federal criminal caseload.⁹ The rising tide of this human and judicial catastrophe may not crest for at least another generation, as asbestos induced diseases continue to claim more victims.¹⁰

The volume of mass torts presents a challenge that our legal process cannot yet meet. The problem is not caused by asbestos alone, although it currently accounts for the single largest share of the cases. A relative handful of

3. See Part IV *infra*.

4. See Part I *infra*.

5. See Part II *infra*.

6. JUDICIAL CONFERENCE OF THE UNITED STATES, REPORT OF THE JUDICIAL CONFERENCE AD HOC COMMITTEE ON ASBESTOS LITIGATION (1991) [hereinafter, REPORT].

7. *Id.* at 2.

8. *Id.* Quoting from a study by the Institute for Civil Justice of the Rand Corporation, the report also stated: "The picture is not a pretty one. Decisions concerning thousands of deaths, millions of injuries, and billions of dollars are entangled in a litigation system whose strengths have increasingly been overshadowed by its weaknesses." *Id.*

9. As of March, 1991, nearly 31,000 asbestos cases were pending in federal district courts. See *In re Asbestos Prods. Liab. Litig.* (No. VI), 771 F. Supp. 415 (J.P.M.L. 1991) (citing data from the Administrative Office of the United States Courts). The state courts are burdened with twice the number of asbestos cases.

10. This is due in large part to the great delay between the victim's exposure to asbestos and the eventual manifestation of the disease.

products accounts for the bulk of federal products liability litigation.¹¹ Moreover, because products liability cases are more expensive and time consuming than most other types of cases, they consume a disproportionate share of society's dispute resolution resources. Thus, it seems that a single product which can kill or injure tens of thousands, perhaps millions, of people, has the potential to devastate the judicial system as well.¹²

The Committee discussed the various methods that have been used in attempts to cope with the onslaught of asbestos cases: pretrial and trial management, consolidation of cases, class actions, transfer to the judicial panel on multidistrict litigation, collateral estoppel, alternative dispute resolution, and inactivation of dockets.¹³ For reasons of doubtful legality or apparent ineffectiveness, the Committee regarded each of these methods as having failed¹⁴ to improve the justice system's ability to provide just and prompt resolution of the cases.¹⁵

Of the many recommendations made by the ad hoc Committee and approved by the Judicial Conference,¹⁶ two are prominent. First, recognizing that the number of asbestos-related cases may become too great for the courts to manage, the Committee recommended that Congress legislate a national solution by creating new fora for the resolution of these disputes. Faced with a deluge of claims, the courts will not provide justice in any reasonable period of time, and the defendants will likely be bankrupted by

11. Asbestos alone accounted for 25% of the cases, while tools/machinery/equipment, pharmaceuticals, and motor vehicles together totalled 35%. A mere 34 companies were lead defendants in over 35,000 suits. See TERENCE DUNGWORTH, *PRODUCT LIABILITY AND THE BUSINESS SECTOR: LITIGATION TRENDS IN FEDERAL COURTS* at vi, vii (1988).

12. The volume of asbestos cases has been mistaken by more than a few commentators for a generalized explosion in products liability or even tort litigation. See, e.g., U.S. DEPT. OF JUSTICE, *REPORT OF THE TORT POLICY WORKING GROUP ON THE CAUSES, EXTENT, AND POLICY IMPLICATIONS OF THE CURRENT CRISIS IN INSURANCE AVAILABILITY AND AFFORDABILITY* (1986). For further discussion of this point, see Michael J. Saks, *Do We Really Know Anything About the Behavior of the Tort Litigation System—And Why Not?*, 140 U. PA. L. REV. 1147, 1202-05 (1992).

13. REPORT, *supra* note 6, at 17-26. See generally Linda S. Mullenix, *Complex Litigation Reform and Article III Jurisdiction*, 58 *FORDHAM L. REV.* 169 (1990); Alvin B. Rubin, *Mass Torts and Litigation Disasters*, 20 *GA. L. REV.* 429 (1986); Jack B. Weinstein, *Preliminary Reflections on the Law's Reaction to Disasters*, 11 *COLUM. J. ENVTL. L.* 1 (1986); Jack B. Weinstein, *Procedural and Substantive Problems in Complex Litigation Arising from Disasters*, 5 *TOURO L. REV.* 1 (1988); Spencer Williams, *Mass Tort Class Actions: Going, Going, Gone?*, 98 *F.R.D.* 323 (1983); Annual Judicial Conference, Second Judicial Circuit of the United States, *Innovative Techniques for Resolving Complex Litigation*, 115 *F.R.D.* 374 (1987). For a discussion of the shifting conceptualization of procedure in mass torts, see also Judith Resnick, *From "Cases" to "Litigation,"* *LAW & CONTEMP. PROBS.*, Summer 1991, at 5.

14. *But see* MARK A. PETERSON & MOLLY SELVIN, *RESOLUTION OF MASS TORTS: TOWARD A FRAMEWORK FOR EVALUATION OF AGGREGATIVE PROCEDURES* (1988) (finding that different aggregation and ADR methods met with greater success or failure more because of characteristics of the litigation and implementation strategy than because of the particular kind of aggregative procedures employed).

15. On July 29, 1991, the Panel on Multidistrict Litigation ordered that all personal injury asbestos litigation in U.S. federal courts not already in trial be transferred to the Eastern District of Pennsylvania for pretrial proceedings under 28 U.S.C. § 1407 (1988). *In re Asbestos Prods. Liab. Litig.* (No. VI), 771 *F. Supp.* 415 (J.P.M.L. 1991). District Judge Charles R. Weiner has charge of these tens of thousands of cases, and presumably is looking for a way to resolve them.

16. On March 12, 1991.

legal fees and damage assessments long before all of those they have injured have been compensated.¹⁷ The Committee envisions a single administrative or judicial arena which can take command of all state and federal asbestos cases. This forum would also manage all assets at risk and develop ways of dividing these assets equitably among all those entitled, presently or in the future, to recover for their losses. Although this proposal may seem the most sensible solution to mass tort litigation,¹⁸ few expect Congress to act on the Committee's suggestion. The principal fear is that this would ultimately become another federal bailout which, to say the least, is not being proposed at a fiscally opportune moment.

Consequently, the Committee sought to provide the federal courts with alternative solutions which did not require the assistance of Congress. The Committee therefore proposed a procedure known as *collective* trials or case *aggregation* as the principal alternative to a legislative solution. In essence, this process consists of sampling asbestos cases from the total filed within a court's jurisdiction, trying the sample, and then extrapolating the results of the sampled cases to the remaining cases, without subjecting them to individual trials.¹⁹ The Committee asked Congress to authorize this procedure explicitly.²⁰

Controversy surrounds aggregation not only because it is new, but also because the procedure, according to critics, deprives parties of their due process rights.²¹ One member of the ad hoc Committee dissented from their report and its recommendations for precisely these reasons:

[T]he use of class action "collective" trials (trials by aggregation of claims) . . . is a novel and radical procedure that has never been accepted by an appellate court. It has been challenged as being constitutionally suspect in denying defendants their due process and jury trial rights as to individualized claimants, as well as conflicting with the court's obligation to apply state law. It would establish a new form of tort liability with far reaching ramifications to other mass tort cases. . . . Trial by aggregation of claims and then the extrapolation of the damages by the court has been recognized

17. Almost half of asbestos defendants have already filed for bankruptcy. REPORT, *supra* note 6, at 30. For asbestos cases closed in 1980-1982, the average cost to defendants per case was about \$101,000, of which \$39,000 was net compensation to the plaintiff, \$37,000 went to the defendant's litigation expenditures, and \$25,000 went to the plaintiff's litigation expenditures. JAMES S. KAKALIK, PATRICIA A. EBENER, WILLIAM L.F. FELSTINER, MICHAEL G. SHANLEY & GUS W. HAGGSTRÖM, VARIATION IN ASBESTOS LITIGATION COMPENSATION AND EXPENSES at xviii (1984).

18. See Lester Brickman, *The Asbestos Claims Management Act of 1991: A Proposal to the United States Congress*, CARDOZO L. REV. (forthcoming 1992); Lester Brickman, *The Asbestos Litigation Crisis: Is There a Need for an Administrative Alternative?*, CARDOZO L. REV. (forthcoming 1992).

19. The aggregation procedure is so new that it has been applied only in *Cimino v. Raymark Indus.*, 751 F. Supp. 649 (E.D. Tex. 1990), which is being appealed to the Fifth Circuit, and is in the process of being applied in *In re Shell Oil Co.*, 136 F.R.D. 588 (E.D. La. 1991).

20. REPORT, *supra* note 6, at 36.

21. E.g., Richard A. Epstein, *The Consolidation of Complex Litigation: A Critical Evaluation of the ALI Proposal*, 10 J.L. & COM. 1 (1990); Roger H. Trangsrud, *Mass Trials in Mass Tort Cases: A Dissent*, 1989 U. ILL. L. REV. 69.

by the committee itself as being "the most radical solution . . ." ²²

Moreover, proposals to depart from the traditional trial model implicate fundamental choices among different "versions of legal reality." ²³

II. AN ILLUSTRATION OF AGGREGATION: *CIMINO V. RAYMARK*

A. *The Saga of Cimino v. Raymark*

In *Cimino v. Raymark Industries*,²⁴ Chief Judge Robert Parker of the Eastern District of Texas used the procedural innovation of aggregation to resolve the trial of mass torts arising from a class action asbestos case. In several cases prior to *Cimino*, the district court and court of appeals had tried to resolve this litigation. Their results were characterized by Judge Parker as "missed opportunities."²⁵

One missed opportunity occurred in 1981, when one defendant sought to assert a district-wide market share determination among all the defendants in order to reduce the costs of continuing litigation and to establish apportionment among the defendants. This effort was abandoned, however, in response to pressure from co-defendants.²⁶ Judge Parker lamented, with hindsight, that the court did not force the issue, because a district-wide market share determination could have saved millions of dollars in transaction costs.²⁷ Indeed, while these cases had awaited resolution, many of the key defendants, including the first named defendant, Raymark, went bankrupt.²⁸ In addition, over four hundred members of the class died while waiting for their cases to be heard. And by the time the class action would ultimately end, transaction costs were likely to exceed compensation.²⁹ Thus, the remaining class members subject to the *Cimino* decision had been burdened by these same costs and had yet to receive their day in court.

To reduce the costs of repetitive trials, the district court also had used issue preclusion to find products containing asbestos defective and unreasonably dangerous as a matter of law, and to prevent the plaintiffs from seeking punitive damages.³⁰ This approach became another "missed opportunity"

22. REPORT, *supra* note 6, at 41 (separate dissenting statement of Judge Thomas F. Hogan). One might, however, ask a few questions about these judgments of radicality. Is aggregation of claims more "radical" than their complete removal from the courts and disposition through a freshly baked forum, with its own new and untried rules? Moreover, what does it matter how "radical" the solution is? The most radical solution, legislative takeover, also seems to be a solution whose time ought to come, even though it is unlikely to, and all the "non-radical" solutions have failed so far.

23. PETER H. SCHUCK, *AGENT ORANGE ON TRIAL: MASS TOXIC DISASTERS IN THE COURTS* 255 (1986).

24. 751 F. Supp. 649 (E.D. Tex. 1990).

25. *Id.* at 651.

26. *Id.*

27. *Id.* Eventually, the defendants stipulated to their apportionment of responsibility. *Id.* at 654.

28. *Id.* at 650-51.

29. See note 17 *supra*.

30. 751 F. Supp. at 651 (citing *Hardy v. Johns-Manville Sales Corp.*, 509 F. Supp. 1353 (E.D. Tex. 1981), *rev'd in part*, 681 F.2d 334 (5th Cir. 1982)).

when it, too, was rejected by the Fifth Circuit.³¹ Judge Parker emphasized “the disparity of appreciation for the magnitude of the problem between the trial court and the Court of Appeals.”³² He suggested that the district court should have caused “thirty to forty identical appeals to have been processed in order to enhance the awareness level of the Court of Appeals.”³³

In a third attempt at a solution, the district court established a voluntary program of alternative dispute resolution (ADR) for the asbestos cases.³⁴ Although many defendants participated, the ADR program provided only partial settlements before it was set aside by the District Court for the Eastern District of Texas sitting en banc.³⁵

After these three efforts, the district court was left with the claim resolution procedures outlined in the Fifth Circuit’s 1986 decision in *Jenkins v. Raymark Industries*.³⁶ In *Jenkins*, the Fifth Circuit upheld the district court’s earlier decision to certify a class of plaintiffs with asbestos-related claims to determine the viability of the “state of the art” defense and to obtain jury determinations of common factual issues.³⁷ Common issues aside, however, the *Cimino* court was still left with 2298 cases to try.³⁸

The *Jenkins* procedure was inadequate because it simply could not accommodate the large number of cases that had accumulated on the district court’s docket. This fact, combined with defendants’ attempt to avoid liability through a “fortress mentality” strategy, frustrated the court’s ability to provide a forum to all plaintiffs in these cases.³⁹ The defendants’ strategy involved pressing for an individual trial in each case and contesting all issues, even though they involved the same products, warnings and conduct.⁴⁰ The court estimated that even if it could conclude thirty cases a month, it would take over six years to try all of these cases and, at the present rate of filing, over 5000 cases would still be pending.⁴¹ The court faced the challenge of providing a method for trying these cases that was fair, yet cost effective, as well as one that would keep the court from falling further behind each day. In tackling this problem the court stated: “It is not enough to chronicle the existence of this problem and to lament congressional inaction.

