An Interview with Steven J. Brams

Michael A. Jones

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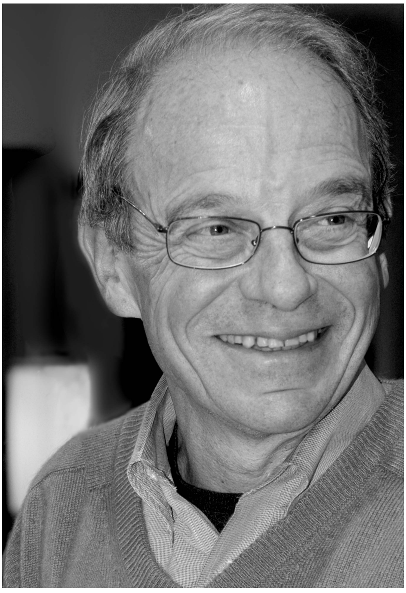
Michael A. Jones (maj@ams.org) earned his Ph.D. in game theory at Northwestern University under the direction of Donald G. Saari in 1994. While in a 3-year position at the U.S. Military Academy at West Point, he regularly attended Roy Radner's Microeconomic Theory Workshop at New York University (NYU) where he was introduced to Steven J. Brams by Katri Saari—Don's daughter, then a Ph.D. student in Politics at NYU. Michael was at Montclair State University in New Jersey from 1998 to 2008 and taught a masters level game theory course at NYU in the Department of Politics from 2005–2007. He is now an Associate Editor at Mathematical Reviews.

A prolific writer on social choice and fairness issues, Steven J. Brams is the author of over 250 articles and author (or co-author) of 14 books, including *Approval Voting* with Peter C. Fishburn [**2**], *Fair Division: From Cake-Cutting to Dispute Resolution* with Alan D. Taylor [**4**], and, most recently, *Mathematics and Democracy: Designing Better Voting and Fair-Division Procedures* [**1**]. As a vocal advocate for the application of mathematical algorithms to solve social problems, Brams is a pioneer, particularly in the areas of fair division and voting systems.



Steven A. Brams

After majoring in Politics, Economics, and Science at MIT, Brams earned a Ph.D. in Political Science at Northwestern. Currently he is a Professor of Politics at New

York University. He is a past president of the Public Choice Society (2004–2006), and one afternoon at the 2009 Public Choice Society meetings, I had the opportunity to talk to him about his work.

Jones: *Although not one yourself, you have collaborated with a lot of mathematicians. Why choose to work with mathematicians?*

Brams: I like their style, their turn of mind. I think they are particularly good at handling, in depth, the kinds of questions I'm interested in. I certainly can use help. Mathematicians are the obvious people to turn to.

Jones: *How did your first collaboration with a mathematician come about?*

Brams: One of my first collaborations was with Peter Fishburn. We happened to meet at a conference on social choice. I had begun work on approval voting, and he said he was also interested and could address some of the questions that I'd raised. I also recall working early with Phil Straffin and Mort Davis. Mort is a game theorist. Phil got interested in game theory and wrote a book on it. Together we worked on different problems; in fact, the three of us wrote several articles together. I found those collaborations very fruitful. *I* definitely got help, and the mathematicians seemed interested as well.

Jones: *As a result of your work with Peter Fishburn, approval voting has been adopted by a number of different organizations, mainly professional societies. How successful were your efforts to urge the adoption of approval voting?*

Brams: I actually wrote an article with Peter Fishburn about the success of approval voting [**3**]. We—myself in particular—tried hard, initially, to sell it to politicians, beginning in New Hampshire where I grew up. In 1979–1980, I made a kind of campaign trip to New Hampshire with some local help from people I knew, or people who knew people who might be interested. I appeared on the local public television station, talked to the governor, and testified before senate and house committees of the state legislature.

