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7 Economics imperialism reconsidered

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Introduction

This chapter uses Uskali Mäki's (2009) concepts of "good" and "bad" imperialism to investigate the "economics imperialism" thesis. If science expands by offering (a) consilience, and (b) epistemological and ontological unity – that is, it explains more phenomena with greater parsimony – then this is good scientific expansion. Economics imperialism is only bad if the methodology of economics expands outside its domain without increasing understanding in the above manners.

I take from Steve Clarke and Adrian Walsh the view that the burden of proof is on the shoulders of an analyst claiming to identify bad imperialism because she needs to account for "why imperialistic ideas are liable to succeed in the disciplines they attempt to colonise, despite their lack of explanatory virtue" (Clarke and Walsh 2009, 202). This chapter argues three points. First, alleged "economics imperialism" is better described as "rational choice imperialism" because there is a disciplinary break between the earlier schools of classical and neoclassical economics versus game theory. Second, following Mäki, the advances and imperializing power of rational choice is *derivational*, rather than epistemological, conciliatory, or ontological. Third, the stakes of accurately identifying and even resisting rational choice imperialism follow from it potentially reflecting a type of politically motivated imperialism that may not contribute to scientific understanding. Clarke and Walsh recognize that some forms of disciplinary imperialism dismiss alternative manners of inquiry, and potentially also inform common-sense views of valid or appropriate social ontologies.

1 Good and bad "scientific imperialism"

The case of scientific imperialism focal to this chapter is that of economics imperialism which refers to starkly polarized territory in which many theorists are critical of the increasing encroachment of economic assumptions on domains of inquiry formerly operating with alternative approaches (Sen 1977; Heath 2008), and other researchers are celebratory (Becker 1978; Posner 1984; Buchanan 1975). However, before discussing economics imperialism specifically, it is useful to follow Mäki in developing tools to investigate this so-called

"imperialism" in neutral terms. Mäki recommends having an open mind as to whether disciplinary imperialism is "good" or "bad," and therefore articulates a means to discover whether disciplinary expansion is consistent with scientific unification and greater explanatory power. Suppose, for example, that a scientific theory such as Isaac Newton's theory of gravitation is able to explain the movement of objects both on Earth and throughout the heavens, then although this modern physics colonizes astronomy with the same analytic structure applied to the motion of Earth-bound corporeal bodies, no credible philosopher of science will denounce this expansion as contrary to the principles of effective scientific inquiry. As Clarke and Walsh (2009) point out, in fact it seems likely that if a body of theory is applied to a new domain of study and those theorists find it useful, then *prima facie* it would seem that this exercise shares common ground with the widespread and self-sustaining acceptance of Newtonian physics. Thus Mäki notes that, "unification provides a norm that is firmly embedded in the institution called science" (Mäki 2009, 262). This type of expansion fits comfortably with the belief in scientific progress.

Mäki spells out features of a successful extension of a scientific method from one domain to others. Unification of inquiry should be effective with respect to ontology, pragmatics, and epistemology. For the first, Maki states that, "ontological unification is a matter of redescribing large classes of apparently independent explanandum phenomena as forms or manifestations of a common system of entities, causes, and mechanisms" (Mäki 2009, 364). The core idea is that a scientific theory may expand credibly if it applies to a broader ontology akin to Newtonian gravitation pertaining to motion both within and beyond Earth's atmosphere. As I will explore below, in the case of the expansion of economic science, it would exhibit the property of greater ontological relevance if its mode of explanation successfully explains not only traditional market transactions, but, for example, also all rational decision-making. Economists propose to achieve this aim (Hausman 2012).

With respect to pragmatism, Mäki refers to two types of consilience: subsumption and cardinality. If one theory more successfully explains both phenomena to which it initially was applied and in addition those previously explained by another theory, then the broader theory has more explanatory power. The Copernican model of celestial mechanics explained both the Earth's movement vis-à-vis the sun and that of the other planets' orbits around the sun, and over time was seen to offer a more synthetic perspective than that of the Ptolomaic system with its well-known reliance on epicycles (Kuhn 1962). Similarly, if one theory is able to explain more bundles of facts than another, then that more encompassing theory seems obviously more effective. Mathematical models of waves can explain these patterns of energy transfer in multiple substances to include radio waves, water waves, and sound waves. Again, looking ahead to the theme of economics imperialism, if game theory can explain both markets and crime whereas neoclassical economics could only explain markets, then game theory seems to offer greater explanatory power.

With respect to epistemology, Mäki points out that scientists prefer parsimony in theory choice, typically deferring to theories making the fewest assumptions. Thus, if empirical tests are used to determine the accuracy of hypotheses generated by theories, and the data support two different theories, the one with greater parsimony will likely be preferred. Again, in reference to the expansion of economics beyond its borders, if rational choice and Freudian psychology both explain individuals' consumptive choices, but rational choice has fewer assumptions, then likely theorists will find it to be the more epistemically effective.

In his discussion of features of scientific theories that make them more compelling and able to expand their domains of relevance, Mäki also introduces an alternative means by which theories can increase their range of application. He calls this a type of unification that proceeds through the power of derivation as opposed to greater explanation of ontological phenomena. The idea is that a theory may provide the means to derive many conclusions analytically, and hence generate an impressive quantity of results that cover a range of phenomena in domains formerly addressed by alternative theories and methods. Yet such a theory is limited to derivational unification if its formal results are not vindicated by empirical verification. Below I will argue that the concept of imperialism through derivational unification is particularly relevant to the type of expansion characterized by rational choice.

To summarize, then, I concur with Mäki that the expansion of a scientific theory from one domain to another appears to be consistent with the aims of science. Hence it is valuable to identify features of scientific unification that are consistent with the enterprise of science, and the celebration of increased ontological, practical, and epistemological applicability is thus warranted. However, Mäki does alert us to a type of unification through the multiplication of analytic derivations without empirical vindication that could characterize a manner of expansion that may not enhance the explanatory power of scientific inquiry.