31. *Id.* (citing *Hardy v. Johns-Manville Sales Corp.*, 681 F.2d 334 (5th Cir. 1982)).

32. *Id.*

33. *Id.* According to Judge Parker, the *Hardy* decision “has cost over \$400 million in increased and unnecessary transaction costs and has preserved for defendants the right to be subjected to punitive damages.” *Id.*

34. *Id.*

35. *Id.* The ADR program was found to be flawed in three respects: (1) the program could not be binding or mandatory under existing law, (2) some plaintiffs’ counsel were uncooperative and the defendants made it ineffective by delay tactics, and (3) the defendants were unable to agree upon the apportionment of damages. *Id.*

36. 782 F.2d 468 (5th Cir. 1986). These approved procedures constitute Phases I and II of *Cimino*, to be discussed momentarily. What remains at issue are the aggregation and sampling procedures that formed Phase III of the trial.

37. *Jenkins*, 782 F.2d at 473.

38. *Cimino v. Raymark Indus.*, 751 F. Supp. 649, 653 (E.D. Tex. 1990).

39. *Id.* at 651.

40. *Id.* at 651-52.

41. *Id.* at 652.

The litigants and the public rightfully expect the courts to be problem solvers."⁴²

B. *The Statistical "Solution" in Cimino*

Under Federal Rule of Civil Procedure 23(b)(3), the court certified a class consisting of 3031 members with existing asbestos cases in the Eastern District of Texas.⁴³ All the plaintiffs claimed asbestos-related injury or disease resulting from exposure to defendants' asbestos-containing insulation products. After the settlement and dismissal of some 700 cases, the remaining class consisted of 2298 plaintiffs.⁴⁴

Cimino was tried in three phases. Phase I used the procedures approved by the Fifth Circuit in *Jenkins* to resolve all common issues of law and fact.⁴⁵ Phase II required a jury determination for each of the worksites, crafts, and relevant time periods as to whether asbestos-containing insulation products were used, as well as which groups were sufficiently exposed to such asbestos products to cause the alleged injuries. This phase also included an apportionment of responsibility among the defendants.⁴⁶ In addition, asbestos exposure issues submitted to the court were further specified as to time, place, craft, and amounts of exposure.⁴⁷

Phase III assessed damages and provides the main focus of our analysis. All of the *Cimino* plaintiffs waived their right to an individualized verdict and agreed to the following sampling procedures. The 2298 class members were divided into five disease categories based on the plaintiffs' injury claims. From each of the five disease categories the court selected a random sample,⁴⁸ distributed as follows:

	<u>Sample Size</u>	<u>Disease Category Population</u>
Mesothelioma	15	32
Lung Cancer	25	186
Other Cancer	20	58
Asbestosis	50	1050
<u>Pleural Disease</u>	<u>50</u>	<u>972</u>
Totals	160	2298

42. *Id.*

43. *Id.*

44. *Id.*

45. *Id.* at 653. Phase I issues were (1) whether each asbestos-containing insulation product manufactured by each defendant was defective and unreasonably dangerous, (2) the adequacy of defendants' warnings, and (3) the "state of the art" and the "fiber type" defenses. The issue of punitive damages was also submitted for jury determination. *Id.*

46. *Id.* at 654. The defendants stipulated to this last issue, so a jury finding was unnecessary.

47. *Id.* at 653.

48. A "random sample" is one in which each member of the population has an equal probability of being selected for inclusion in the sample. Since only careful procedures can produce random samples, courts using sampling techniques ought to describe exactly what sort of procedure was employed, much as a research study describes its methods so that readers can evaluate for themselves the quality of the research.

The damage portion of each sampled case was submitted to a jury and those plaintiffs were awarded the actual *individual* verdicts, subject to remittitur or new trial orders. Then, the average verdict after remittitur, within each of the five disease categories, was awarded to each *nonsample* group member.⁴⁹

The verdict for Phase I was returned in March, 1990. Two new juries were selected for Phases II and III in July, 1990. These two juries sat together for the first five trial days, which were devoted primarily to medical testimony. Next, the two juries were divided and each began hearing testimony on its share of the 160 sampled plaintiffs. The juries then began returning damage verdicts; the last verdict was received in early October, 1990, some eight months after the trial had begun.⁵⁰

Phase II was designed to resolve the issue of plaintiffs' exposure to defendants' products on a class-wide basis.⁵¹ The court concluded that the resolution of the issues in Phase II was facilitated by the "homogeneous nature" of these plaintiffs' work histories.⁵² After the juries reached their verdicts for the nine class representatives and the 160 trial sample plaintiffs, the court ordered remittitur in thirty-four of the pulmonary and pleural cases and in one mesothelioma case.⁵³

In Phase I, the initial jury had found the defendants grossly negligent, holding them liable for punitive damages. This jury had also assessed a punitive damages multiplier for each dollar of actual damages in varying amounts for each of the non-settling defendants.⁵⁴ The court then would apply the multipliers set for a defendant to that defendant's allocated share of actual damages.⁵⁵

During Phase III, the defendants introduced evidence of plaintiffs' contributory negligence. The two new juries were instructed to consider the plaintiffs' contributory negligence, for example from smoking, only if the plaintiff was suffering from an asbestos-related disease linked to smoking, and only if the plaintiff had knowledge and appreciation of the danger of the

49. *Cimino v. Raymark Indus.*, 751 F. Supp. 649, 653 (E.D. Tex. 1990).

50. *Id.* During this time, the court entered 373 signed orders. The resulting transcript was over 25,000 pages. Before trial, almost 2000 sets of interrogatories were answered by the parties and 2354 depositions were taken, with an additional 800 taken during the trial. Independent medical examinations were taken of 1400 plaintiffs. During trial, 271 expert witnesses and 292 fact witnesses testified; 6176 exhibits were received into evidence, constituting 577,000 pages of documents. Fifty-eight lawyers participated in the in-court presentation of the case. The case was presided over in varying degree by four district court judges and three magistrates. Judge Parker notes that "[i]f all that is accomplished by this is the closing of 169 cases, then it was not worth the effort and will not be repeated." *Id.*

51. *Id.* at 653-54.

52. *Id.* at 654.

53. *Id.* at 657. The court also granted a new trial in one mesothelioma case.

54. *Id.* at 657-58. Using a multiplier to compute punitive damages was suggested in *Jenkins v. Raymark Indus.*, 782 F.2d 468, 474 (5th Cir. 1986). The same procedure for setting punitive damages has been adopted for use in *In re Shell Oil Co.*, 136 F.R.D. 588 (E.D. La. 1991), which also follows the procedures approved in *Jenkins*.

55. *Cimino*, 751 F. Supp. at 658.

product.⁵⁶ As a result, some plaintiffs received awards of zero, which were factored into the average amounts awarded to the nonsample plaintiffs.⁵⁷

Phase III of the court's solution used inferential statistics to resolve damages for the nontrial sample. Using this procedure, damages were computed for the 2138 cases other than the 160 actually tried. In support of the use of sampling, the court quoted a Sixth Circuit decision, *E.K. Hardison Seed Co. v. Jones*, which held samples to be admissible "to show the quality or condition of the entire lot or mass from which they are taken."⁵⁸ The *Hardison* court had found two prerequisites necessary to admit samples. First, the total population of cases should be substantially uniform with reference to the quality of the sample in question. Second, the sample should be representative of the total population.⁵⁹

Defendants asserted that the use of these statistical methods was inappropriate.⁶⁰ The court rejected this claim, pointing out the use of statistics and extrapolation by the defendants in their own evidence during the trial. The court then gave examples of the use of statistics in medical research, testing of new products, standardized educational testing, the political arena, and in the courts.⁶¹ The court described the use of statistics as "common-place,"⁶² with applications in employment discrimination, antitrust, trademark infringement, civil rights, and tort cases (e.g., to prove liability and damages).⁶³

When the class was certified, the court considered two options for allocating damages. One was to provide a lump sum award to the plaintiffs as a group. Under the lump sum approach, typical plaintiffs would be chosen for a jury's benefit in determining a single lump sum damage award for the entire class.⁶⁴ However, this approach was rejected by the Fifth Circuit in *In re Fibreboard Corp.*⁶⁵

56. *Id.*

57. *Id.* at 665.

58. *Id.* at 662 n.14 (quoting *E.K. Hardison Seed Co. v. Jones*, 149 F.2d 252, 256 (6th Cir. 1945)).

59. *E.K. Hardison Seed Co. v. Jones*, 149 F.2d 252, 256 (6th Cir. 1945).

60. *Cimino*, 751 F. Supp. at 665.

61. *Id.* at 659-61.

62. *Id.* at 661.

63. *Id.* at 661-63.

64. *Id.* at 664. Because of the court's initial plan to employ the lump sum approach, descriptive data were gathered on the class members. The data became essential to the aggregation and sampling approach that eventually was used.

65. 893 F.2d 706 (5th Cir. 1990). Here, the Fifth Circuit concluded that the class members could not be certified for trial under Rule 23(b)(3) because under the lump sum procedure there existed too many disparities among the various plaintiffs for their common concerns to predominate. *Id.* at 712. Moreover, the Court of Appeals held that the lump sum procedure infringed on the dictates of *Erie R.R. v. Tompkins*, 304 U.S. 64 (1938), in that it resulted in the claim of a single unit of 2990 persons without the possibility of individualized claims as required under substantive Texas tort law. *In re Fibreboard*, 893 F.2d at 711. In *Cimino*, the district court attempted to address the issues raised in *In re Fibreboard* by structuring the damages only trial in Phase III and then dividing the plaintiffs into five disease categories from which the samples were drawn in a way that, arguably, the 160 jury results would be comparable to the average result if all 2990 cases were tried. *Cimino*, 751 F. Supp. at 665-66. Thus, the *Cimino* court attempted to individualize the judgments for non-tried cases. *Cf.* Letter from Judith Resnik, Professor of Law, University of Southern California, and

Instead, the *Cimino* court decided to try a representative sample of cases and then extrapolate those awards to the nonsample cases. The sampling option, in contrast to the lump sum award procedure, included the allocation of damages to the 160 randomly sampled plaintiffs. When the court adopted the random sampling approach to damages, it deferred a decision on the "representativeness" of the sample until after the actual trials for the 160 plaintiffs. The court later concluded that the impact of the 160 cases was of sufficient importance that it had to determine whether the sample was in fact representative.⁶⁶ This required that the randomly drawn samples be comparable to the population of each disease category.

To address this issue, the court held a post-trial hearing. At the post-trial hearing, the court concluded that the samples within each disease category were representative of the larger population of nontrial cases.⁶⁷ In setting the sample size for each disease category, the court sought a confidence level of 95 percent.⁶⁸ Expert testimony indicated that the actual precision level achieved by the samples exceeded that sought by the court.⁶⁹ In addition, this testimony revealed that, with two minor exceptions, the samples on the whole achieved a 99 percent confidence level. Defendants presented no evidence at the post-trial hearing attacking the methodology for comparing the sample to the entire class population.⁷⁰ The court concluded, therefore, that the distributions of numerous variables were comparable between the samples and their respective subclasses of the population of cases. It found that because the goodness-of-fit⁷¹ exceeded the acceptable limits it had articulated, no further cases needed to be tried prior to extrapolation of the damage awards to the nontrial sample.

In summary, the court found no methodological reason why the average damage verdicts for the 160 sampled cases in each disease category should not be applied to the non-sample class members. The average damages were calculated after remittitur and took into account those cases in which plaintiffs failed to prove the existence of an asbestos-related disease, resulting in a zero verdict. The court concluded:

Individual members of a disease category who will receive an award that might be different from one they would have received had their individual

Thomas D. Rowe, Jr., Professor of Law, Duke University, to the Honorable Thomas M. Reavley, Chair of the Ad Hoc Committee on Asbestos Litigation (Mar. 8, 1991) (on file with the *Stanford Law Review*).

66. *Cimino*, 751 F. Supp. at 664.

67. *Id.*

68. *Id.* Confidence levels, or confidence intervals, are explained, at notes 178-179 *infra* and accompanying text. They concern the probability that the sample actually reflects the population. Confidence intervals are used in *Cimino* as a tool for assessing the extent to which a sample reflects the population from which it was drawn. Problems with the application in this case, and alternatives, are discussed at notes 180-184 *infra* and accompanying text.

69. Statistically, this would mean that the goodness-of-fit between the sample and the population was closer than the court required. *Cimino*, 751 F. Supp. at 664.