Jones: *Good people to know!*

Brams: Yes. It's a small state, and I thought things went pretty well. There was an article in the *Manchester Union Leader*, the leading New Hampshire newspaper, a kind of factual piece. It didn't take an editorial stance, and it garnered quite a bit of publicity. I'm not even sure if a bill was ever written, or ever got out of committee. New Hampshire is innovative in certain areas. They were the first state to have a lottery, for example. Because they don't have a sales or income tax, they try to get revenue by any means possible. They did *not* choose to be innovative on approval voting. Then I testified in Vermont. I remember going to the capital to talk to people. I ended up testifying in Albany, also. There the reception was more positive. A bill was written; it is the appendix to [**2**]. I got help all along from both political scientists and mathematicians, but I guess I was the primary mover.

Ultimately, we were not successful. We had the most success in North Dakota, actually, where a state senator got interested in approval voting and sponsored a bill. It passed the senate, but not the house. So, bills were written, but the movement didn't advance. Then we began approaching professional organizations. Several expressed interest. The first, I think, was the Institute of Management Science, which eventually hooked up with the Operations Research Society of America to become INFORMS. They did an experiment, allowing members to vote both under approval voting and under plurality voting. Several other organizations took up the cudgel, and we got adoptions in quite few of them including the two major mathematical societies, the MAA and the AMS.

Jones: *A lot of other organizations are pushing election reforms now: from instant run-off to range voting. What, if anything, came before your work on approval voting?*

Brams: The best example is James W. Bucklin. He was a lawyer from Grand Junction, Colorado, at the turn of the 20th century who proposed a system that came to be called Bucklin voting. His method was actually adopted by a few small cities in Colorado—and one or two other states, I think—though eventually it died out. And surely there have been others who pushed reform ideas.

Recently there have been more reformers, including Don Saari, an advocate for the Borda count who has written several books and many articles arguing its virtues. Another mathematician, Warren Smith, has pushed range voting. And instant runoff is now being pushed by a Washington non-profit [**7**]. It doesn't have much academic support, however.

Over the years several people have each had their ideas about these systems, which they've pushed. I've been one of them but am maybe not so active these days.

Jones: *You mentioned Phil Straffin. I know of your work with him on having teams draft athletes fairly. How did you get interested in fair division?*

Brams: Beginning in the 1980s, the Sloan Foundation sponsored summer seminars, which were really faculty workshops. It was called the New Liberal Arts program. Faculty from certain liberal arts colleges and historically black colleges were eligible. About 30–35 colleges were invited to participate, and among the activities were these seminars. I was asked by a mathematician, Sam Goldberg, at Oberlin, whom I'd met previously and who became a program officer of the Sloan Foundation, if I'd be willing to do one of these seminars. I agreed and did one in the mid 80s that was repeated a couple of times. In the subsequent seminars a mathematician who'd been at the first seminar got quite interested. That was Alan Taylor of Union College. He and I did some seminars together. We talked, but nothing clicked until a few years later when I posed a problem in cake-cutting to him. The story is told in a *Discover* magazine article [**8**], so I won't give the details. Eventually, we combined ideas and solved a 50-year old mathematical problem: How can you cut a cake, or any heterogeneous good, so that everybody gets what they think is at least a tied-for-largest piece? It's called an *envy-free* solution—because no one envies anybody if the pieces they get are tied, at least, for the largest piece. There was an existence result, but no algorithm. We came up with one—and that's how I got started working with Alan Taylor.

Jones: *That work is quite theoretical. What you taught in the Sloan seminars was probably more practical. Which came first, theory or application?*

Brams: It's hard to separate these things. I had gotten interested in game theory by working with William Riker, who was a pioneer in this field, when I first taught at the University of Rochester in the late 60s and early 70s. We wrote some articles together. That early work was applications: to presidential elections, to the Bible. By the time I taught the Sloan seminars, I had considered many applications of game theory and was curious about other problems—like cake-cutting. I thought that some of these ideas might be made more practical. The theoretical solution Alan and I came up with for cake-cutting was really not useable. So we worked on procedures which I thought were more applicable to real-life problems. That eventually resulted in [**4**] and our popular book [**5**].