2 Revisiting the "economics imperialism" thesis

George Stigler's "Economics – The Imperial Science?" (1984) discusses how the discipline of economics "has been aggressive in addressing central problems in a considerable number of neighboring social disciplines without any invitations" (Stigler 1984, 311). He describes how theorists have made forays in modeling diverse social phenomena like criminal activity and family planning (e.g., Becker 1978) using concepts and methods from economics. Thus, the exercise of economics imperialism exhibited by Anthony Downs (1957), James M. Buchanan and Gordon Tullock (1962), Thomas Schelling (1960), Michael Taylor (1976) and Russell Hardin (1982) is generally accepted to represent applying economic arguments to democracy, the social contract, law, conflict and conflict resolution, cooperation, and collective action. Before interrogating this understanding of the type of imperialism exhibited by game theory in the

next section, the goal here is to provide a charitable description of what is normally referred to by the phrase "economics imperialism" (Lazear 2000; Miller 1997, 1181). This task is helpful due to the common currency of the phrase and the imagery that this common lore narrative evokes.

The essence of the economics methodology being expropriated by other fields, which include political science, international relations, jurisprudence, public policy, arbitration, conflict resolution, sociology, and psychology, is that rational agents maximize utility in all decision-making independent of its context. Thus individual choice can be modeled according to whether actors behave consistently given that outcomes are usually realized in accordance with probabilities rather than certainties. Additionally, interactions are modeled assuming that individuals maximize individual gain competitively. The assumptions underlying the disciplinary unification are parsimonious and only demand that actors have complete and consistent preferences over outcomes (Hargreaves Heap and Varoufakis 2004, 8); and that, from these assumptions, utility functions can be constructed that pertain to diverse choice situations from markets to politics (Mueller 2003; Pettit 2002), and love and truth-telling (e.g., Becker 1978; Lewis 1969) to evolutionary science (Trivers 1971; Smith 1982; Dawkins 1979). Nothing seems to be outside the confines of this application of bare bones individualistic maximization to every conceivable domain of rational judgment (Hausman 2012). Even the sympathy characterized by Adam Smith's (1982 [1759]) impartial spectator has been subjected to the assumption that all individuals maximize some type of gain in every decision and interaction (Pettit 2002). If actors demonstrate altruism, then this is merely another strategy by which they benefit, either by aiding the promotion of their genetic identity through kin, or seeking immortality and longevity through reputation (Dawkins 1979).

In considering these examples of economics imperialism it is evident that one particular brand of economic theorizing underlies this trend: rational choice theory. This is a point acknowledged by Mäki (2002, 239). Here the fundamental concepts are narrow self-interest and comporting with the axioms of expected utility theory (Mäki 2002, 237). Economics imperialism is not that of Adam Smith's supply/demand analysis; it is not the neoclassicals' formalization of diminishing marginal utility; nor is it Keynesianism or macroeconomics. The economic method underlying the late 20th-century domination of economics over other disciplines is specifically the game theory revolution which encompasses expected utility theory as an intrinsic part (von Neumann and Morgenstern 1953 [1944]). Although Mäki also refers to "cost benefit analysis" being essential to economics imperialism (Mäki 2013, 332; see also Clarke and Walsh 2009, 196), it is unclear whether individual expected utility maximization is a class of cost–benefit analysis, vice versa, or if they are derived from the same fundamental theory.

So far I have discussed Mäki's classification of "good" and "bad" imperialism with the former representing effective scientific unification that reflects progressive understanding of phenomena, and the latter involving "new types of explanandum phenomena [that] are located in territories that are occupied by

[different] disciplines … and where [the colonizing discipline] presents itself hegemonically as being in possession of superior theories and methods, thereby excluding rival theories and approaches from consideration" (Mäki 2009, 274). Economics imperialism is synonymous with rational choice imperialism, and it remains to be determined whether the multidisciplinary adoption of game theory (encompassing expected utility theory, which serves as the basis of decision theory applicable in parametric contexts without any interactive partners) represents a good or bad form of science expansion.[1] If game theory helps to unify our understanding of human behavior with parsimonious assumptions that encompass a greater range of social phenomena, which are subject to empirical verification, or offers greater efficacy of explanation than alternative theories, then it qualifies as constructive expansion.

The next section scrutinizes the rational choice revolution first as a species of economics imperialism, and draws attention to how it may be more appropriate to view this theoretical transformation as a distinctive rupture contrasting with prior economic theorizing. In fact, game theory first established itself in fields external to economics before finally colonizing economics itself. The following section interrogates whether rational choice offers epistemic unification through either encompassing a greater ontological range of experience, or through offering greater empirical verification. This section raises the possibility that the unification and expansion offered by rational choice is better understood as falling into the derivational category that Mäki argues is not a legitimate species of scientific progress.

The stakes of accurately understanding the nature of economics imperialism, as stated by Clarke and Walsh, is that if one method of scientific inquiry is adopted in another field, either voluntarily with the hopes of professional success, or coercively due to the allocation of opportunities for funding and prestige, then it is possible both that alternative theories may be lost, and alternative ontologies or fields of value may recede from sight (Clarke and Walsh 2009). This is because alternative theories may afford forms of explanation that focus on individual identity in terms of types, without being able to speak to experiential data that pertain to specific individuals (Mäki 2002, 253). Furthermore, I will suggest that possibly subjecting individuals to environments in which they become data points for the type of behavioral decision-making analysis typical of rational choice (either in experiments, or in the process of designing institutions, public policies, and legal frameworks in accordance with the assumptions and findings of rational choice) may significantly alter their self-expression to comport with the colonizing means of scientific explanation.

3 Is the "rational choice revolution" really "economics imperialism"?

It is clear that in many, if not most, theorists' minds, economics imperialism and the rational choice revolution are synonymous, dating to the initial publication of John von Neumann and Oskar Morgenstern's *Theory of Games and*

Economic Behavior, and gradually becoming first a solidified canon of literature including Duncan Luce and Howard Raiffa's *Games and Decisions*, Anthony Downs' *An Economic Theory of Democracy* (1957), James Buchanan and Gordon Tullock's *Calculus of Consent* (1962), Mancur Olson's *Theory of Collective Action*, and Gary Becker's *Economic Approach to Human Behavior* (1978). This understanding is independent from whether theorists support or criticize the widespread acceptance of rational choice. Viewing rational choice as a product of economics, rather than as post-World War II economics transformed by game theory, may have been encouraged by Morgenstern's vision of revolutionizing the study of economics in terms of strategic interactions (Leonard 1992). Moreover, the early application of game theory to the dual constraint problems encountered by military planners related gaming, linear programming, and military worth (cost–benefit analysis) as an exercise of achieving efficiency in strategy in the late 1940s and 1950s (Erickson 2015; Thomas 2015).