70. *Id.*

71. "Goodness-of-fit" is a term used in statistics to refer to the closeness of fit between a population and representative sample.

case been decided by a jury have waived any objections, and the defendants cannot show that the total amount of damages would be greater under the court's method compared to individual trials of these cases. Indeed, the millions of dollars saved in reduced transaction costs inure to defendants' benefit.⁷²

The court was sensitive to the view that statistical models cannot replace completely the traditional values embodied in our notions of due process.⁷³ Nevertheless, it concluded that science had assumed its proper role in the dispute resolution process in this mass tort situation.⁷⁴ The court asserted that it could not be said that the solution in *Cimino* was not a "trial";⁷⁵ the orders entered were a product of judicial opinion, and the liability verdicts and 160 damage awards for the randomly sampled cases were made by juries.⁷⁶

As mentioned earlier, the plaintiffs stipulated to the use of aggregation,⁷⁷ thereby waiving all objections to the procedure.⁷⁸ In contrast, the defendants objected to the solution,⁷⁹ asserting that even in mass tort asbestos litigation, due process entitles defendants to a traditional individual trial in each of the 2298 cases. Defendants argued that no common issues existed and that the damages elements varied among plaintiffs. The court found, however, that: (1) it was undisputed that the product list submitted during Phase I comprised insulation products manufactured by the defendants, (2) the jury found these products to be defective, and (3) these factors would not vary from plaintiff to plaintiff.⁸⁰ Although the degree of exposure varied for each plaintiff, the court concluded these factors had been set by the stipulations in Phase II of the trial. The court opined that the essential elements of

72. *Cimino*, 751 F. Supp. at 665.

73. *Id.* For an overview of traditional values of due process, see Martin H. Redish & Lawrence C. Marshall, *Adjudicatory Independence and the Values of Procedural Due Process*, 95 YALE L.J. 455 (1986).

74. *Cimino*, 751 F. Supp. at 665. For applications of social science to social reform, see Peter David Blanck, *The Americans with Disabilities Act: Further Implications for Employers and Employees*, 16 J. CORP. L. (forthcoming 1992); Peter David Blanck, *Empirical Study of the Employment Provisions of the Americans with Disabilities Act: Methods, Preliminary Findings and Implications*, 22 N.M. L. REV. (forthcoming 1992).

75. *Cimino*, 751 F. Supp. at 665.

76. *Id.*

77. However, one is left to wonder about the quality of plaintiffs' waiver. Our colleague, Professor Green, has suggested that while it may make sense in the aggregate for plaintiffs to consent, the same would likely not be true for an asbestosis victim who is at the extreme end of the disease for members in his category. Several related questions arise: Would such a plaintiff have consented freely to including his case in the aggregative procedure, especially knowing that most others relatively less afflicted would consent? And, would such a plaintiff actually be presented with this choice by plaintiffs' counsel?

78. Similarly, most plaintiffs approved of the mass transfer of cases by the Panel on Multidistrict Litigation. *In re Asbestos Prods. Liab. Litig.* (No. VI), 771 F. Supp. 415, 416 (J.P.M.L. 1991).

79. Future analysis is required of instances in which plaintiffs consent to the aggregative procedures versus instances in which there is nonconsent by both plaintiffs and defendants. For example, the impact of consent on settlement outcomes in aggregated tort litigation poses an interesting empirical question. The discussion herein focuses primarily on cases in which plaintiffs consent to the aggregation procedures. See, e.g., note 78 *supra* (behavior of plaintiffs in Multidistrict Litigation).

80. *Cimino*, 751 F. Supp. at 665.

damages in personal injury tort cases were tried, and that it had ascertained the appropriate damages in Phase III.⁸¹

In the end, the court reasoned that unless its solution were used, these cases would not be tried, which would be the ultimate failure of due process:

Defendants complain about the 1% likelihood that the result would be significantly different. However, plaintiffs are facing a 100% confidence level of being denied access to the courts. The Court will leave it to academicians and legal scholars to debate whether our notion of due process has room for balancing these competing interests.⁸²

III. THE JUSTICE OF SAMPLING AND AGGREGATION

In this section, we examine the constitutional, psychological, and societal values that aggregated trial procedures may serve.⁸³ First, we review broadly both the instrumental and noninstrumental values procedural due process is thought to express and to support. Then, we probe more deeply into two value domains where aggregation appears to raise the greatest concern: distributive justice and procedural justice.

A. Instrumental and Noninstrumental Values in Procedural Due Process

Assuming that aggregation is capable of ameliorating the numbers problem that mass tort litigation presents, the procedure still must meet the constitutional test of due process. Defendants involved in aggregated trials like *Cimino* claim that aggregated procedures deny them their constitutional due process right to a one-on-one trial.⁸⁴ But a closer look at the aggregated trial, at least in the mass tort context, suggests that this procedure does not necessarily violate traditional notions of due process under the Fifth and Fourteenth Amendments.⁸⁵ In fact, the absence of such procedures is tantamount to denying many litigants their due process trial rights altogether.⁸⁶

Two basic points are made in this subsection: (1) traditional notions of procedural due process are, in fact, met in the aggregated context, and (2) alternative procedures, such as aggregated trials, may be necessary for vindicating due process values in the context of mass tort litigation.⁸⁷ The discus-

81. *Id.*

82. *Id.* at 666. In this quotation, the court no doubt is using these terms metaphorically.

83. For a review of the constitutional issues raised in the REPORT, *supra* note 6, see Resnick & Rowe, *supra* note 65.

84. Note that Judge Parker's conclusion is that the aggregation solution still involves a trial, orders that are a product of judicial opinion, and liability verdicts and awards for all parties. *Cimino*, 751 F. Supp. at 665.

85. See, e.g., *Martin v. Wilks*, 490 U.S. 755, 762 n.2 (1989) (concluding, after citing supporting case law, that in class action suits, in appropriate circumstances "a person, although not a party, has interests adequately represented by someone with the same interests who is a party").

86. *Cimino*, 751 F. Supp. at 666. See generally David Hittner & Kathleen Weisz Osman, *Federal Civil Trial Delays: A Constitutional Dilemma?*, 31 S. TEX. L.J. 341 (1990).

87. Cf. *Cimino*, 751 F. Supp. at 665-66 (defendants arguing that *In re Fibreboard Corp.*, 893 F.2d 706 (5th Cir. 1990), entitles them to traditional one-on-one trial in each of the 2298 cases; court noting that due process in asbestos context should not be analyzed in traditional terms but should encompass societal interest involved).

sion that follows considers what types of procedures may be necessary to meet due process requirements in aggregating trials in mass tort litigation. We conclude that the argument that due process requirements, traditional or otherwise, are not met in the aggregated trial process has little merit.⁸⁸ Indeed, we will show that the aggregated trial is, in some vital respects, superior to the individual trial.

In the past twenty years considerable analysis has been done on the requirements of due process. The analysis here reviews the issue from the vantage point of the litigant—both plaintiff and defendant—in mass tort litigation who may invoke the clause. As others have put the question, what process is due when it is recognized that the guarantee already applies in a particular case?⁸⁹ Professors Redish and Marshall have provided a useful framework for analysis of what procedures are necessary to meet the requirements of due process in aggregated mass tort litigation.⁹⁰ They describe the Supreme Court's flexible conception of due process that is to be applied on a case-by-case basis, and analyze core values of the procedural due process requirement.⁹¹ Their work supports the view that "due process, unlike some legal rules, is not a technical conception with a fixed content unrelated to time, place and circumstances."⁹²

The Supreme Court has applied a balancing approach, weighing procedural safeguards against the State's burden in providing such protections.⁹³ In *Mathews v. Eldridge*,⁹⁴ the Court identified the three factors that shape the balancing process: (1) the private interest affected, (2) the risk of erroneous deprivation of the interest through the procedures used, and (3) the Government's interest, including all fiscal and administrative burdens that the additional procedure would require.⁹⁵ The *Mathews* test attempts to ensure the *accuracy of outcome* from the process. It is relatively less focused on the fairness or perceived fairness of the procedures themselves.⁹⁶

Recently, in *Connecticut v. Doehr*,⁹⁷ the Supreme Court has refined the third prong of the *Mathews* test for disputes involving only private parties.

88. See also Resnik & Rowe, *supra* note 65, at 11-12 (In the trial of mass torts, "class action treatment of some issues does not preclude individual decisionmaking on others, and it is the need for clarity on the question of aggregate treatment of causation and damage issues in asbestos litigation that prompts the Ad Hoc Committee's suggestions.").

89. For extensive analysis of this question, see Redish & Marshall, *supra* note 73, at 456.

90. *Id.*

91. *Id.* See also *Mathews v. Eldridge*, 424 U.S. 319, 334 (1976) (examining what process is due when the government itself seeks to effect a deprivation on its own initiative); *Morrissey v. Brewer*, 408 U.S. 471, 481 (1972) (requiring a hearing before parole revocation).

92. *Connecticut v. Doehr*, 111 S. Ct. 2105, 2112 (1991) (quoting Cafeteria and Restaurant Workers Union, Local 473 v. McElroy, 367 U.S. 886, 895 (1961)).

93. Redish & Marshall, *supra* note 73, at 468-72 (overview of balancing scheme).

94. 424 U.S. 319, 334-35 (1976) (holding plaintiff not denied due process when Social Security Administration terminated benefits without hearing).

95. *Id.* at 335.

96. See Jerry L. Mashaw, *The Supreme Court's Due Process Calculus for Administrative Adjudication in Mathews v. Eldridge: Three Factors in Search of a Theory of Value*, 44 U. CHI. L. REV. 28 (1976) (arguing that in balancing approach Court ignores other basic concerns such as individual dignity and equality).

97. 111 S. Ct. 2105 (1991).

In *Doehr*, the Court found unconstitutional a Connecticut statute that allowed prejudgment attachment of real estate without prior notice or a hearing (e.g., without a trial). A plaintiff merely had to verify that there was probable cause to sustain the attachment's validity. Although the Court followed the first two factors in *Mathews*, it altered the third factor to focus principally on the interest of the party seeking its prejudgment remedy, with "due regard for any ancillary interest the government may have in providing the procedure or foregoing the added burden of providing greater protections."⁹⁸ The ultimate outcome in *Doehr*, like that in *Cimino*, hinges on the due process interests of both the plaintiffs and the defendants. But in *Doehr*, the Court underscored the importance of the plaintiffs' interest in the modified *Mathews* test by suggesting that a showing by the plaintiff of some exigent circumstance may be enough to allow a pre-hearing attachment.⁹⁹ In *Cimino*, the class members are faced with just such exigent circumstances.

The aggregation procedure is not necessarily inconsistent with the *Mathews* test. First, the private interest affected principally involves the compensation defendants would have to pay plaintiffs, including both those in actual trials and those receiving the extrapolated damage awards. But this prong does not address the relationship between the procedure afforded the parties and the interest at stake. One could argue that in the aggregated trial, the defendants' total liability almost certainly does not significantly exceed what they would have to pay after individual trials, attorney fees and other transaction costs. However, the *Mathews* test as applied to the aggregated trial clearly does not suggest a mere assessment of plaintiffs' and defendants' monetary compensation, regardless of the trial procedures used.

Under the second prong of the *Mathews* test there may be little or no risk of erroneous deprivation of the defendants' property through aggregation procedures.¹⁰⁰ In the aggregated trial, a determination of liability occurs, with judicial orders subject to objection and appeal. Each plaintiff still must prove medical status, liability, and all other components of the traditional tort claim (e.g., in *Cimino*, during Phases I and II). The only issue decided in the aggregate is how the damages are to be allocated from defendants to particular plaintiffs based on their individual circumstances (e.g., in *Cimino*, during Phase III).

The third prong of the *Mathews* test is really not a factor at all in the mass tort litigation context. No one can argue rationally that the procedure creates additional fiscal or administrative burdens for the defendants that come close to those resulting from the traditional one-on-one trial context. Again, one need only consider the enormous transaction costs involved in trying the huge and growing backlog of cases pending in the courts to appre-

98. *Id.* at 2112.

99. *Id.* at 2115.

100. *Cf.* Resnik & Rowe, *supra* note 65, at 17 (noting that due process analysis depends on the sampling technique employed, for example, in cases actually tried if "every triable defense of each defendant could be presented to the trier of fact"). *But see also* Part IV *infra*.

ciate this point.¹⁰¹ *Doehr* lends support to the view that the *Cimino* class members' interests in the aggregation procedure are compelling because, in the absence of such procedures, they would not receive their day in court, which would be the ultimate failure of due process.¹⁰²

Although the flexible structure of the *Mathews* test seems by itself to support the constitutionality of aggregation procedures in mass tort litigation,¹⁰³ hypothesized "instrumental" and "noninstrumental" values embodied in procedural due process implicate the psychological and societal benefits of the procedure and warrant brief analysis. This analysis supports the conclusion that the due process values embodied in *Mathews* and its progeny are constitutionally satisfied in the aggregated mass tort trial.¹⁰⁴

Instrumentalists argue that the constitutional purpose of the due process clause is to ensure the most accurate decision possible.¹⁰⁵ The rights to notice, hearing, and counsel each contribute to the goal of accuracy. These procedures allow litigants to argue their case fairly before the decisionmaker and, as Justice Frankfurter stated, "generat[e] the feeling, so important to a popular government, that justice has been done."¹⁰⁶

In some circumstances it is possible "to fashion a hearing that meets the requirements of due process, even though one or another of these procedural elements is absent."¹⁰⁷ For example, cases on appeal regularly are decided on written briefs without oral argument.¹⁰⁸ Another example arises in small claims trials, where participation by counsel is neither required nor customary.¹⁰⁹ Thus, in certain circumstances, traditional elements of due process have been omitted "without adversely affecting the factfinding process."¹¹⁰ Likewise, the instrumental conception may be applied to aggregated trials. In the properly conducted aggregated trial, parties receive adequate and fair notice of the proceedings. The entire process is conducted as a judicial proceeding before an independent adjudicator.¹¹¹ Parties whose property rights are implicated have the opportunity to be represented and heard unless they

101. See REPORT, *supra* note 6, at 13 (finding, for example, that in a typical asbestos case 61 cents of each dollar are consumed by transaction costs).