Jones: *One thing that came out of* [**4**] *was the Adjusted Winner procedure. It was used to settle court cases in a mock trial at the University of Washington's law school, wasn't it? How well did it do?*

Brams: Well, we didn't exactly set up cases. I gave what are called CLE Seminars—Continuing Legal Education—to lawyers, 120 lawyers in a day. I talked about some game theory and fair division, and the organizer, a law professor, wanted a demonstration. He chose a case modeled after Donald and Ivana Trump's divorce and drew up fact sheets. Two lawyers were chosen to negotiate a solution for the clients. That was intended to be a demonstration of traditional bargaining. At the same time, other lawyers were separated into two rooms. I had the room which represented how Ivana saw the issues. The organizer had the room for Donald. Adjusted Winner is a point-allocation procedure. So through audience participation, each of us got 'Donald' and 'Ivana' to allocate points to the items in dispute. Then we applied our procedure. It gave essentially the same solution—exactly the same solution, in fact—that the two lawyers came to, who negotiated for 45 minutes. It wasn't a real case. It was a demonstration.

Jones: *You're the chairman of the advisory board for a company called Fair Outcomes, Inc., that looks at fair division problems. Do they use the Adjusted Winner procedure?*

Brams: Adjusted Winner *is* one of their procedures; there are a few others. We got together because when I was at a game theory meeting a couple years ago I met a lawyer, Jim Ring, who was interested in applying game theory. We discussed a procedure that he developed, and I suggested an emendation. He liked that, and he liked the ideas behind my other work, in particular with Alan Taylor. Preceding all this, NYU had patented the algorithm that implements Adjusted Winner. So NYU had a patent, Alan Taylor and I were the co-inventors, but it hadn't really been used. That's why I wanted it part of his company's portfolio. He licensed the patent rights in 2008 from NYU. We are now trying to persuade people that mathematical algorithms can genuinely facilitate dispute resolution—whether divorce, or an international border dispute, or anything in-between.

Jones: *One of the procedures supposedly involves sorting out disputes between eBay sellers and dissatisfied customers.*

Brams: That's a hybrid procedure, a little bit complicated—so I won't describe it too fully. It tries to be fair to both sides: the customer who wants the product fixed, or perhaps replaced, or to get a refund; and the seller who wants to preserve his or her reputation. We provide a mechanism, over the internet, for settling the dispute, whether it be a cash payment, or return of the item, or a repair. I've talked to people from eBay and similar e-commerce firms about the procedure. It hasn't been adopted yet, but the trade press in this area of e-commerce has written some favorable things. Fair Outcomes, Inc. and its products are in an embryonic stage. We will see whether it's eventually successful.

Jones: *You've applied game theory to the Bible and to other works,* Catch 22, *for example. Where might game theory be applied next? What are the limitations to its application, if any?*

Brams: Game theory has made intrusions into many different fields—not just the social sciences, not just economics and political science. It's a major tool in evolutionary biology; there's a whole field of evolutionary game theory. I think it can go in different directions. Certainly the mathematics has been extended and refined, and there are people out there interested in applications. The two don't always get together. We could use more mathematicians taking applications seriously, and maybe more practitioners doing some mathematics to understand what's going on.

The ideas of game theory are pregnant. By that I mean they permeate all areas. I've applied game theory to the exegesis of stories of the Hebrew Bible and, in a forthcoming work, to literature, to opera, and to history—not just single cases, but to the ebb and flow of historical forces—and to theology—which follows some work I did on the Bible—and to philosophy. Some of the paradoxes in philosophy can be expressed quite well in game-theoretic terms.