Thus, in this section I question the standard understanding with the aim of better appreciating the nature of colonization entailed by rational choice. I will argue that rather than represent the phenomenon of "economics imperialism," the rational choice revolution is better thought of as a distinctive break in the understanding of human agency, from an instrumentalism of using means most efficiently to achieve ends, to strategic competition among actors to satisfy their preferences exemplified by complete and consistent rankings over all conceivable end states. Moreover, I further explore the hypothesis that the misrepresentation of the rational choice revolution as *economics imperialism* falsely conveys to the disciplinary ascendance of game theory a pedigree of legitimacy that economics and instrumental rationality achieved starting with Adam Smith and augmented by the neoclassical economists' formalization of general equilibrium theory and economic efficiency. I will argue that in fact the rational choice revolution is better understood as a new methodology that defines "rational action" as having consistent preferences over all possible end states, ranking them on a single and finite scale, and making consistent choices among potential end states treated as lotteries of outcomes. This view of rational choice is distinct and at odds with the neoclassical model of rational action that copies the mathematical formalism of rational mechanics requiring rational actors to obey the law of diminishing marginal utility (Mirowski 1989). Even if the rational choice school of thought has imperializing tendencies, these transformed the discipline of economics itself which previously had only achieved the recognition of existing as a free-standing science by deliberately demarcating its territory from psychology and politics (Amadae 2003).

Mäki describes how rational choice seems to reflect a continuity with preceding forms of economic analysis: "It is well known that the [Lionel] Robbinsian 'definition' of economics in terms of ends and scarce means … is powerfully scope-expanding" (Mäki 2009, 358). Here Mäki alludes to the observations of Jack Hirshleifer, who notes that, "[w]hat gives economics its imperialist invasive power is that our analytic categories – scarcity, cost, preferences, opportunities, etc. – are truly universal in applicability [1985, 53]"

(ibid., 359). The idea is that the neoclassical economists, who used calculus-based constrained optimization in their models, formalized the formerly discursive concepts of scarcity, cost, preferences, etc., and that game theorists took these same formal concepts and then applied them to "reputation, sex, status, eternal salvation, the meaning of life, and a good night's sleep" (Hirshleifer 1985, 53; Mäki 2009, 358). Mäki's list of the colonized fields is lengthy: "politicians' and bureaucrats' behavior, voting and law, crime and punishment, racial discrimination and slavery, marriage and divorce, pornography and prostitution, religion and suicide, drug addiction and abortion, sport and gambling, rock 'n' roll and science" (Mäki 2009, 358).

Even if it is true that rational choice theory is used to model these diverse social interactions and phenomena, it is not true that this was by extending the methods of neoclassical economists to new fields of inquiry and areas of human behavior outside market transactions characterized by ratios of exchange of scarce and fungible goods. Two points about the nature and scope of economic science, to which Robbins (1935) dedicated a monograph by that name, are evident. First, in his endeavor to carefully delimit the boundaries of economic science, Robbins made clear that the appropriate domain of economic analysis is the efficient use of scarce means which are traded against each other in specific ratios depending on individuals' goals and market prices. The neoclassicals' domain of economics is that of economic value, usually expressible in monetary denominations. Here, money is simply one more commodity that is traded for other goods in precise ratios that must uphold the law of diminishing marginal utility – if consumers and producers are rational. Second, with this in mind, possibly countering Karl Marx's thesis that capitalists end up pursuing monetary gain as a valuable end in itself, Robbins (1935) clarified that money can never be an end, but only a mere means. Thus for Robbins, economic science is strictly limited to the domain of the efficient obtainment of means, which he treated as finite tangible resources that are useful in precise ratios. The trade-offs referred to in neoclassical economics are those captured in a two-good problem: increasing consumption of, for example, bread, must come at the price of giving up some wine and vice versa (Robbins 1935). Economic science is strictly the domain of the efficient allocation of means, which are exchangeable, fungible, scarce resources. Agents have preferences over commodity bundles that are suitable for representation in a graphic model of an Edgeworth box.

In order for rational choice theory to model diverse considerations ranging from sex and sleep to suicide and addiction, it was necessary that it wholly abandon the neoclassical framework of constrained maximization which borrowed the mathematics of the path of least action from physics (Mirowski 1989; Amadae 2003). The early game theorists were fully aware of, and celebrated, their clean break free from the perspective of constrained maximization (von Neumann and Morgenstern 1953 [1944]; Luce and Raiffa 1957). Instead of individuals ranking commodity bundles or *finite means*, each exhibiting unique causal properties consistent with mass and energy, and chemical properties and compound substances characteristic of periodic elements, the game

theoretic agents rank *outcomes*. Sometimes outcomes can be dollar denominations, or lotteries of varying probabilities of dollar denominations, or possibly being at war or at peace, or winning or losing an election. Thus, for the rational choice revolution to be able to expand the domain of economics beyond the constrained maximization of utility under a budget constraint, its theoretical foundation first had to reformulate the nature of choice to redefine rationality from the efficient use of means to the consistent ranking of ends, or outcomes themselves. Von Neumann and Morgenstern, as well as Luce and Raiffa, discuss this new formalization of expected utility in careful detail. They boast that their bold initiative cuts free from the neoclassicists' limited thinking of constrained optimization under a budget constraint. Not only do they reformulate the notion of utility, but they also model strategic interactions in which individuals maximize their pursuit of anticipated utility against other like-minded players (Leonard 2010).

Thus, game theory developed largely outside economics from the 1940s until roughly 1970. It is well known that von Neumann, a mathematical physicist, and Morgenstern, a less well-known Austrian economist, developed *Theory of Games*, a mathematically dense 600-plus-page volume that was almost entirely ignored by economists (Leonard 1992) until the late 1970s and early 1980s. In the late 1940s and 1950s, early work in game theory was pursued for military strategy (Erickson 2015), mainly at the Santa Monica-based RAND Corporation (Amadae 2003, 2016). Perhaps the first economist who can truly be described as an "economics imperialist," Thomas Schelling, initially used game theory to model nuclear deterrence and conflict before going on to model the segregation of neighborhoods and collective action (Schelling 1960, 1973, 1978; Amadae 2016). Von Neumann and Morgenstern's initial theory, which mainly pertained to two-person zero-sum game theory, seemed much more useful for conflict than applicable to economic exchange in which all actors were supposed to gain rather than one individual's gain being someone else's loss (Leonard 2010). Game theory was a staple in nuclear deterrence (Aumann et al. 1967) in the 1960s. It was also developed in evolutionary game theory as early as the late 1960s (Trivers 1971). It represented a paradigm of powerful derivational import and its sparse assumptions could be used to model any interaction in which agents were understood to have consistent preferences over outcomes (Axelrod 1970).