102. See text accompanying note 82 *supra*. See also notes 77-78 *supra* and accompanying text (plaintiff class waived any objection to aggregation procedure).

103. This is a somewhat different conclusion from that of Redish and Marshall, who conclude that the *Mathews* test can lead to the result that an individual sometimes will "have a clear due process right to no process." Redish & Marshall, *supra* note 73, at 472.

104. *Id.* at 475-76 (arguing that "[n]one of the core values of due process . . . can be fulfilled without the participation of an independent adjudicator").

105. *Id.* at 476-77 (summarizing the instrumentalists' position).

106. Joint Anti-Fascist Refugee Comm. v. McGrath, 341 U.S. 123, 172 (1951) (Frankfurter, J., concurring).

107. Redish & Marshall, *supra* note 73, at 479.

108. *Id.* at 477-78. See also United States v. Smith, 484 F.2d 8 (10th Cir. 1973) (holding that court of appeals may decide cases on written briefs only), *cert. denied*, 415 U.S. 978 (1974).

109. Redish & Marshall, *supra* note 73, at 477. Indeed, several states prohibit representation by attorneys. See Suzanne Elwell, *The Iowa Small Claims Court: An Empirical Analysis*, 75 IOWA L. REV. 433, 448 n.99 (1990) (citing state statutory provisions).

110. Redish & Marshall, *supra* note 73, at 477.

111. See *Cimino v. Raymark Indus.*, 751 F. Supp. 649, 665 (E.D. Tex. 1990).

stipulate otherwise, as did the *Cimino* class members.¹¹²

Additionally, in the aggregated trial, parties present written briefs¹¹³ and the right to counsel is no more limited than in an ordinary class action. Evidence and witnesses are examined and cross-examined, and motions are argued. When well done, the aggregated trial does not deny any of the instrumental values of due process, particularly from the viewpoint of defendants. Moreover, the value of procedural participation, central to legitimate judicial process, is not necessarily compromised in aggregated trials for either class members or defendants.¹¹⁴ Of course, as the Fifth Circuit concluded in *In re Fibreboard*, there is some point at which changes in procedure affect the parties' substantive legal rights and duties.¹¹⁵

Legal scholars have also asserted "noninstrumental" values that are said to be embodied in procedural due process, particularly in civil litigation.¹¹⁶ One noninstrumental value is the "appearance" of justice and fairness in the courtroom.¹¹⁷ These scholars argue that due process requires trial judges to be not only fair and impartial; they also must satisfy the appearance of justice.¹¹⁸ The instrumental value of *being* fair cannot be realized fully unless the noninstrumental value of *appearing* fair is also achieved. The appearance of judicial impartiality and independence is not necessarily undermined by aggregation procedures. To the contrary, the aggregation procedure may even minimize, for example, incentives for trial judges to develop preconceived notions about individual trial outcomes.¹¹⁹ Judge Newman has taken the argument one step further, suggesting that traditional conceptions of fairness in our system of justice are related to "many of the undesirable as-

112. Cf. Resnik & Rowe, *supra* note 65, at 16 (concluding that written notice to opt out of aggregated trial would respond to plaintiffs' due process concerns, but defendants' issues are whether defendants have standing to object to procedures, and, if so, whether they are deprived of due process or Seventh Amendment right to jury trial).

113. *But cf.* Redish & Marshall, *supra* note 73, at 478 (noting that in complex cases involving technical medical evidence, written presentation of evidence is in fact more helpful than the oral presentation of evidence).

114. See Susan P. Sturm, *A Normative Theory of Public Law Remedies*, 79 GEO. L.J. 1357, 1391-93 (1991) (reviewing scholarship asserting that participation serves two basic values: respect for the dignity of litigants and enhancement of reasoned and accurate decisionmaking).

115. *In re Fibreboard Corp.*, 893 F.2d 706, 711 (5th Cir. 1990) ("substantive duty can come dressed as a change in procedure," thereby infringing on the *Erie* doctrine). See generally Part IV *infra*, for a discussion of the relation of procedural changes and substantive legal outcomes.

116. See Jerry L. Mashaw, *Administrative Due Process: The Quest for a Dignitary Theory*, 61 B.U. L. REV. 885, 899 (1981) (developing the concept of noninstrumental values). See also Judith Resnik, *Tiers*, 57 S. CAL. L. REV. 837 (1984).

117. For empirical studies of this value, see Peter David Blanck, Robert Rosenthal & LaDoris Hazzard Cordell, *The Appearance of Justice: Judges' Verbal and Nonverbal Behavior in Criminal Jury Trials*, 38 STAN. L. REV. 89 (1985); Peter David Blanck, Robert Rosenthal, Allen J. Hart & Frank Bernieri, *The Measure of the Judge: An Empirically-Based Framework for Exploring Trial Judges' Behavior*, 75 IOWA L. REV. 653 (1990); Peter David Blanck, *What Empirical Research Tells Us: Studying Judges' and Juries' Behavior*, 40 AM. U. L. REV. 775 (1991).

118. The appearance of judicial bias, for example, is sometimes a ground for reversal even if the judge is, in fact, completely impartial. See Blanck, *What Empirical Research Tells Us: Studying Judges' and Juries' Behavior*, *supra* note 117, at 776.

119. Cf. Sturm, *supra* note 114, at 1399 (examining possible remedial structure and roles of trial judges in public law litigation).

pects of our modern process of litigation," such as a narrow emphasis on individual case results.¹²⁰

Another noninstrumental value that has been suggested is equality before the law.¹²¹ In principle, procedural rules in aggregated trials should be "equal" for all plaintiffs and defendants.¹²² But in reality, equality sometimes does not prevail. For example, in *Cimino* all class members should probably have received the average damage award, regardless of whether or not their particular award was determined by a jury, and yet only 160 class members received jury awards.

Predictability, transparency, and rationality have also been asserted as noninstrumental values.¹²³ These values relate to the litigants' ability to plan and make rational and informed choices about their case,¹²⁴ and require the court's decision to be based on relevant factors. In the aggregated trial, predictability, transparency, and rationality require that the procedures produce results that are valid (e.g., that may be properly extrapolated) and repeatable (e.g., that the methodologies employed be applied in other contexts in similar cases). These issues are further explored in Part IV below, where we consider some of the principles that affect how aggregation serves the goals and values of procedural due process.

Another noninstrumental value, participation, relates to the litigants' right to communicate their views and feelings to their adversaries and to the court¹²⁵ (as opposed to the instrumental conception of participation).¹²⁶ Participation is important to the litigants on both a psychological level (e.g., to give the perception that they are playing a meaningful part in the litigation process) and on a societal level (e.g., to give the perception that the

120. Jon O. Newman, *Rethinking Fairness: Perspectives on the Litigation Process*, 94 YALE L.J. 1643, 1643-44 (1985). Newman also states, "[a] broadened concept of fairness—one that includes fairness not only toward litigants in an individual case but also to all who use or wish to use the litigation system and to all who are affected by it—can lead to changes that directly confront the challenges of delay and expense." *Id.* at 1644.

121. Mashaw, *supra* note 116, at 899 (distinguishing equality value from who wins or loses, defining the issue as whether the parties are accorded equal procedural rights). See also Redish & Marshall, *supra* note 73, at 484 (citing Robert S. Summers, *Evaluating and Improving Legal Processes—A Plea for Values*, 60 CORNELL L. REV. 1, 25 (1974)); Resnik, *supra* note 116, at 858.

122. Cf. *Cimino v. Raymark Indus.*, 751 F. Supp. 649, 652 (E.D. Tex. 1990) (plaintiffs stipulated to aggregated trial procedures). Arguably, those plaintiffs in *Cimino* receiving trials have access to different procedures than those not receiving jury trials. Yet, no reason exists for suspecting any systematic bias in the selection of plaintiffs for trials. Moreover, defendants are parties to all trials in which the elements of the case are developed. The only aspect in which defendants are not involved is the mechanical extrapolation of the damage awards to nontrial plaintiff participants.

123. Redish & Marshall, *supra* note 73, at 485-86 (summarizing the various noninstrumental values).

124. Mashaw, *supra* note 116, at 901. Professor Summers calls this value "procedural rationality." Summers, *supra* note 121, at 26.

125. See JOHN THIBAUT & LAURENS WALKER, *PROCEDURAL JUSTICE: A PSYCHOLOGICAL ANALYSIS* (1975); Frank I. Michelman, *Formal and Associational Aims in Procedural Due Process, in DUE PROCESS: NOMOS XVIII 126-27* (J. Roland Pennock & John W. Chapman eds., 1977) (lack of participation value can also create psychological harm to the litigants).

126. See note 114 *supra*.

decisionmaking system works).¹²⁷ A related noninstrumental value, "revelation," also provides psychological and societal benefits, but is distinct from procedural methods affecting the outcome of a case.¹²⁸ Simply put, revelation embodies the litigants' desire to know the grounds on which their cases were decided and to receive a fair explanation of the result. Like participation, revelation affords litigants and others the ability to develop future litigation strategies in similar cases.¹²⁹ Again, in principle, the value of revelation would not necessarily be thwarted by aggregated procedures.

Our brief review of the values of procedure suggests that, on balance, the aggregated trial serves these values as well as traditional one-on-one trials.¹³⁰ Aggregated trials in mass tort litigation do not, by their nature, deprive litigants of the interests embodied in due process. Likewise, the instrumental values relating to procedure actually are realized more fully in a well conducted aggregated trial than in the individual trial. The picture is less clear with respect to noninstrumental values, however.

While the values of equality, predictability, transparency, rationality, and revelation may be quite well served by aggregation, other related values may not be. For example, the "appearance" of justice and fairness may fare well if aggregation procedures are considered carefully, but on superficial examination they may seem inferior to the individual trial. The right of a defendant to communicate his or her views is largely preserved in the aggregated trial, despite being not so well preserved in relation to each individual plaintiff.¹³¹ Finally, although autonomy and dignity seem to suffer in the aggregated trial, both are vindicated largely by comparing the relative losses to plaintiffs versus defendants as to the various realistic alternatives for adjudication in mass injury situations.¹³² These points are further developed in the next two sections, in which we analyze the impact of aggregate trials on some of the most crucial values at stake in procedural due process.

127. Redish & Marshall, *supra* note 73, at 487-89 (citing Michelman and others). See text accompanying notes 133-161 *infra* (sections III.B and III.C).

128. Redish & Marshall, *supra* note 73, at 489.

129. *Id.* Another noninstrumental dimension asserted is that of litigant autonomy and dignity and relates to the way in which procedures are used. *Id.* at 491 (noting that "strong support" exists for the "position that the government violates due process where it invades individuals' dignity rights through physical or mental intrusion").

130. *But cf. In re Fibreboard Corp.*, 893 F.2d 706, 712 (5th Cir. 1990) (noting that lump sum procedures "comprise something other than a trial within our authority. It is called a trial, but it is not."). The Fifth Circuit, although acknowledging the need for innovation and "judicial creativity" in the area, found that the lump sum solution would be better addressed by either Congress or the state legislature. *Id.* Even the concerns expressed in *In re Fibreboard* may be satisfied by a well-designed aggregated trial, as we explain in notes 171-207 *infra* and accompanying text.

131. Resnik & Rowe, *supra* note 65, at 18-19, raise the issue of a possible violation of the defendants' Seventh Amendment right to a jury trial in aggregation cases. Again, the constitutionality of the procedure depends upon the quality of the sampling performed. See Part IV *infra*. *Cf. In re Fibreboard*, 893 F.2d at 712 (holding lump sum procedure compromises defendants' right to jury trial).

132. We will develop this point in some detail at notes 154-161 *infra* and accompanying text.

B. *Distributive Justice: Instrumental Values*

A major—perhaps *the* major—due process concern in an aggregated trial is the validity of the outcome. That is, as we have said, one important instrumental function of the legal process is ensuring rational, reasonable, accurate, and non-arbitrary outcomes.¹³³ A fair process ought to result in plaintiffs receiving, within reasonable tolerances, the proper amount in damages. Similarly, corrective justice may require that the process extract from defendants only the amount they owe to the particular plaintiff to whom they are liable, no more than that amount and no less.

The main argument against trial by aggregation and sampling asserts that such trials cannot give the parties as accurate a result as they would obtain through traditional bilateral trials. Indeed, the intuitive plausibility of this argument is almost irresistible: How could a damage award, arrived at by extrapolation from an average of *other*, though similar, cases, possibly be as accurate as the verdict of a jury that hears the particulars of an individual case? Yet, paradoxically perhaps, this intuition is incorrect. Aggregation, properly conducted, will provide awards that are more accurate, not less.