Game theory could, I think, become a kind of calculus of the social sciences. It's a natural language for making strategic ideas precise and more rigorous. So I am a big proponent. At the Executive Council meeting of the Game Theory Society in 2008, we talked about renaming game theory "game science" with the idea that it might eventually become a department at a college and/or university. There are no departments of "something *theory*" but there are departments of "something *science*", for example, political science and computer science. A name change might help. We'll see whether that initiative is successful.

Jones: *You mentioned paradoxes. What is it about them that grabs your attention?*

Brams: By their very nature, paradoxes grab attention because they are not obvious until resolved. Philosophers have had a heyday with paradoxes, using them to introduce new questions. So they're useful in terms of being provocative. They're stimulating to students as well. I make a lot of use of them in teaching and in research. Game theory is particularly paradoxical, in some aspects, because it involves thinking about thinking. Reflexivity, which has interested philosophers, is part and parcel of game theory.

Jones: *What kind of advice would you give mathematicians who want to work with social scientists?*

Brams: Political scientists in most departments are not trained in formal modeling. Almost all political scientists, especially in graduate school, take statistics, but this isn't the essence of mathematics necessarily. More and more schools teach game theory or applied game theory courses to political science and other social science students. Economics, of course, is the leader.

What was effective in the early days, when I was starting out, can still be effective. That was short courses, taught by mathematicians and pushing applications. Bill Lucas was a pioneer, for example. He taught Chautauqua-type courses introducing mathematicians to applications. Several switched fields. Several mathematicians I work with, in fact, started out in functional analysis, set theory and elsewhere, and are now game theorists interested in fair division. It's a matter of introducing mathematicians to ideas outside their fields.

I want to see more foundation support for interdisciplinary work. The Sloan Foundation took this seriously in the 1980s, but they haven't done much since. I'd like to see more. Cross-disciplinary meetings, seminars, and short courses not only can help mathematicians, but also social scientists link up to do good joint research.

Jones: *Didn't some of the material in* For All Practical Purposes [**6**] *come out of Bill Lucas' short courses?*

Brams: Bill Lucas was one of the first authors of *For All Practical Purposes*. For the first three or four editions, he did the game theory, fair division, and apportionment chapters. Then Alan Taylor and I began doing some chapters, and there were a few others. The book is now in its eighth edition.

Texts like this, other materials too, can stimulate a field. The COMAP book and some of its competitors are quite widely used in [liberal arts] mathematics courses. It's another vehicle for introducing people [to mathematical applications in the social sciences]. Teaching assistants, mathematics graduate students, are not well versed in this material. They've never seen it before, so they get to learn it too.

Jones: *My introduction to game theory was as a teaching assistant for a game theory course my first year in graduate school.*

Brams: Not everyone converts like you did!

Mathematicians don't take social scientists seriously because they don't think they can pose interesting mathematical questions. It's a challenge for social scientists to frame questions that can be translated into mathematical models. I had some background in mathematics coming out of MIT, but most social scientists don't. Even if you give them training in graduate school, it's intense without time to think. It's stuffed down their throats, so to speak. Starting that training earlier is important. I'd like to see more math modeling courses in the social science curriculum. Mathematicians can benefit from helping teach these courses.

Jones: *The COMAP book, and its imitators, show mathematics applied to everyday situations. People who are never going to take another math class again in their life can understand them. Their view of mathematics may change; the way that they vote to support science and mathematics will change as well, hopefully. That helps the field another way.*

Brams: Mathematicians can do a better job at public relations by describing the problems that they're working on—not just in the hard sciences, but in the social sciences too—questions of voting, and fair division, and the other areas in which I've worked. Ultimately the political process listens. Then everybody benefits.

Summary. Steven J. Brams, game theorist and political scientist, describes his role helping approval voting gain political traction. Also how to apply fair division procedures to resolve eBay buyer-seller disputes and how interdisciplinary seminars in the 1980s led not only to advances in research, but to significant pedagogical changes.

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