It is difficult to sustain a thesis of "economics imperialism" if many of the initial trailblazers had disciplinary homes outside economics (Amadae 2003). Kenneth J. Arrow is an obvious exception, but even he accepted that the maximization used in social choice is distinct from the neoclassical concept of maximization under a budget constraint (Arrow 1963; Amadae 2003, 83–132). Economists as a community of theorists did not embrace game theory until the late 1970s and 1980s when the Nash mutual-best-reply equilibrium became the accepted solution concept, in contrast to von Neumann and Morgenstern's more limited solution concept based on extending zero-sum theory to non-zero-sum games (Mirowski 2002; Binmore's introduction to Nash 1996).

The manner of formulating utility, developed by von Neumann and Morgenstern, called "expected utility theory," displaced the formal models of diminishing marginal utility and over time became the standard treatment of utility in economics. However, economists only caught up with work achieved in other disciplines such as political science (Riker and Ordeshook 1973; Taylor 1976), nuclear deterrence (Schelling 1960; Schelling and Halperin 1961), international relations (Jervis 1978), public policy analysis (Stokey and Zeckhauser 1978) and evolutionary game theory (Trivers 1971) after these other disciplines had already standardized canonical game theoretic literature (Myerson 1991). Even behavioral economics, which uses rational choice theory as the standard normative theory of rationality against which to test individuals' systematic deviations, originated from the work of Daniel Kahneman, a psychologist, and Amos Tversky, a mathematics-trained cognitive scientist and psychologist (1979). These facts about which theorists, in what disciplines, played key roles in establishing rational choice theory early on permit us to stand back and reappraise the economics imperialism thesis, and lead us to the conclusion that the rational choice revolution is not a species of economists colonizing other fields so much as the extension of a new formal method to multiple disciplines that followed from its original statement in *Theory of Games and Economic Behaviour* (von Neumann and Morgenstern 1953 [1944]) and application by von Neumann himself to submarine warfare (Leonard 2010).

Before going on to assess the scientific value contributed by game theory to understand a vast array of human behavior, I would like to draw attention to the clear means by which game theory purports to apply to all decision-making. In the words of von Neumann and Morgenstern themselves, they clearly state that their concept of a solution, or the identification of an outcome rational players converge on, "is plausibly a set of rules for each participant which tell him how to behave in every situation which may conceivably arise" (von Neumann and Morgenstern 1953 [1944], 31). Thus, *every conceivable* decision a rational individual may make falls within the purview of expected utility theory and game theory. Moreover, when it comes to agents' expected utility functions, or their complete ranking of all possible outcomes, *everything* of relevance to actors' appraisal of value is argued to be in their preference orderings (Myerson 1991, 7–8). Preference rankings over outcomes "must be a total [meaning exhaustively comprehensive] ranking, incorporating every factor agents take to influence their choices" (Hausman 2012, 34). These default orthodox expected utility rankings in game theory only consider actors' evaluation of outcomes (Hausman 2012, 53), and yet at the same time assume these rankings are exhaustively comprehensive (Hausman 2012, 35). Game theoretic expected utility functions both incorporate these assumptions and then operationalize a mathematics that provides the means to treat individuals' choices according to these terms. Rational choice can imperialistically explain all choice because from its original formulation, expected utility theory was designed to represent all cognitive information necessary to explain rational behavior. Thus, in assembling the points put forward in this section, rational

choice is a new methodology for understanding individuals' rational choices that shifts attention from market choice under a budget constraint to consistent rankings over all possible end states, and taking appropriate strategic choices given competition against others who similarly seek to secure reational expectations.

In the next section I suggest that this wider perspective, which is open-minded about the type and source of imperialism, not only is helpful for maintaining a neutral vantage point for evaluating the nature of the rational choice revolution, but also rejects the thesis that the successful and already vindicated methodology of economic science was exported from economics into other disciplines on the promise that it could offer greater explanatory power to achieve scientific unification and consilience. Once rational choice theory is viewed, as its founders recommend, as a disciplinary rift with neo-classical economics rather than a further refinement and expansion of this pre-existing theory, then it becomes easier to evaluate its successes assessed in terms of ontological and epistemological unification, as well as pragmatic progress in capturing more data with fewer assumptions. In moving ahead with this analysis I am grateful for Mäki's helpful distinction between "derivational" and "ontological" expansion (Mäki 2009, 263–64).

4 Subjecting the "rational choice revolution" to Mäki's criteria for good and bad imperialism

According to Mäki, and I think unarguably, the expansion of one method of explanation to a broader range of empirical phenomena fits within the understanding of scientific inquiry. Yet, even given this tacit recognition that the envelopment of one discipline by another may well be a positive development leading to greater explanatory success, Mäki distinguishes criteria that characterize constructive versus destructive imperialism. Obviously, if a theory (a) can satisfactorily explain a larger range of ontological substrata or properties, such as either decisions in markets or elections and choices by humans or single-celled organisms, then this is consistent with science. Similarly, if a theory (b) can either explain more facts than another theory, or cover the entire domain of a competing theory in addition to its prior domain, much like identifying DNA provides a unifying mechanism that sustains both plant and animal life, then this too would seem to be a happy outcome of scientific unification. Furthermore, if a theory were able to (c) predict either more or novel empirical data, such as Albert Einstein's general relativity theory predicts gravitational waves, then this empirical means of verification would endorse this type of scientific expansion to encompass more fields of investigation. The question is, does rational choice achieve (a), (b), or (c)?