Most might assume that each plaintiff who receives a sample's average as an award is receiving an estimate that likely constitutes over- or under-compensation. An individual award, however, is also an estimate—in fact, a less accurate estimate. Consider the archetypal single case more carefully. To regard an individualized damages determination as *the* correct amount is nothing more than a potent—and often desirable—illusion resulting largely from the fact that more is invisible than evident about the measurement process that underlies the legal process.¹³⁴

Let us consider one important nonobvious feature of the process. Every verdict is itself merely a sample from the large population of potential verdicts. That “population of verdicts” consists of all the awards that would result from trying the same case repeatedly for an infinite number of times. We can remind ourselves that the exact same case could have been tried repeatedly in different contexts: before the same jury;¹³⁵ before different ju-

133. We have noted other, noninstrumental, due process concerns with the value of process for its own sake. Concerning symbolic functions, see Resnik, *supra* note 116; concerning psychological functions, see J. THIBAUT & L. WALKER, *supra* note 125; and concerning social and political functions, see TOM R. TYLER, *WHY PEOPLE OBEY THE LAW* (1990).

134. Some components of legal process and evidence rules promote more accuracy in the system than many realize, including those who are intimate participants in it. Other components appear to impede the legal system's ability to produce reliable results. Some argue that illusory inaccuracy, and sometimes deliberate inaccuracy, may be necessary to accomplish some of the functions of the legal process. *E.g.*, Michael J. Saks, *Enhancing and Restraining Accuracy in Adjudication*, *LAW & CONTEMP. PROBS.*, Autumn 1988, at 243, 267-78. Other times—as when hiding error and unreliability by taking a single measurement by a single judge or jury in a single case—the process capitalizes on some illusions of accuracy.

135. That even this situation of nearly exact replication would produce a *distribution* of awards—and not a single award—is consistent with the intuitions of judges and lawyers. See Hans Zeisel, “. . . And Then There Were None: The Diminution of the Federal Jury,” 38 *U. CHI. L. REV.* 710 (1971).

ries; or by different lawyers using exactly the same facts. Or, the case could have been tried using different permutations of the same facts or different facts and arguments that could have been assembled out of the same basic case. Clearly, any given trial of a case is but a single instance from among thousands of possible trials of that same basic case. It makes more sense, then, to think of the “true” award as the average of the population of possible awards. The fact that we normally obtain only one award from one trial of each case obscures the population of possible awards from which that one was drawn.

The large skewed distribution in Figure 1 depicts the damage awards from a typical court’s docket.¹³⁶ However, each of the individual awards which compose this distribution is itself just one from among that individual award’s potential range of outcomes.

Imagine a case were tried 100 times. Then the verdicts are arrayed on a frequency distribution. (This distribution is depicted as the small shaded one in Figure 1.) It should be apparent that any single verdict is just one from among those.¹³⁷ Many of the possible single verdicts constitute over- or under-compensation compared to the mean of that distribution, and that mean is the best estimate of the “true” award. Thus, to find the true award for a case, we would need to retry each case numerous times and take the mean of the resulting awards. By taking just the one award that results from a single trial we are accepting the likelihood of some error.¹³⁸ With traditional individualized cases the legal process always accepts this error, and it always has.¹³⁹

In turn, any array of damage awards conceals the underlying variation due to the measurement error associated with each of the individual awards, as shown in Figure 1. A distribution of damage awards really consists of a set of mini-distributions reflecting the error in measurement around some

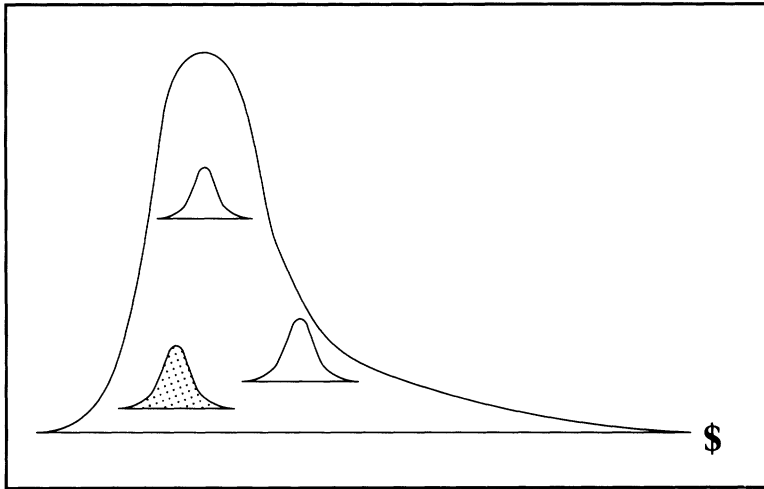
136. That is, most awards are bunched near the low end; larger and larger awards occur with smaller and smaller frequency. See MARK A. PETERSON & GEORGE PRIEST, *THE CIVIL JURY: TRENDS IN TRIALS AND VERDICTS, COOK COUNTY, ILLINOIS, 1960-1979* (1982).

137. This is apparent when social scientists conduct civil jury simulation experiments. They often take a single videotaped trial and present it repeatedly to different juries. The same exact trial produces different outcomes when decided by different juries, which center about a single mean. Even if the one taped trial were repeated to the *same* jury some time later, it likely would produce a somewhat different result than it did the first time. Repeated measurements of any object using any measuring instrument produce the same phenomenon. All measurement contains some random error.

138. This is known as *measurement error*. Understanding its implications and ways of dealing with it began when Abraham De Moivre discovered the “curve of error” (now known as the normal probability distribution) in 1733. Such statistical concepts are now well developed and employed in widely diverse fields—from basic science to industrial quality control, from astronomy to zoology, and they even appear occasionally in law. Judge Parker offers a number of examples in *Cimino v. Raymark Indus.*, 751 F. Supp. 649, 661-63 (E.D. Tex. 1990). The basic concepts can be found in virtually any textbook on statistics or sampling or research methods.

139. This is not entirely alien to the intuition of lawyers and judges. When speaking of jury trials as unpredictable, they are intuitively recognizing that a single trial of a case is vulnerable to measurement error. See Zeisel, *supra* note 135, at 710. If litigators tried each case ten times and the average result were the verdict, they would have greater confidence in their ability to predict trial outcomes, even as the fact of measurement error became more obvious.

Figure 1
Hypothetical Distribution of Damage Awards
in a Court's Docket



“true” award for each case. The “correct” award can be made visible by certain procedural devices, such as repeated trials of the same case, or aggregation.

Try another thought experiment. Suppose that in an aggregation of cases, every one of 1000 were identical, and from those, 100 were drawn at random for trial.¹⁴⁰ By trying these 100 cases and taking the average award, the court will have done the equivalent of our first thought experiment and will have far more accurately measured the correct damages than is usually done in individualized cases. By granting the mean award to each of the 100 cases, the court awards a more nearly correct amount than if each case received the award assigned by its jury.¹⁴¹ By awarding that same amount to each of the remaining 900 plaintiffs, the court also does better, in terms of accuracy of award, than it would if it conducted 900 individualized trials.¹⁴²

140. Despite their being “identical,” they will of course produce different outcomes, just as trying the very same case over and over produces different outcomes.

141. Note that the court in *Cimino* did not do this. In each individually tried case, it awarded the damages amount arrived at by the jury.

142. Here is a concrete example, using data from SHARI DIAMOND & JAY CASPAR, *BLIND-FOLDING THE JURY TO VERDICT CONSEQUENCES: DAMAGES, EXPERTS, AND THE CIVIL JURY* (1991), to illustrate the power of aggregation to increase the accuracy of awards. Let's speak in terms of individual jurors. In a single experimental condition of the authors' study, involving an

The goals of corrective justice are better achieved: defendants pay to each plaintiff an amount that is better correct than could otherwise be accomplished.

Upon closer examination, then, any given award in a traditional trial is likely to be an over- or under-award relative to the true, or population, mean of awards for that trial. The aggregation approach is capable of surmounting this defect. For one thing, in aggregated trials people recognize that the problem exists and they begin to think about how to minimize it. The structure of traditional trials blinds us to their jurimetrics.¹⁴³ More importantly, the aggregation procedure itself provides a device for minimizing the problem and producing a more accurate¹⁴⁴ estimate of the true award.

Another benefit is that aggregation will refine out some of the random and systematic error (that is, irrationality and bias) of jury decisions, while preserving the rational core of the jury's logic. Individual awards vary due to legally relevant differences among cases, but also due to random noise in decisionmaking as well as to larger biases¹⁴⁵ and smaller nuances.¹⁴⁶ The aggregation process refines the decision by averaging out of existence the undesirable variations and bringing the systematic and legally relevant relationships into sharper relief.¹⁴⁷

Of course, the cases composing *Cimino*, or any other collection of cases, are not identical. The more they vary from each other in legally relevant ways, the more we move away from aggregation's accuracy-producing benefits and move toward its error-producing harms. Thus, one needs to know how hetero- or homogeneous are the subgroups from which the cases were

antitrust case, the mean of all the jurors' awards came to \$193,088 and the standard deviation came to \$181,951. Thus, our single best estimate of what the population of eligible jurors would award in that condition of that case is \$193,088. Note that in spite of all these jurors seeing *exactly the same case*, the awards varied dramatically. One-third of the jurors reached awards less than \$11,131 or greater than \$375,045 (that is, minus and plus one standard deviation). If juries were aggregated into clusters of four (that is, four juries hearing four cases, and here the four cases are literally identical) and the average of their four awards were taken to be the best estimate of the population mean, they would form a distribution in which one-third of the awards would be less than \$102,112 or greater than \$284,064. In samples of nine cases each, one-third of awards are less than \$132,438 or greater than \$253,738. In samples of 16 cases each, one-third of awards are less than \$147,600 or greater than \$238,576. In samples of 25 cases each, one-third of awards are less than \$156,698 or greater than \$229,478. And in samples of 49 cases each, one-third of awards are less than \$167,095 or greater than \$219,081. Thus, as the sample size increases, the standard error of the sampling distribution decreases. In other words, progressively enlarging the sample focuses the distribution more and more tightly on the best estimate of the "true" award.

143. Jurimetrics refers to the measurement of justice, or at least those aspects of it that are of an empirical nature. The term is borrowed from Lee Loevinger, *Jurimetrics: The Methodology of Legal Inquiry*, 28 LAW & CONTEMP. PROBS. 5 (1963), and the journal bearing the name.

144. That is, compared to the capabilities of the traditional trial.

145. See AUDREY CHIN & MARK A. PETERSON, DEEP POCKETS, EMPTY POCKETS: WHO WINS IN COOK COUNTY JURY TRIALS 38-41 (1985), which found black plaintiffs receiving smaller awards than similarly situated white plaintiffs.

146. Some plaintiffs or defendants or their lawyers will seem more sympathetic or attractive or likeable to jurors.

147. There is no magic to this. That random bias is eliminated by averaging is intuitively obvious. Systematic biases can either be captured in a variable, as for example race sometimes is in the data brought to bear in discrimination cases, or can be submerged into the error variance and thereby averaged away, as race is in the data on which sentencing guidelines are based.

sampled and to which extrapolations are later made. At some point along the heterogeneity-homogeneity continuum, aggregation ceases to improve the accuracy of traditional trials and becomes a vitiation. The court in *Cimino* may have improved on conventional trials or may have introduced more error. We could determine that with precision only by comparing the homogeneity of the strata with the measurement error in individual cases.¹⁴⁸

In practical terms, from the standpoint of distributive justice, this problem does not matter. Assume that the aggregation procedure inadvertently brought together heterogeneous subgroups. Those who would have a serious potential objection about distributive injustice would be the plaintiffs, who get a single bite at the compensation apple. Whether they receive the correct amount, a windfall, or are seriously undercompensated, they have had their day in court. From the viewpoint of defendants, even if there are relatively large errors, with numerous over- and under-awards, all of those differences will cancel each other out and the average award will be the same¹⁴⁹ in the collective trial as it would have been with the individualized determinations.¹⁵⁰

From the defendant's perspective, it is hard to conceive of a reasonably well done aggregation procedure that would not deliver equally or more accurate outcomes. The people to whom heterogeneity problems can make a real difference are the individual plaintiffs, for whom the situation is more complicated.¹⁵¹ The more heterogeneous the subgroups, the greater the error involved.¹⁵² Either the subgroups need to be composed of sufficiently similar cases to insure reduction rather than magnification of error, or the plaintiffs would have to waive their right to more accurate determinations.¹⁵³

148. It would be helpful to know the size of the average measurement error in traditional case-by-case decisions. (The error could be determined, for example, by repeated trials of a sample of cases, or estimated by studying data from dockets of cases that went to trial.) Such a figure could be used as a standard against which to test any given aggregated trial, to see whether it has made matters better or worse in terms of accuracy of awards.

149. Minus transaction costs.

150. Even if the court's aggregation is a rough one, as long as a group is large and representative enough, it will produce the correct population average. Consider this illustration. Suppose one month an employer's computer goes mad doing the payroll. For each of several thousand paychecks, it mistakenly selects a number at random between -1000 and +1000 and subtracts from or adds to each paycheck that amount of dollars. Any given employee might mourn his underpayment or celebrate her overpayment. But, because the mean of the errors comes to zero, the employer is in exactly the position it would have been had the errors not occurred.

