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Game Theory Meets the Humanities and Both Win

OR

Book Review: *Game Theory and the Humanities:
Bridging Two Worlds*, by Steven J. Brams

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Synopsis

This review discusses Brams' wide-ranging book *Game Theory and the Humanities* and gives some basic examples of the methodology and style, including how the Theory of Moves contributes to understanding such games.

Game Theory and the Humanities: Bridging Two Worlds.

By Steven J. Brams, MIT Press, Cambridge, MA, 2012. (Hardcover US\$35.00, ISBN: 9780262015226. Paperback US\$18.00, ISBN: 9780262518253. 336 pages.)

In writing a book review, the author needs to make a basic decision. Should he take the easy route and start with a glorified table of contents, or take some effort to find an attractive and relevant example to lure the reader in? The reader, too, has to decide within a paragraph or two whether to read what might be several dense pages ending in irrelevance—or perhaps miss out on a really valuable and even informative resource.

In fact, one might set this scenario up as a non-zero-sum game between two players: the Author and the Reader. For the purposes of this scenario, let us assume that all reviews that start with a summary are boring, and ones starting with a clever example are useful (but that the players don't know this). In that case, one might rank the results as in the matrix in Table 1, (with 4 being best).

	Reader Sticks With It	Reader Quits
Author Starts with Example	(A 3, R 4)	(A 1, R 2)
Author Starts with Summary	(A 4, R 1)	(A 2, R 3)

Table 1: The Book Review Game.

Clearly the author wants the review to be read; however, a secondary motivation is definitely expending as little effort as possible. The reader, on the other hand, wants to avoid ennui, but figures that missing out on a good review is better than reading a bad one to the bitter end.¹

The reader of *this* review has already figured out that this bears no resemblance to reality. But if Author and Reader are *fictional* characters, in a similar-yet-not-the-same world in a novel, all at once doing some analysis of what behaviors might be rational might make good sense—at the very least, to an author exploring different scenarios, or to a critic.

That game theory of this variety might yield insight into literature, and indeed into many of *the humanities*, is the premise of Steve Brams' unique book. Drawing from a wide array of disciplines (and bringing together in one convenient place a number of his better-known, as well as more obscure, analyses), Brams, a game theorist and a professor of politics in New York University, brings games and equilibria to bear on everything from the law and philosophy to the Hebrew Bible.

Some topics in the humanities, as one might expect, lend themselves well to game-theoretic analysis. Two representative samples are Brams' careful analysis of Joseph Heller's original *Catch-22* in the eponymous novel and a reconstruction of the possible games played in the Iran hostage crisis.² Unsurprisingly for a political scientist, there are chapters on the law, political philosophy, fair division, and magnanimity after wars—all topics where one can easily imagine two players whose motives and preferences can be analyzed from the historical record.

¹If you know a little game theory, note that there is only one Nash equilibrium, and it's not the ideal outcome. And if you do not, for the purposes of this review, a Nash equilibrium is a pragmatically optimal solution to a problem, in the sense that the players, aiming to optimize their own outcomes, will end up converging to such an outcome.

²Brams interprets the latter as *history* rather than *political science*.

For instance, in the last category he tackles topics like the Franco-Prussian and US Civil Wars. The analysis makes a good deal of sense, and (at least to me) helps cut through the knot of entangled possible motives for postbellum dealings. Much the same can be said of the other chapters. Using basic game theory, one can start to explain behavior as rational (for instance, within the setup of a novel) that otherwise might be hard to understand. This is a key concept in the book; the goal is not to provide definitive conclusions about (say) Macbeth, but to move toward recognition that difficult episodes (whether real or fictional) might be less enigmatic than common wisdom would suggest.

To entice the reader, I haven't yet mentioned a number of more surprising applications. Brams devotes two whole chapters to literary instances of game-theoretic deduction, such as an analysis of rationality in *Lysistrata*. He has taught seminars and written entire books concerning serious uses of game theory in understanding superior beings³ and the God of the Old Testament in particular; the summaries here of those larger writings are extremely useful for moving beyond simplistic portrayals of these topics that ignore the human experience surrounding them.

So what sort of analyses does Brams make of such varied situations? It's worth indulging in an extended example, so let us return to the original Author-Reader story. You may not be convinced that this is a good literary device; well, this author is no novelist. However, exactly the same game matrix describes the game involved in the US President Richard Nixon's potential defiance of the Supreme Court in the matter of the Watergate tapes.