In his discussion of economics imperialism, Mäki paves the way to answering this question by also identifying "derivational unification." This refers to "derivations of conclusions from a set of premises" which can also be a feature of scientific expansion but, if unmet with verification by empirical tests, may

provide a means to identify a type of scientific imperialism that does not necessarily advance understanding. Writing in 1985, game theorist Robert Aumann acknowledges that rational choice theory offers derivational unification which Mäki describes as "a matter of deriving large classes of explanandum sentences from a parsimonious set of theoretical sentences or inferential patterns." Crucially, "theories are regarded as logical formulae, possibly devoid of truth-value, serving the task of generating implications and saving the phenomena" (Mäki 2009, 363). Aumann directly accepts that game theory is powerful because it offers the means of derivational unification: "the validity of utility maximization does not depend on its being an accurate description of the behavior of individuals." He goes on to note that "rather, it derives its being the underlying postulate that *pulls together most of economic theory*." However, Aumann's crucial acknowledgment follows because he discloses that rational choice's basis in the hypothesis of expected utility maximization cannot be experimentally verified:

> While attractive as hypotheses, there is little theory built on them, *they pull together almost nothing*; they have few interesting consequences. In judging utility maximization, we must ask not 'Is it plausible?' but '*What does it tie together, where does it lead?*'"
>
> (Aumann 1985, 46, quoted by Mäki 2009, 364)

This sense in which rational choice offers an elementary set of choice axioms that define rational action, and can be used by derivation in accordance with game theory to model any situation reducible to these assumptions, points toward the almost endless power of the theory to present the means to derive countless formal models. Game theoretic models are typically tested for their analytic consistency. When they are applied in empirical studies, rather than verifying the accuracy of the models, these experiments test whether actors behave rationally given the assumptions built into the model (e.g., Rapoport and Chammah 1965; Rand et al. 2012). Nobel Prize-winning game theorist Roger B. Myerson admits that there is no way to empirically test the validity of game theory; instead, as he puts it, "one can only ask whether a person who understands the model would feel that he would be making a mistake if he did not make decisions according to the model" (Myerson 1991, 22). In their skeptical assessment of game theory's contributions, Donald P. Green and Ian Shapiro (1996) accuse game theorists of generating formal models but with little value for actually explaining or understanding social contexts as basic as voting or collective action.[2]

In part the derivational force of rational choice stems from the fact that its veracity is entirely analytic. Ken Binmore acknowledges that the theory of rational choice is in essence tautological; it asserts that actors maximize expected utility but this essentially boils down to observing that in every choice, actors by definition choose what they most prefer (Binmore 1994, 169). The model imputes rationality to agents, and defines precisely the characteristics of preference and strategically rational choice that must obtain in order for individuals to qualify as rational and for the formal models to pertain to concrete contexts.

Expected utility theory is the preferred theory of instrumental action from the 1980s to the present, and as such is normative in defining the rules that agents must comport with (Luce and Raiffa 1957). It is also prescriptive in providing an analytic means to design institutions, legal frameworks, and public policies on the assumptions that citizens and consumers are either rational actors, or if they fail to comport with the dictates of the theory, are prone to systematic failures of rational choice that should be remedied by the interventions of policymakers and choice architects (Buchanan 1975; North 1990; Thaler and Sunstein 2009). So long as rational choice cannot be falsified, and insofar as actors who fail to exhibit consistent choice on its terms are labeled irrational, it is difficult to argue against Aumann's point that an important and perhaps chief quality of game theory is its derivational ability to generate models that could be applied to diverse social situations.

Here I briefly introduce the case of US nuclear deterrence which demonstrates both of the tendencies that I have striven to document. On the one hand, the type of modeling that was central to nuclear deterrence in the 1960s is considered a form of "economics imperialism" and yet is better understood to be an expression of the post-World War II rationality project (Thomas 2015; Erickson 2015). On the other hand, at least one well-positioned contemporary defense intellectual, Michael Desch, vehemently argues that the formal modeling approach characterizing deterrence theory, which came to characterize the mainstream approach adopted throughout the US academic profession of political science in the 1980s, is purely analytic without any practical purchase on real problems confronting military planners (Desch 2018).

Desch takes it for granted that the new wave of security studies generated by the academic strategists to implement nuclear deterrence exemplifies economics imperialism insofar as this research can best be characterized as "increasingly abstract and methodologically-fixated … late Golden Age economic theories of nuclear strategy" (Desch 2018, 7). Desch argues that nuclear deterrence theory of the 1950s and 1960s typifies "the methods and approaches of Economics" (ibid., 8). Because his main goal is to contend that this formal approach can lead to endless analytically derived formal models that are of no use for steering strategic policy, his goal is not to exhume the historical origins of this "Economic approach." Yet even in articulating his concern over the emptiness of economic modeling applied to policies of nuclear deterrence, Desch acknowledges the point I make throughout this chapter: the body of thought characterizing rational deterrence is game theory. Desch quotes the World War II- and Cold War-era British operations researcher P.M.S. Blackett, who complained about the limitations of the rational strategists' approach, that it did not "clothe the skeleton conflicts of the theory of games with the complex flesh and blood attributes of real nations; hence the bizarre nature of some of their practical conclusions" (Blackett 1961, 16).

Yet despite his disinclination to excavate the origins of the theory that he refers to as the Economic approach, Desch does much to document the mushrooming formal analytic work on the one hand, paired against its

increasing lack of policy applications on the other between 1980 and 2012. Formal quantitative models increased to become approximately 50% of the research presented in top international relations journals during these three decades. Yet, according to Desch, by 2010 the relevance of this research to practical problem-solving in policy venues dropped from full applicability in 1980 to as low as no policy relevance today. Thus, in focusing on the case of nuclear deterrence as a paradigmatic example of "economic imperialism" that would better be designated "rational choice imperialism," or possibly "analytic formal imperialism," Desch provides a sustained and convincing argument that this expansion of scientific method is derivational but not successful in achieving greater ontological scope, increased powers of explanation, or enhanced predictive power.

Yet despite this tautological quality of much of the theoretical work underneath the rational choice umbrella, and the additional fact that behavioral economists use canonical rational choice theory as the standard of pure rationality that human subjects deviate from (Kahneman and Tversky 1979), via its undeniable and much discussed imperialism, rational choice has come to have a lot of impact on the structure of institutions, laws, and policies (e.g., Stern 2006). Thus, if the imperializing power of rational choice stems from its ability to serve as the basis for deriving endless formal models under the assumption that individuals maximize the expected utility reflected in the models, then the cautionary notices put forward by Mäki, and by Clarke and Walsh are significant.

Mäki warns that a scientific theory may be spread, as Ronald Coase warns us about rational choice, with theorists' hopes that they may be able to extract increasing insights into the operation of phenomena without actually attaining any actual ontological or epistemological unification from this derivational capacity (Mäki 2009, 367; Coase 1978, 209). Mäki also worries that the type of explanation that rational choice affords, even if it does turn out to be empirically sound, may tell us something about types of individuals in some categories of circumstances without helping us to understand particular individuals with specific identities. Even if a model were produced to predict the number of suicides under a specific change in public policy under the assumptions of rational agency, this theory would still be useless in predicting the actual suicide of any one individual, or shedding light on that agent's decision-making prior to the indelible act.