151. In *Cimino*, at least, the plaintiffs made that a nonissue by waiving any right to individual trials.

152. This *standard error* can be measured and made known, in a manner suggested at *supra* note 148. Perhaps appellate courts would come to define an acceptable level of error here, just as they have defined acceptable and unacceptable levels of statistical significance. See, e.g., *Palmer v. Shultz*, 815 F.2d 84, 92-96 (D.C. Cir. 1987) (interpreting Supreme Court opinions as setting 1.96 standard deviations as the level at which group differences in hiring or promotion give rise to an inference of discrimination).

153. If plaintiffs did not waive their right to trial, the court has a more difficult decision to make. Aggregation presents a much greater risk of error to plaintiffs than to defendants. As a result, aggregation ought to be ordered over plaintiffs's objections only when a court has been satis-

C. *Procedural Justice: Noninstrumental Goals*

A considerable amount of research has shown that parties to judicial procedures are not concerned merely with distributive justice. Participants care a great deal about the process.¹⁵⁴ The more the process affords party control of the presentation of evidence, and insures that third party decisionmakers pay serious attention to the particulars of the case, the more satisfied participants are with the process. Indeed, parties are more accepting of undesired outcomes when the process affords procedural justice.¹⁵⁵

The proposed aggregation procedure may seem to violate much of what we have learned about the importance of procedural justice. After all, in aggregation thousands of plaintiffs in thousands of cases would be deprived of their day in court and their chance to present their case. Furthermore, although all defendants would have an opportunity to present their evidence and arguments, they would not get to do so in response to every plaintiff, but only to a sample of them.

Several answers may be offered to the objection that aggregation denies parties procedural justice. One answer is that aggregation has never been compared empirically with traditional procedures.¹⁵⁶ It may be that when a party has a vicarious day in court, represented by other litigants whose circumstances are very similar to his own,¹⁵⁷ this would approximate, in terms of procedural justice, what the traditional adversary procedure provides.¹⁵⁸

Another answer comes from asking the question, "Compared to what?" For asbestos defendants, the choice is between a day in court in each and every case, on the one hand, or being denied a day in court for the majority of cases, on the other. Undoubtedly they would receive more occasions for procedural justice with traditional case-by-case litigation.¹⁵⁹ On the other hand, with aggregation, they never will be shut out of trial opportunities

fied to a heightened degree that the conditions for achieving the advantages of aggregation have been met. In addition, a court might weigh some loss of accuracy against judicial economy.

154. See generally E. ALLAN LIND & TOM TYLER, *THE SOCIAL PSYCHOLOGY OF PROCEDURAL JUSTICE* (1988); J. THIBAUT & L. WALKER, *supra* note 125; Redish & Marshall, *supra* note 73. For an application of this principle in another context, see Peter David Blanck, *On Integrating Persons With Mental Retardation: The ADA and ADR*, 22 N.M. L. REV. (forthcoming 1992).

155. See E.A. LIND & T. TYLER, *supra* note 154 (reviewing studies).

156. This could be approached in a variety of ways, such as designing simulation studies involving trial participants and observers whose reactions can be obtained, or by collecting data from participants in actual trials that have been conducted individually or by aggregation and sampling. Many examples of procedural justice research conducted by simulation or in the field are provided by E.A. LIND & T. TYLER, *supra* note 154.

157. Again, this suggests the importance of homogeneous subgroups. Note, however, that what homogeneity accomplishes also could be achieved through certain statistical procedures. Indeed, as will be seen in Part IV *infra*, our own recommendation comes down to a combination of stratified sampling and regression modeling.

158. See E.A. LIND & T. TYLER, *supra* note 154; J. THIBAUT & L. WALKER, *supra* note 125.

159. They also would prefer this strategy because they can delay paying, and perhaps watch cases disappear or become reduced in value as time passes and plaintiffs die.

[The defendants] are attempting to avoid liability by obstructing the Court's ability to provide a forum in these cases. . . . They assert a right to individual trials in each case and assert the right to repeatedly contest in each case every contestable issue involving the same products, the same warnings, and the same conduct. The strategy is a sound one; the

altogether. They will always get to represent themselves, if only in a subset of cases. Moreover, the differences in procedural justice for defendants are far less pronounced than those facing plaintiffs.

The practical alternatives faced by asbestos plaintiffs are: (a) individualized damage determinations which, for some large number of plaintiffs, will occur after they have already died of their diseases;¹⁶⁰ (b) bilateral settlements which, in class actions or mass consolidations, involve plaintiff-lawyer to defendant-lawyer negotiations with little or no involvement by the actual parties; or (c) aggregation and sampling. We see no way around a frankly utilitarian judgment here. How much satisfaction, in total, will be produced by these three options? The first holds little promise. A few plaintiffs will get their day in court and enjoy the full panoply of procedural rights. But most will have no day in court, no participation, and will die without knowing what became of their cases. The second option is the Agent Orange situation, and many of those plaintiffs are not just dissatisfied, they are furious.¹⁶¹ The third option, aggregation, offers an opportunity to be heard through representatives from a potentially cohesive group of fellow victims speaking on behalf of the whole group.

Although it is an empirical question as to which option affords the greatest procedural justice, our reflections lead us to conclude that of the realistic options available to asbestos plaintiffs, aggregation would provide more procedural justice than the alternatives. Indeed, it may well afford the most procedural justice that possibly can be provided under the circumstances.

D. *Bidding Farewell to the Illusion of Individualized Justice*

We already have noted one flaw in the imagery of the archetypal civil trial: The verdict appears precise and individualized, but in reality it is only a sample of one from a wider population of possible outcomes. The illusion that individualized adjudication provides a precision that aggregation lacks is nothing more than that, an illusion. Individualized trials substitute one form of error for another. Therefore, their results actually may be less accurate than those of a well-conducted aggregated trial.

In an article cited by Judge Parker in *Cimino* and by the report of the Judicial Conference ad hoc Committee, Deborah Hensler identifies other

defendants know that if the procedure in *Cimino* is not affirmed, these cases will never be tried.

Cimino v. Raymark Indus., 751 F. Supp. 649, 651-52 (E.D. Tex. 1990).

160. This presumes the society is not willing to invest in more courts, judges, and lawyers to carry out the individual trials in a reasonable period of time. Because torts of mass injury come in waves and are not a permanent part of the system, it probably would be unwise to make permanent changes in the law or in trial procedures in order to deal with what is not a permanent change in the landscape of litigation. See DEBORAH HENSLER, MARY E. VAIANA, JAMES S. KAKALIK & MARK A. PETERSON, *TRENDS IN TORT LITIGATION EXPLOSION: THE STORY BEHIND THE STATISTICS* (1987); Marc Galanter, *The Day After the Litigation Explosion*, 46 MD. L. REV. 3, 25 (1986).

161. See Stephen Labaton, *Five Years After Settlement, Agent Orange War Lives On*, N.Y. TIMES, May 8, 1989, at D1. With the court's approval, lawyers settled the claims on behalf of their clients, based on their judgment concerning the prospects for the success of the case, for an amount that many Vietnam era veteran plaintiffs of the class felt was far less than they would have accepted.

conceptions about the traditional trial that have not withstood empirical examination.¹⁶² Hensler reports the findings of studies on three myths about litigation: lawyer-client relations and litigant control, opportunities for adjudication, and substantive outcomes. The findings show that tort lawyers and their clients in mass tort cases communicate remarkably little about their cases and that clients have little control over the course of the litigation. Even in the absence of formal aggregative procedures, lawyers informally aggregate cases by representing hundreds or thousands of clients and meeting with them in large groups. Settlement discussions often are conducted about large groups of claimants, sometimes under pressure from judges.¹⁶³

Such informal aggregation is dangerous because it lacks the procedural safeguards of formal aggregation. No effort is made to ensure that the groups are homogeneous or that the cases discussed are representative. Moreover, no one checks to make sure the plaintiffs consent to the aggregation. According to Hensler's article, some lawyers could not even locate their clients, much less inform them or take direction from them.¹⁶⁴ While the full-fledged trial is the standard about which debates over procedural reforms inevitably are conducted, trials are rare occurrences, especially when mass torts are involved.¹⁶⁵

Finally, damage awards in traditional settlements and trials are not models of accuracy or equity. Some plaintiffs enjoy windfalls, but these are usually those plaintiffs with the lowest losses. Most plaintiffs, particularly those with serious injuries, recover only a fraction of their actual losses.¹⁶⁶ In product liability cases generally, those with losses under \$10,000 recovered \$7.27 per dollar of actual losses, while those with losses over \$1,000,000 recovered only \$0.25.¹⁶⁷ This pattern of low end over-compensation and high end under-compensation is a well-replicated phenomenon. One study of asbestos workers' widows found that they recovered an average of \$0.31 cents per dollar of loss.¹⁶⁸

For opponents of aggregation or bilateral adjudication idealists, these studies do not really undercut traditional trials. Even if conventional procedures in mass tort cases fall short of the ideals so venerated in the traditional vision of the trial, opponents of aggregation still can argue that formal aggregation makes matters worse.¹⁶⁹ In their view, approving formal aggregative procedures would give plaintiffs even shorter shrift than at present. By de-

162. Deborah Hensler, *Resolving Mass Toxic Torts: Myths and Realities*, 1989 U. ILL. L. REV. 89.

163. *Id.* at 92-97.

164. *Id.*

165. *Id.* at 97-100.

166. *See Saks, supra* note 12 (summarizing studies).

167. *Id.*

168. Hensler, *supra* note 162, at 101 n.66 (citing William G. Johnson & Edward Heller, *The Costs of Asbestos-associated Disease and Death*, 61 MILBANK MEMORIAL FUND Q. 177, 188 (1983)).

169. Indeed, a clever opponent of aggregation might say that precisely because of the findings cited by Hensler, we cannot afford to reduce the quality of the process, because there is not as much room below the traditional procedure as we used to think. Were the traditional process as good as we had thought, a reduced form such as the collective trial might still have been quite good enough.

manding that the litigation system strive toward an unattainable ideal, they would argue, a greater degree of justice and fairness is attained than would otherwise be realized.

This article, however, argues that formal aggregative procedures offer important affirmative advantages over traditional trials. The data Hensler reports show that there is considerable room for improvement; one can at least hope that aggregation will produce some of those improvements. Put simply, at least as much reason exists to expect aggregation to improve matters as to expect it to enlarge further the gap between what the justice system promises and what it delivers.¹⁷⁰

IV. AGGREGATING WELL

Providing a manual of statistical and methodological procedures for conducting aggregated trials is far beyond the scope of this article. Nevertheless, we need to consider some of the principles that will affect how well or poorly aggregation will serve the goals and values of procedure. For aggregation to be a realistic solution, the courts must conduct it in such a way that its benefits are most likely to be maximized and its potential harms minimized. In this section, we discuss the major methodological and statistical issues that must be considered in developing aggregative procedures.

A. *Sampling Cases for Trials*

Mass torts represent a sampling theorist's dream. The population of cases from which the sample is to be drawn is known with unusual completeness.¹⁷¹ This provides the *sampling frame* from which any type of case sampling proceeds. In addition, many details are known or can be learned about each member of the population.¹⁷² Thus, the degree to which the sample is representative of the population can be known with near certainty—a great improvement over most sampling situations. Representativeness is the touchstone of good sampling.

One must be on guard against one problem in particular: Samples that are representative when first drawn may grow less so over time. Attention must be paid to possible changes that could render a previously representative sample unrepresentative. When that occurs, sampling will not accurately reflect what needs to be known about the population. If over time cases are added to the docket by new filings or removed through settlement, a sample already drawn may grow increasingly unrepresentative. This problem can be minimized by prohibiting new cases from entering the aggrega-

170. One can determine which is better empirically only by adopting alternative procedures on an experimental basis and comparing the results. Laurens Walker, *Perfecting Federal Civil Rules: A Proposal for Restricted Field Experiments*, LAW & CONTEMP. PROBS., Summer 1988, at 67.

171. All asbestos cases and all the parties that form the relevant population in a particular court's jurisdiction are literally known by name.

172. Francis E. McGovern, *Toward a Functional Approach for Managing Complex Litigation*, 53 U. CHI. L. REV. 440 (1986).

tion once the sample is drawn, and by not authorizing settlements.¹⁷³

Rather than drawing from the population of cases as a whole, samples can be drawn from subgroups, or stratifications, of the population. For example, the population of cases in *Cimino* was divided into five groups based on the asbestos-related disease from which the plaintiff was suffering. Such subgrouping helps to insure that a sufficient number of cases are sampled from each subgroup in order to obtain a reliable estimate of that subgroup's awards. It also creates more homogeneous subpopulations.

How many cases need to be sampled? This depends in large part on the variability of the population. The more diverse the population, the larger the sample must be in order to reflect the population accurately. The more homogeneous the population, the fewer cases that need to be sampled.¹⁷⁴ Thus, dividing the population of cases into homogeneous subgroups not only serves the important goal of improving the accuracy of outcomes as required by distributive justice, but also allows for more efficient sampling.