In that case, the players were Nixon himself and two of his own appointees to the Court. To summarize Brams' argument, Burger and Blackmun voting with the rest of the court to demand that Nixon hands over the tapes (against what could have been their own jurisprudential leaning) was the Nash equilibrium of this game. Without the potential for each player to threaten to move to a different outcome, it is hard to see how the outcome could have been otherwise between rational players (even if Nixon, with some foresight, could have avoided the whole confrontation before the game started).

³Brams also tackles the question of how we might know if they exist; see *Superior Beings: If They Exist, How Would We Know? Game-Theoretic Implications of Omniscience, Omnipotence, Immortality, and Incomprehensibility*, Springer, New York, 1983/2007.

So far so good. But Brams' real contribution to this kind of study (and the basis for much of the book) is his *Theory of Moves* (TOM). This is the idea that in some games, one really can view the players as being able to threaten to move from a Nash equilibrium (or other state) in order to try to force a better outcome over many rounds of play. For instance, in the Book Review Game between the Author and the Reader, if A moves from (2, 3) to the (worse) (1, 1), R will definitely want to move to (3, 4).⁴ Note that each player can only move within a row or a column, depending on which player s/he is. Nonetheless, often this threat to move to a worse outcome (perhaps for both) leads to a move by the other player of a similar type, and so forth.

The real consequence of TOM is that one can extrapolate from all starting positions what moves might be made or threatened. Then both players can see what outcomes are possible ending states and choose a *Nonmyopic Equilibrium* state. In the Author-Reader/Court-Nixon game, this is the Pareto-optimal (3, 4). To fully understand why, a careful reading of pages 61–63 (where this is introduced) is necessary.⁵ But the essence is that by predicting threats and moves, each player will know where to stop threatening and moving for a preferred outcome. In general games, these equilibria are not always Pareto-optimal.⁶ Nonetheless, in my view, any theory that can give a good way to get from a non-optimal Nash equilibrium to a Pareto-optimal outcome is very much worth exploring!

Finally, a book review should also address briefly why the book might be relevant to the readership of the particular outlet it is being aimed for. In the context of this *Journal*, we might wonder. Even if *game theory* is a recognized part of mathematics, the connection between *the humanities* and *humanistic* might be somewhat up for grabs. After all, there is plenty of academic work in disciplines such as classics or history which is not really humanistic, or at least not in my estimation. Textual criticism and archival analysis are both valuable, but they do not always address human motivation.

⁴In fact, many of the analyses take into account that one party must move first, such as the Court in this case, yielding a 2×4 payoff matrix.

⁵The short version is that Author knows Reader would prefer to stay at the Nash equilibrium than switch to (4, 1); so Author will choose not to exercise the move from (3, 4) to (4, 1), but Reader prefers (3, 4) to (1, 2), and will also then choose not to move from (3, 4).

⁶In the 2×2 case there is only one half-exception.

Brams manages to convince his reader that we can gain deeper insight into what motivates us as humans by thinking about these questions. I think that the most intriguing of these examples is the story of the *Akedah*, which motivates Kierkegaard's famous reflection *Fear and Trembling*. This is the story of the Biblical patriarch Abraham, and his choice whether to obey God and sacrifice his son and heir Isaac (or, in the Islamic tradition, Ishmael). Few choices could be more fraught with consequence, and Brams gives several different possible game-theoretic interpretations addressing different possible motivations for both Abraham and God. For those unsure on the one hand about whether God could be treated as having motivation, or on the other about whether God exists, I encourage one to read Brams' treatment first, which I think will convince one of the appropriateness and utility of examining such stories through this lens, even given such uncertainty.

A couple caveats. First, although presented in more friendly fashion and not going in as much depth as the source papers and books, this is still very much a research-type text which would be hard to use for course adoption at most colleges. It is more accessible because of the relatively simplicity of the mathematics, but the arguments are still deep, and the reader who is truly an expert in all the topics in the humanities addressed will be hard to find. Second, those who are experts in such topics may or may not agree with the arguments presented herein, or even find them trivial or too complex. That's okay; as Brams says in another book, such readers are invited to derive their own conclusions from different starting points—the point is that the method may illuminate, not any specific conclusions.

So in sum, I find this text to be indispensable for any course that teaches game theory, as a source of provocative and wide-ranging examples.⁷ And it's a worthy addition to the library of anyone who cares about either human choices, or how to bring mathematics beyond the sciences.

Postscript: An extensive review by the same author focusing more on the theistic and Biblical aspects of several of Brams' books will soon be published in the *Journal of the Association of Christians in the Mathematical Sciences*.

⁷Indeed, one of my students based a good paper on coming up with his own game matrix for the *Akedah*. I can see a lot of promise for student projects or even publications coming from the ideas in this book.