Clarke and Walsh further worry that alternative ways of understanding social phenomena and of accounting for human values may be eroded, or even lost entirely. When challenged that they seem to imply a view of science that either upholds progress as a telos along a singular developmental path, or must accept a relativism of explanation, the authors defend the view that some theories can progressively aid in offering superior explanations without also assuming that a particular developmental path is a forgone conclusion. Clarke and Walsh defend their view that despite the fact that imperialism seems to be self-vindicating, because arguably scientists would not adopt theories unless they were motivated by good reasons, still scientific expansion may offer unwelcome restrictions on

understanding by eliminating alternatives rather than maintaining an effective intellectual marketplace for ideas.

Here they finally hit on one of the primary reasons that "economics imperialism" could be both abolishing potentially fruitful veins of discovery and stifling creative wherewithal to engage in open exploration. In developing these ideas, they point to the fact that imperialistic tendencies can follow from the exercise of power rather than the self-vindicating nature of the scientific method with expansionist tendencies. Thus, politically motivated rather than intellectually vetted expansion could follow from the superior prestige of a field that thus holds attraction to researchers in another discipline who seek to borrow its pedigree in order to cater to audiences and funding opportunities. For example, the prestige enjoyed by game theorists working on nuclear deterrence helped to make game theory attractive to researchers in other fields) (Amadae 2016).

In their final conclusion, Clarke and Walsh alight on another consideration to ponder in evaluating the pros and cons of scientific imperialism. Let us suppose that derivational expansion and success is not a sign of bad imperialism, although by itself it does not entail either ontological or epistemological unification. Thus, the rational choice school could be a step in the constructive expansion of a scientific approach. Perhaps, as Herbert Gintis (2009) suggests, that at some later stage in the future, the rational choice revolution may achieve the unification of the social and behavioral sciences because cognitive science may reveal the truth-value of the elementary claims put forward by game theory, that human brains are constructed to rank all outcomes on a single scale of reference. However, even before this point was carefully established, in the meantime expected utility theory could transform the social world in its image if its basic tenets were absorbed throughout popular culture to account for the nature of rational action and consumer choice (Clarke and Walsh 2013, 349–350; Dixit 2010).

This suggestion is not far-fetched because research shows that individual behavior can be changed to conform to the predictions of rational choice under any of three circumstances. Students at elite institutions exposed to game theory can become normalized to accept its understanding of rational self-interest (Frank et al. 1993; Miller 1999). Not only are economics students more prone to cheating, but also game theory actively condones cheating as rational (McCabe and Trevino 1993, 1995; Nonacs 2013). Individuals who function in institutions that only reward behavior with an incentive structure matching the motivational structure suggested by rational choice will, rather than treat action choices as intrinsically meaningful or worthwhile, tend to conform to incentives relinquishing other motivational sets (Mazar and Ariely 2006). Encountering actors whose behavior or self-understanding conforms to expected utility theory and strategic rationality can also encourage action indistinguishable from that predicted by non-cooperative game theory, and therefore can serve to fragment bonds of trust among members of a society (Amadae 2016, 69–98). Given the ongoing assertions by game theorists that they can capture

everything of relevance throughout the social sciences and even, increasingly, the humanities, within the scope of rational choice (e.g., Brams 2012), Clarke and Walsh's concern deserves to be heard.

5 Convergence of appraisal of the social significance of the rational choice revolution

In this concluding section I will reflect briefly on the significance of the rational choice revolution that impacted diverse fields throughout the social sciences and professional programs. I urge rejecting the "economics imperialism" thesis suggesting the increasing colonization of diverse disciplines using the template of neoclassical economics. Not only do I argue that the former is a much more accurate way to understand the development of rational choice as a distinctive method that replaced neoclassical economics, but furthermore I suggest that this broader perspective helps at least to raise the question of whether the late 20th-century shift in the social and behavioral sciences to the rational actor model may signal a wider transformation of scientific approach to the study of human society. Here I have in mind the scale of disciplinary transformation that Michel Foucault argued best typifies the development of the human sciences during the Enlightenment that was concurrent with the rise of panoptic disciplinary techniques (Foucault 1979). He further suggested, toward the end of his scholarly career, that a similarly proportioned transformation may be entailed in the late-modern shift to neoliberal political economy (Foucault 2010).

I invoke Foucault to make the case that scientific development is relative to the aims and goals of scientists, and their intersection with the cultural milieu in which their science must gain an institutional footing and demonstrate its relevance. I am also not worried about the familiar charge of relativism that referencing Foucault can induce. This is because I hold that even though, for example, the Newtonian and Einsteinian scientific programs are incommensurable in their elementary assumptions and represent clear and distinct research programs that study the same ontological substrata, still each is clearly valuable and serves as a paradigmatic case of sound scientific theory. Incommensurability does not necessarily imply that good science and bad science cannot be differentiated because all are relative to the cultures and interests of scientists. Let us suppose that scholasticism and the tactics of inquisition, spectacle, and divine right of kings yielded to contradistinctive democratic will formation, surveillance, and disciplining to achieve modern institutional efficiencies. It is similarly possible that post-modern social science may now be predicated on a divergent approach to human agency that dissolves the relevance of separate disciplines because it demands that actors exhaustively rank world states, and strategically compete against each other, in all domains of action. The brilliance of Foucault's work on regimes of knowledge production and the organization of power is that he interrelates the authority of human scientists achieved through scientific practices with their role in governing and normalizing behavior.