In general, the larger the sample, the more likely it will reflect the population; the smaller the sample, the less likely it is to do so—for any given degree of heterogeneity. How do we know whether the sample is large enough, under the given circumstances, to faithfully reflect the population parameters?¹⁷⁵ This question requires both a descriptive statistical answer and a normative legal answer.¹⁷⁶

The statistical answer provided in *Cimino* was to compute *confidence limits* around a sample statistic.¹⁷⁷ That court concluded that on a wide variety of background factors, the population means and proportions fell within a 99 percent confidence interval of the sample's means and proportions.¹⁷⁸

173. As a Rule 23(b)(3) class, cases may settle only with the approval of the court. The court may, nevertheless, want to encourage settlement when that is possible. The problem that settlement creates for keeping the sample representative could be monitored by analyses to assess the changing fit, if any, between sample and population, and then adjusting the sample data, if need be, to insure that it is representative of the population.

174. Hypothetical: Suppose a canned soup warehouse was caught in a flood, and all the labels were washed off the cans and carried downstream, but we knew that all the cans in the warehouse were the same flavor. How many would we need to open to determine what kind of soup was in the warehouse? Answer: One.

175. Measures of samples are called *statistics*; measures of populations are called *parameters*.

176. Fortunately, unlike most sampling situations, in mass injury cases the courts can do far better in evaluating the adequacy of the sample. With the help of surveys of the population of cases, we can know in detail what the population parameters are and compare them to the sample's values. See McGovern, *supra* note 172.

177. See notes 68-70 *supra* and accompanying text.

178. One caution is worth mentioning at the outset. Assessing the adequacy of the sample might well include examining the actual values marking the limits of the confidence intervals. While the *Cimino* court accepted confidence intervals to establish goodness-of-fit between the sample and the population, we still do not know how wide those confidence ranges are. The record ought to include a table of population means and corresponding sample means as well as the corresponding confidence limits or significance levels. Then one could look to see how close or far the population parameters and the sample statistics are from each other.

Consider this analogy: Suppose at one of his press conferences during the Gulf War, General Schwartzkopf declares that nearly all of his bombs fell inside a 99% confidence range of their

Confidence limits normally are drawn around a sample's mean when the population mean is not known, in order to infer a zone within which the population mean exists at a specified level of probability.¹⁷⁹ But in *Cimino* the relevant population parameters were known, they did not have to be inferred. The question, rather, was whether the sample represented the population accurately enough.

What was needed was a test of whether the sample statistics differed from the population parameters to a degree that would raise doubts about the sample's representativeness.¹⁸⁰ One straightforward approach to this would be to test each sample mean against an exact hypothesis of its corresponding population mean, while setting the critical level for that test at something far higher than a conventional p-level of .05 or .01.¹⁸¹ This is because conventional significance testing aims to be conservative about erroneous rejection of the presumption of no differences. Thus, one would reject the presumption of no-difference only if the probability of that decision being erroneous was smaller than, say, one percent. That is, we make it hard to find significance and easy to walk away empty handed. But in the situation of sampling from known aggregations the reverse is true. The error we want to guard against is *erroneously concluding that the sample means equal the population mean*. We should, therefore, make it easy to reject the presumption that the sample and the population are alike, and hard to conclude that they are alike. That can be accomplished by setting the p-level for the proposed significance tests at .20¹⁸² or higher.¹⁸³

targets. That statement means something quite different if the 99% confidence range is 20 yards across than if it is 20 miles.

Another sort of analogy is to the 80% rule in discrimination law. See EEOC Guidelines, 29 C.F.R. § 1607.4(d) (1988). To conclude that the difference between an eligible work force and those actually hired is "statistically significant" is not considered enough; the magnitude of the difference between the sample and the population must be at least 80%. Thus, the size of the difference, not its statistical reliability alone, is of importance. (Significance tests and confidence intervals are nearly twins. But while in the discrimination context the question is how far the sample departs from the population, the question in the mass tort sampling situation is how close the sample has remained to the population from which it was drawn.)

179. For example, suppose a random sample is drawn and the mean age of plaintiffs is computed to be 48.7 years. Based on the variability found in the sample of cases and the degree of confidence one requires, a range of confidence can be calculated around that mean. A 95% confidence interval, for example, provides a range of values within which we can be 95% sure that the true population mean falls. For example, the 95% confidence interval for a case population's age might be 48.7 plus or minus 3.2 years, so that we can say that we are 95% sure that the true population mean falls somewhere between 45.5 and 51.9. As the confidence interval grows larger, from 90% to 95% to 99%, etc., we can be more confident that the population mean falls within it; the narrower the confidence interval, the less confident we can be—much like casting a net. The wider the net, the more sure we are to catch what we are after.

180. In the following discussion we convert some statistical terminology into its equivalent legal terminology in an effort to make these paragraphs more accessible to a legal audience.

181. "P-level" is a term used in statistics to represent the probability of an erroneous rejection of a given null hypothesis.

182. We mention .20 because that is the conventional level of significance used by statisticians when model-testing, comparing actual data to a predicted outcome, a situation analogous to what we face here. The sample statistics are the "known data" and the population parameters are the "expected."

183. This could be done as easily using confidence limits, as were used in *Cimino*. But, we

The normative answer requires deciding what is a sufficiently large and representative sample. How close a fit is close enough for the law's purposes is a legal judgment that eventually will have to be made by the courts¹⁸⁴ or Congress, and requires a balancing of the costs of greater accuracy against the consequences of error.

B. *Achieving Within-Group Homogeneity and Between-Group Heterogeneity*

We discussed earlier the critical importance of sampling from relatively homogeneous groups in order to attain the increased accuracy that aggregation makes possible. We now consider how homogeneity can be maximized, and the cost of failing to do so.

In *Cimino*, the court created subgroups by stratifying the population into disease categories. Presumably, the cases within disease categories are more similar to each other (and more different from those in the other groups) than cases in the intact population.¹⁸⁵ This strategy implies that the cases can be lined up on a single dimension for assessing similarity, such as severity of disease. Again, because data on the entire population of cases are available, we need not guess at this.

In selecting variables for stratifying the cases, courts can be guided by empirical research studying the determinants of jury awards in conventional asbestos cases¹⁸⁶ or by the findings of other courts as they acquire experience with aggregation.¹⁸⁷ Such sources can tell a court which differences among plaintiffs are likely to have an impact on the awards.¹⁸⁸ On the basis of those

favor the significance test approach for two reasons. It is more familiar. And it makes the problem of which error is to be guarded against more obvious, and therefore easier to explain why the conservative test is to set the alpha level high.

In *Cimino*, this appears to have been done backwards. Instead of confidence limits of 95% or 99%, which are very likely to embrace the population mean because they are very wide, we would have more faith in the representativeness of the samples if 80% or 60% or 40% confidence intervals had been employed—those being much smaller. Had they still captured the population mean, the sample must have been quite representative of the population.

This valuable point was made by Professor David Barnes at the program of the Litigation Section of the AALS at its 1992 annual meeting, and it should be heeded. The implications for the *Cimino* case, however, are not as serious as they might appear at first blush. The effective probability level is altered by the number of tests performed. For example, if the p-level for a significance test is .01, the effective p-level for a set of, say, 15 tests is .01 times 15, or .15. Thus, any of the comparisons resulting in a p-level under .15 would lead to rejecting the hypothesis that the sample is representative of the population with respect to that variable.

184. *E.g.*, *Palmer v. Shultz*, 815 F.2d 84, 92-96 (D.C. Cir. 1987).

185. Whether this did have such an effect could be determined by calculating the pooled within-group variance for the subgroups and comparing that to the variance of the population as a whole.

186. *E.g.*, JAMES S. KAKALIK, PATRICIA A. EBENER, WILLIAM FELSTINER, GUS W. HAGSTROM & MICHAEL G. SHANLEY, *VARIATION IN ASBESTOS LITIGATION COMPENSATION AND EXPENSES* (1984).

187. Meta-analytic procedures for pooling the findings of different studies would provide useful help in discovering relationships among variables across studies or aggregate trials. *See generally* LARRY V. HEDGES & INGRAM OLKIN, *STATISTICAL METHODS FOR META-ANALYSIS* (1985); ROBERT ROSENTHAL, *META-ANALYTIC PROCEDURES FOR SOCIAL RESEARCH*, (rev. ed. 1991).

188. On the one hand, this is not exhaustive or definitive; some differences are not measured,

important differences, population subgroups can be formed. This approach implies that cases differ on a substantial number of different variables on which cases will be profiled.

Other techniques might refine the effort further. For example, by using *cluster analysis*¹⁸⁹ on data describing the case population, subgroupings could be defined that maximize the ratio of between-group variation to within-group variation. In other words, cases could be grouped so that the cases within a group are most like each other, while the subgroups themselves are most different from each other. Cases that do not fit into a cluster could be deemed too *sui generis* to be included in the aggregations and could be tried individually.¹⁹⁰ Samples could then be drawn from these highly homogeneous clusters.

A tradeoff has to be made between the number and size of the subgroups. The more subgroups formed, the more homogeneous they will be. The more of them, the smaller they will be. The smaller the subgroups are, the less reliable and less efficient sampling will be. At some point a line has to be drawn where it is judged that further refinement into subgroups will cost more in lost reliability than it gains in increased homogeneity. This, too, requires the exercise of judicial wisdom informed by statistical information.

We noted earlier that a continuum exists between the circumstances in which aggregation increases accuracy of outcomes and the circumstances in which aggregation reduces accuracy. At the beneficial end of that continuum, subgroups are relatively pure and homogeneous. As the number of cases counted into that subpopulation is enlarged, the sample gains the advantage shrinking error, along with the risk of greater heterogeneity. At the point where the increased error due to increased heterogeneity overtakes the decreased error due to larger size, the overall error begins to increase.

Figure 2 depicts the situation at both the desirable and the undesirable ends of that continuum. In Figure 2a, measurement error for individual cases¹⁹¹ is large and the standard error of the sampling distribution¹⁹² is small. In this situation, aggregation would achieve a greater accuracy in assigning awards to cases than if they were tried individually. But in Figure 2b, measurement error is small and the standard error of the sampling distri-

and all of them are measured imperfectly. Still, in *Jenkins*, "fewer than ten variables . . . can explain approximately 90% of the variation among case values." Francis E. McGovern, *The Cycle of Mass Tort Litigation* 15 (Yale Program in Civil Litigation Working Paper No. 122, 1990).

189. See ROBERT R. SOKAL & PETER H.A. SNEATH, *PRINCIPLES OF NUMERICAL TAXONOMY* (1963). Cluster analysis is a module included in most general purpose statistical software packages for personal computers. See *Advanced Statistical Analysis: Summary of Features*, PC MAG., Mar. 14, 1989, at 126, 128-29.

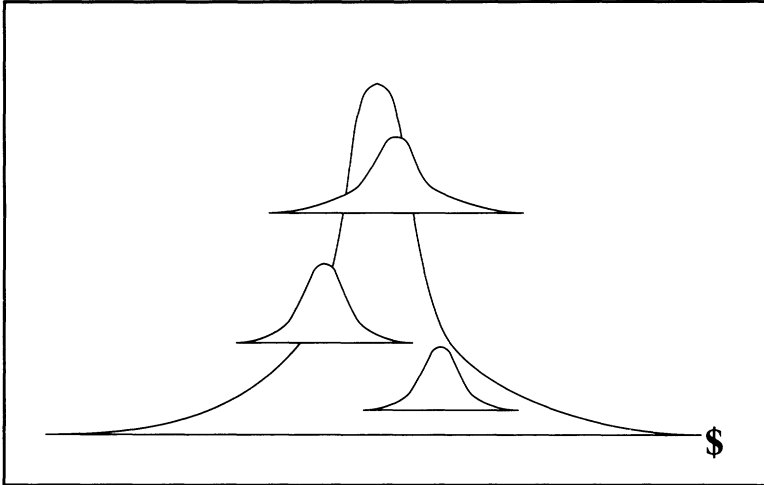
190. Some of the tried cases in *Cimino* resulted in verdicts of no damages. This may be a reflection of groups that are too heterogeneous, rather than erratic decisionmaking by juries. An approach such as cluster analysis might unite most of the no-liability cases together into a single subgroup.

191. This is the variation that would be found if a case were tried repeatedly and the results of those trials displayed in a frequency distribution.

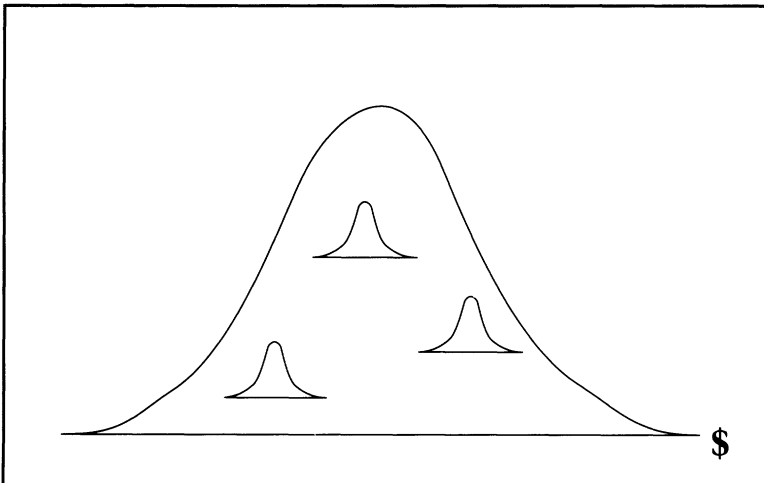
192. A sampling distribution is the distribution of means that would be obtained if all possible samples of a given size were drawn from a population.