In *Prisoners of Reason* (2016) I argue that orthodox rational choice entails four unique assumptions about human behavior which, by being postulated as normative and prescriptive, have played a role in refashioning individual subjectivity to comply with its demands. These unprecedented imperatives are: (a) that only outcomes have value, and not the means or processes by which outcomes are achieved (Hausman 2012, 53); (b) that the total value available for consideration is finite and can be monetized (Giocoli 2006); (c) that individuals must compete against each other strategically without the ability for working together in teams (Bacharach 2006); and (d) that impartial or disinterested action is prohibited under the assumption that every choice must further agents' goals (Sen 1985, in Sen 2002, 206–224). Although this concluding section is not the place to explore these basic assumptions underlying the imperialistic rationality project, it is easy to touch on how radical these assumptions are. They deny the possibility of commitment, or the type of moral action consistent with the classical liberal no-harm principle or Kantian-style side constraints on action requiring that actors avoid interfering with one another (Heath 2008). Game theory requires that the entire range of experiential value available to agents be of one commensurable, finite type that must encompass aesthetic beauty, tranquility, fulfillment, friendship, loyalty, and trust, in addition to fungible rewards such as cash prizes or incentives. It rejects the possibility that actors can act out of solidarity, and it invalidates the type of selfless charity or beneficence characterizing the imperfect duties and positive virtues stipulated by the classical liberal theorists Adam Smith and Immanuel Kant.

From this perspective, then, Clarke and Walsh's warning that rational choice imperialism may seep down into the common person's worldview, authoritatively demarcating available ontologies for social expression and informing agents' self-understanding of traditional social rites and institutions is pertinent (Clarke and Walsh 2009, 350). Rational choice imperialism is inconsistent with the classical political economy of Adam Smith, which accepts negative and positive virtue, the possibility of impartial judgments, and that markets must be bounded by the rule of law (Smith] 1982 [1759; Amadae 2003, 205–219; Amadae 2008), and is incommensurable with the neoclassical marginalists' definition of rational action as obeying the law of diminishing marginal utility and pertaining only to efficient means rather than the consistent and exhaustive ranking of ends (Amadae 2003). Thus, it behooves us to step back and appraise the full scope and dimensions of the transformation in social theory and practice entailed by game theory.

I close by introducing Paul Forman's article, "On the Historical Forms of Knowledge Production and Curation: Modernity Entailed Disciplinarity, Postmodernity Entails Antidisciplinarity" (2012), because through a distinct method he arrives at almost identical conclusions to those put forward here (and in Amadae 2016). He argues that there has been a comprehensive shift in scientific inquiry that has entailed both the methods and conclusions that map directly onto the 1970s epistemic solidification of the rational choice approach. Where philosophers of economics discuss "economics imperialism," and the

increasing colonization of rational choice of formerly disparate disciplines, Forman, a historian of science, notices a falling away of disciplines altogether as formerly distinctive branches of knowledge are now unified under one singular method. Interestingly, Forman identifies the same four distinctive attributes of rational choice versus the traditional human sciences (including economics) that preceded it. One is the transformation from the study of means, such as Robbins discusses as the pertinent domain of economics, and legitimate processes to a comprehensive focus on ends and outcomes (Forman 2012, 59). I concur with Forman that Western European modern and liberal societies and human sciences focused on fair and impartial means and procedures to generate outcomes, and that this practice and institutional arrangement has fallen away under the new rational choice appraisal of outcomes (see e.g., John Rawls as a modern theorist, discussed by Forman (2012, 74)). Even knowledge production itself ceases to be the result of disinterested processes wherein the integrity of procedures is a mark of the effective and veridical establishment of truth-claims. Whereas it was a key attribute of knowledge production throughout modernity that scientists were disinterested, the rational choice approach holds that no action can be disinterested, and even views the generation of truth-claims as signaling techniques whereby the decision whether to utter a truth or falsehood is a function of the preferences and how the speaker best profits (Forman 2012, 74, 79; Lewis 1969). Forman also notes that whereas solidarity was taken to be constitutive of any healthy and vibrant community, in postmodernity solidarity, or working together with a joint goal, has negligible to no credibility as a meaningful category of action (Forman 2012, 87, 88; Tuck 2008). Forman also points to how the core values underlying modern liberalism were assumed to be universally relevant to all actors, whereas under rational choice, all actors' appraisal of value must be relative to their own personal holdings that accurately identify each individual's opportunity costs for giving up one favorable outcome to achieve a more favorable outcome.

In conclusion, Forman's argument that the modern disciplines that have been coextensive with the modern human sciences have very recently yielded to a new, ends-driven, performance metric-sensitive, individualistic, and self-interested mode of inquiry, correlates with the attributes of the rational choice revolution that I have earmarked as foundational. This convergence helps to render credible the idea that not only is the so-called "economic imperialism" of game theory more indicative of a cross-disciplinary transformation than a vindicated exercise of scientific unification, but also that the copious attention devoted to evaluating the significance of this imperialism is crucial.

Notes

1 Rational choice theory became the designation for the family of theories that grew out of the new approach to decision-making put forward by von Neumann and Morgenstern (1944, 1947), and it includes decision theory (applicable to single agents), cooperative and non-cooperative game theory, social choice, public choice, positive

political theory, and public policy analysis. See Amadae (2003) and Erickson (2015). Luce and Raiffa (1957) wrote the first authoritative text; see also Shubik (1982), which together with von Neumann and Morgenstern, demonstrate that game theory was a new approach to studying social interactions that became central to multiple disciplines throughout the social sciences, including economics. Nicolas Guilhot and Alain Marciano argue in "Rational Choice as Neo-Decisionism: Decision-Making in Political Science and Economics after 1945" (in this volume) that the standard "economics imperialism" thesis is misguided for overlooking the fact that the disciplinary transformation centering on rational decision-making largely occurred outside economics.

2 Jaakko Kuorikoski and Aki Lehtinen (2010) argue that it may be possible to make analytic progress via the means of derivation. However, ultimately this would need to be directly associated with empirical testing to count as a means of making progress in social science.

References

Amadae, S.M. 2003. *Rationalizing Capitalist Democracy: The Cold War Origins of Rational Choice Liberalism*. Chicago, IL: University of Chicago Press.

Amadae, S.M. 2008. "Utility, Universality, and Impartiality in Adam Smith's Jurisprudence". *Adam Smith Review* 4: 238–246.

Amadae, S.M. 2016. *Prisoners of Reason: Game Theory and Neoliberal Political Economy*. New York: Cambridge University Press.

Arrow, Kenneth J. 1963. *Social Choice and Individual Values*, second revised edn. New Haven, CT: Yale University Press.

Aumann, Robert J., John C. Harsanyi, John P. Mayberry, Michael Maschler, Herbert E. Scharf, Reinhard Selton and Richard Stearns. 1967. *Models of Gradual Reduction of Arms*. Arms Control and Disarmament Agency, ACDA/ST-116, Sept. 1, 1967.

Axelrod, Robert M. 1970. *Conflict of Interest: A Theory of Divergent Goals with Applications to Politics*. Markham Political Science Series. Chicago, IL: Markham Pub. Co.