Figure 2
Hypothetical Distribution of Damage Awards
in a Subgroup of Cases

2a. Homogeneous Subgroup with Large Measurement Error per Case



2b. Heterogeneous subgroup with Small Measurement Error per Case



bution is large. In this situation, aggregation and sampling would assign awards that are an unacceptable departure from the true awards that should be received.

The reliability of juries becomes visible only when their decisions are aggregated and correlated with predictor variables.¹⁹³ But when the decisions of different juries seeing the same or similar cases are compared to each other, a high degree of error variation becomes apparent. This variability has given rise to the familiar belief that jury verdicts are unpredictable. But despite the unpredictable nature of individual jury decisions, there is an underlying consistency and predictability, which becomes apparent through statistical aggregation. By carefully harnessing the power of aggregation in actual trials, the strengths of jury decisionmaking can be more fully realized.

C. *Juries*

The ways in which juries are employed can make a difference in the consistency and accuracy of outcomes. In *Cimino*, two juries decided eighty cases each. The opinion does not tell us the order in which cases from the various subgroups were presented to each jury.¹⁹⁴

Think of the jury as a measuring instrument, like a thermometer or a bathroom scale. The problems associated with measuring instruments are to a great extent mirror images of those encountered by the aggregation procedure. The degree of homogeneity of the population of cases has its parallel in the degree of reliability of the measuring instrument.¹⁹⁵ The more heterogeneous the population, the more cases that must be sampled from it in order to faithfully reflect it. Similarly, the more unreliable a type of measuring instrument is, the more variation in measurement it produces, and the more of them must be employed in order to consistently reflect what they are measuring. For example, if we have a reliable thermometer, a single one will suffice to give consistent measures of the temperature. The more unreliable our thermometers are—the more they err in random amounts, over- or understating the real temperature—the more of them we would need in order to increase the reliability of the measurements being taken.

In addition to reliability, psychometricians and others interested in the theory and practice of measurement are concerned with *validity*—that is, the accuracy of measurement. A bathroom scale may reliably (consistently) report weight as seventeen pounds greater than it really is. For the most part the law sets aside the problem of validity. The law assumes that the proper verdict is a social judgment, with no external criterion of correctness other

193. See, e.g., MARK A. PETERSON, COMPENSATION OF INJURIES: CIVIL JURY VERDICTS IN COOK COUNTY (1984); McGovern, *supra* note 172.

194. For example, were cases presented at random, or did a jury first decide cases from a single stratum, then from the next stratum, and so on. Also, what effect would the different case assignment strategies have on the jury's pattern of decisions?

195. The term *reliability* has a precise definition: It is the capacity of a measuring instrument to assign like values to like things. Typically, this quality in a measuring device is assessed by a "reliability coefficient"—the correlation between two series of measurements of the same entities.

than that which the community (of which the jury is a representative) would find appropriate. This is most clearly exemplified in cases where the jury must place a dollar value on pain and suffering. Thus, juries that treat like cases alike are considered reliable, and that is as far as the law takes the measurement problem. In short, the law takes reliability to be validity as well.¹⁹⁶

In order to know how few or how many juries are needed, we must know how reliable juries are. Although conventional wisdom holds that juries are of doubtful reliability—in terms of unpredictability of verdicts or awards—systematic empirical research has uncovered a rather different picture.¹⁹⁷ For example, studies of juries assessing damages find awards to be predictable once certain key information about the cases being decided becomes known.¹⁹⁸ These findings suggest that juries are considerably more reliable than is commonly assumed.

On the other hand, juries are not so reliable as to justify using one or a few of them to decide a large number of cases. Take the extreme situation: If one jury is used and it tends to be much too high or too low in its estimations—compared with the population of juries from which it was drawn—then the verdicts in the tried cases would under- or overstate the damage amounts for the tried cases. Those systematic inaccuracies would then be extrapolated to the untried cases as well.

In principle, we could determine the optimal number of juries by developing data that produced a curve relating gains in reliability to increases in the number of juries. We could then identify the point where the marginal increase in reliability was so modest that the use of additional juries was not worth the cost and effort. Again, this calls for a judicial judgment based on the intelligence provided by the data. In the absence of such data, the safest way to avoid this risk is to use as many juries as practicable. Then, when the means are calculated and applied to the untried cases, the errors will cancel each other out.

The problems described above are also present, though usually ignored, in the determination of awards in conventional trials.¹⁹⁹ As we have noted, the advantage of aggregation is that it offers the means for overcoming these

196. See Saks, *supra* note 134, at 243.

197. Much of the relevant literature is reviewed in VALERIE P. HANS & NEIL VIDMAR, *JUDGING THE JURY* (1986); Saks, *supra* note 12; Saks, *supra* note 134.

198. For example, M. PETERSON, *supra* note 193, analyzed jury verdict data in an effort to make sense of the variation in damage awards. The severity of injury was found to be strongly correlated with the jury award. When injury severity, lost income, and case type were used to predict total awards, they accounted for 51% of the variation in jury awards over two decades. *Id.* at 91. This shows both unexplained variation as well as respectable predictability. The addition of more variables increases the power of the predictive model. Recall McGovern's finding that 90% of the variation in asbestos awards was predictable with fewer than 10 variables. See note 188 *supra*.

199. Though with single cases, we do not multiply a one-time error across several thousand more cases. In single-case trials, individual litigants may receive "erroneous" awards, but across a large number of cases the errors offset each other, and on average justice is done. It is precisely this effect that aggregation offers to the great bulk of cases, but *before* the awards are made, and therefore with fewer large errors for any given case.

problems. It would be regrettable to lose the advantages of aggregating cases by failing to appreciate the need for a similar sort of aggregating of the "measuring instruments" as well.

So far we have spoken of juries as thermometers or scales, as if they were fairly stable instruments whose errors were themselves relatively stable. But with human measuring instruments, the sources of unreliability are more complex and, unfortunately, more systematic than random. Consider the following additional complications. All measuring instruments change with use, perhaps especially humans. Thus, by the time a jury is hearing its 80th case on similar issues, it likely is not making decisions in the same way it did in its first decision of that series.²⁰⁰ More particularly, when the same decision-makers see a series of cases, they become increasingly sensitized to subtle differences that would not be detected by different decisionmakers deciding one case each.²⁰¹ Moreover, we might wonder whether jurors deciding a series of highly similar cases do not become excessively, "unnaturally," consistent in their treatment of cases or try to balance out errors they feel they made in one direction by deliberately erring in subsequent cases in the opposite direction. Courts may want to consider whether to regard such changes as a distortion or as an improvement due to experience.²⁰² On the other hand, the law may consider it sufficient cause for concern that these juries may grow increasingly different from the typical jury.

Courts must think about how such problems could be avoided. The risk to untried cases is that if cases sampled from one type of subgroup are decided early and those from another subgroup are decided later, the differences between the average awards for the two groups might be the product, not only of the cases' inherent differences, but also of systematic changes that developed in the jury over time. Protection from this potential problem could come from having numerous juries decide the tried cases. If each of several juries is to hear multiple cases, then cases should be assigned to juries randomly so that the mix of cases early in the series is no different from the mix of cases later in the series.

Randomization of assignment would help to minimize potential bias to tried cases, putting them in much the position they would be in a conventional trial situation. The best protection, however, would actually come from giving even tried cases the mean aggregate award rather than the one arrived at for it by the jury that heard that particular case.²⁰³

200. This phenomenon is known as *instrumentation*. See DONALD T. CAMPBELL & JULIAN C. STANLEY, *EXPERIMENTAL AND QUASI-EXPERIMENTAL DESIGNS FOR RESEARCH* 9 (1966).

201. In research on human judgment and decisionmaking, this difference is evident where effects that are not found in between-subjects experimental designs (designs in which *different* research participants are given different materials to judge) *are* found in within-subjects designs (designs in which the *same* participants see an array of different entities to judge).

202. See also Resnik & Rowe, *supra* note 65, at 18 (suggesting that, if not properly conducted, aggregated trials that are "too complex" for a jury can render the issues incomprehensible and, therefore, violate due process). Resnik and Rowe conclude that the aggregating procedures must ensure that the juries' awards are not the product of bias, thereby lacking in fundamental fairness (citing *Pacific Mutual Life Ins. Co. v. Haslip*, 111 S.Ct. 1032 (1991)).

203. We acknowledge that for noninstrumental reasons courts may prefer to assign to tried

Aggregation helps to eliminate another problem that has crept into the civil justice system due to the use of smaller juries. As the size of the jury decreases, the error variation in awards increases.²⁰⁴ The use of the mean award from multiple juries would reduce or eliminate those errors.²⁰⁵ Thus, in the context of aggregation, the use of smaller juries would be both efficient and accurate, while in the traditional trial setting we give up some reliability in verdicts in order to acquire some additional efficiency.

D. *Extrapolating from Sample to Finite Population*

One way to apply the awards from a group of tried cases to the remaining population of untried cases is simply to take the subgroup sample mean, after adjusting for remittitur granted, and award that amount to each untried case in that subgroup. A more refined approach would take into account additional differences among the cases within each subgroup.

For example, suppose a subgroup is homogeneous in every way except that the plaintiffs vary with respect to the number of future work years they will lose. Such a variable ought to affect the amount of damages awarded. Creating subgroups for each year (or ranges of years) of lost work might create too many subgroups that are too small. The pattern of verdicts in tried cases almost certainly would reflect that the jury took into account the effects of the years of work lost. Within a subgroup, the effect of this variable could be captured by developing a mathematical model of the jury decisions. The model would permit additional variables (including but not limited to number of working years lost) to be taken into account and permit more precise awards to be made among untried cases within subgroups.

In addition, the courts might want to build in a procedure whereby a judge could consider unusual factors in certain of the untried cases, a kind of routinized remittitur review. The number of such cases would be small, owing to the cluster analysis which grouped together only like cases and removed oddball cases from the aggregation altogether, and to the mathematical modeling, which would already have taken into account certain important systematic differences among cases within the same subgroup.

The approach we have been suggesting—clustering cases into homogeneous subgroups—is a refinement of that which was employed in *Cimino*. We have selected this more “physical” approach largely because it would make the procedures more transparent and be more intuitively comprehensible to

cases the damage awards reached by the jury, rather than the aggregate mean, as the court did in *Cimino*. This presents an interesting dilemma: Is this an occasion for allowing the appearance of greater accuracy to override actual greater accuracy? See discussion of noninstrumental values in due process, Section III.A *supra*.

204. Recall that the standard error depends to an important extent upon sample size. The larger the sample, the smaller the error; the smaller the sample, the larger the error. In the context of civil juries, in choosing to use fewer jurors we also have chosen to accept greater error variation, resulting in greater unpredictability in verdicts. For example, when sample sizes are cut in half (say from 12 to 6), all else being equal, the standard error increases 41%. Saks, *supra* note 134.

205. See discussion in Section III.B *supra*.

nonstatisticians (that is, most judges, lawyers, litigants, and citizens). Nevertheless, completely statistical modeling would be a perfectly sensible alternative approach. In essence, this approach takes the mathematical modeling refinement suggested above and replaces the clusters with more variables in the model. That is, juries would decide a representative sample of cases, the characteristics of the cases and the juries' responses to them would be captured in a mathematical model, and the mathematical model would be used to extrapolate damages for the rest of the finite population of cases.²⁰⁶ Such an approach gains the benefit of jury judgments about how different case facts (variables) affect decisions in the cases and permits tailoring to the particulars of each case.²⁰⁷

V. CONCLUSION

Necessity is the mother of invention. And sometimes inventions work better than the devices they have been modeled after. Such is the case with aggregation and sampling in the determination of damages in mass torts. While most commentators debate whether aggregated trials preserve enough of the features of procedural due process to be judged constitutional, we have suggested that aggregated trials have the potential to achieve a level of justice that simply is not possible in traditional individual trials.

Done well, aggregation not only can increase efficiency, it can systematically increase accuracy, reduce bias, and still provide meaningful individualization of awards—all based on jury judgments of the meaning various case characteristics have for case outcomes.

Although a variety of methodological and statistical considerations need to be taken into account in deciding just how aggregated trials can best be conducted, our fundamental conclusion is that they can be carried out in ways that satisfy the norms of procedural due process—and then some.

206. This is what cognitive scientists call "bootstrapping." By statistically relating decision inputs to outputs, people's "decision policies" can be captured in a mathematical model and applied to new decisions. In many contexts these linear models make more consistent and more accurate decisions than the people from whom they were derived. See Robyn M. Dawes & Bernard Corrigan, *Linear Models in Decision Making*, 81 PSYCH. BULL. 95 (1974). That is because the model captures the heart of people's decision "policies" and applies it relentlessly, while the people themselves stray in random or inconsistent ways from decision to decision.

207. This important point has been emphasized by Professor Barnes, *supra* note 183, in arguing for more individualized, though more mathematical, jury determinations.

On the feasibility of this approach, recall, again, McGovern's finding, *supra* note 188, that in at least one case, 90% of the variation in awards could be accounted for by knowing fewer than 10 variables. This is not unusual and probably is to be expected—if the right variables are employed in the model and reasonably well measured. Recall Peterson's finding, *supra* note 198, that 51% of the variation in damages could be accounted for by knowing just a few variables.