Bacharach, Michael. 2006. *Beyond Individual Choice*. Princeton, NJ: Princeton University Press.

Becker, Gary. 1978. *The Economic Approach to Human Behavior*. Chicago, IL: University of Chicago Press.

Binmore, Ken. 1994. *Game Theory and the Social Contract: Playing Fair*. Vol. 1. Cambridge, MA: MIT Press.

Blackett, P.M.S. 1961. "Critique of some Contemporary Defense Thinking". *Encounter* 16(4): 9–17.

Brams, Steven J. 2012. *Game Theory and the Humanities: Bridging Two Worlds*. Cambridge, MA: MIT Press.

Buchanan, James M. 1975. *The Limits of Liberty: Between Anarchy and Leviathan*. Chicago, IL: University of Chicago Press.

Buchanan, James M. 1976. "A Hobbesian Interpretation of the Rawlsian Difference Principle". *Kyklos* 29(1): 5–25.

Buchanan, James M. and Gordon Tullock. 1962. *The Calculus of Consent*. Ann Arbor, MI: University of Michigan Press.

Clarke, Steve and Adrian Walsh. 2009. "Scientific Imperialism and the Proper Relations between the Sciences". *International Studies in the Philosophy of Science* 23(2): 195–207.

Clarke, Steve and Adrian Walsh. 2013. "Imperialism, Progress, Developmental Teleology, and Interdisciplinary Unification". *International Studies in the Philosophy of Science* 27(3): 341–351.

Coase, Ronald H. 1978. "Economics and Contiguous Disciplines". *Journal of Legal Studies* 7: 201–211.

Dawkins, Richard. 1979. *Selfish Gene*. Oxford: Oxford University Press.

Desch, Michael C. 2018. *A Cult of the Irrelevant?* Princeton, NJ: Princeton University Press.

Dixit, Avinash K. and Barry J. Naleuff. 2010. *The Art of Strategy: A Game Theorist's Guide to Success in Business and Life*. New York: W.W. Norton.

Downs, Anthony. 1957. *An Economic Theory of Democracy*. New York: Harper and Row.

Erickson, Paul. 2015. *The World the Game Theorists Made*. Chicago, IL: University of Chicago Press.

Forman, Paul. 2012. "On the Historical Forms of Knowledge Production and Curation: Modernity Entailed Disciplinarity, Postmodernity Entails Antidisciplinarity". *Osiris* 27(1): 56–97.

Foucault, Michel. 1979. *Discipline and Punish*. Trans. by Alan Sheridan. New York: Vintage.

Foucault, Michel. 2010. *Birth of Biopolitics: Lectures at the College de France*. New York: Picador.

Frank, Robert, Thomas Gilovich and Donald Regan. 1993. "Does Studying Economics Inhibit Cooperation?" *Journal of Economic Perspectives* 7: 159–171.

Gintis, Herbert. 2009. *The Bounds of Reason: Game Theory and the Unification of the Behavioral Sciences*. Princeton, NJ: Princeton University Press.

Giocoli, Nicola. 2006. "Do Prudent Agents Play Lotteries: Von Neumann's Contributions to the Theory of Rational Behavior". *Journal for the History of Economic Thought* 28(1): 95–109.

Green, Donald P. and Ian Shapiro. 1996. *Pathologies of Rational Choice Theory: A Critique of Applications in Political Science*. New Haven, CT: Yale University Press.

Hardin, Russell. 1982. *Collective Action*. Baltimore, MD: Johns Hopkins University Press.

Hargreaves Heap, Shaun and Yanis Varoufakis. 2004. *Game Theory: A Critical Text*. Second edition. London; New York: Routledge.

Hausman, Daniel. 2012. *Preference, Value, Choice, and Welfare*. New York: Cambridge University Press.

Heath, Joseph. 2001. *Communicative Action and Rational Choice*. Studies in Contemporary German Social Thought. Cambridge, MA: MIT Press.

Heath, Joseph. 2008. *Following the Rules: Practical Reasoning and Deontic Constraint*. New York: Oxford University Press.

Hirshleifer, Jack. 1985. "The Expanding Domain of Economics". *American Economic Review Special Issue* 75: 53–68.

Jervis, Robert. 1978. "Cooperation Under the Security Dilemma". *World Politics* 30(2): 167–214.

Kahneman, Daniel and Amos Tversky. 1979. "Prospect Theory: An Analysis of a Decision under Risk". *Econometrica* 42(2): 363–392.

Kuhn, Thomas. 1962. *Structure of Scientific Revolutions*. Chicago, IL: University of Chicago Press.

Kuorikoski, Jaasko and Aki Lehtinen. 2010. "Economic Imperialism and Solution Concepts and Political Science". *Philosophy of the Social Science* 40(3): 347–384.

Laezer, Edward. 2000. "Economic Imperialism". *The Quarterly Journal of Economic* 95(1): 99–146.

Leonard, Robert. 1992. "Creating a Context for Game Theory". In E. Roy Weintraub (ed.). *Toward a History of Game Theory*. Durham, NC: Duke University Press, pp. 29–76.

Leonard, Robert. 2010. *Von Neumann, Morgenstern, and the Creation of Game Theory: From Chess to Social Science, 1900–1960*. Historical Perspectives on Modern Economics. New York: Cambridge University Press.

Lewis, David K. 1969. *Convention: A Philosophical Study*. Cambridge, MA: Harvard University Press.

Luce, R. Duncan and Howard Raiffa. 1957. *Games and Decisions; Introduction and Critical Survey*. New York: Wiley.

Mäki, Uskali. 2002. "Explanatory Ecumenism and Economics Imperialism". *Economics and Philosophy* 18: 235–257.

Mäki, Uskali. 2009. "Economics Imperialism: Concept and Constraints". *Philosophy of the Social Sciences* 39(3): 351–380.

Mäki, Uskali. 2013. "Scientific Imperialism: Difficulties in Definition, Identification, and Assessment". *International Studies in the Philosophy of Science* 27(3): 325–339.

Mazar, Nina and Dan Ariely. 2006. "Dishonesty in Everyday Life and its Policy Implications". *Journal of Public Policy & Marketing* 25(1): 117–126.

McCabe, Donald and Linda Klebe Trevino. 1993. "Academic Dishonesty". *Journal of Higher Education* 64(5): 522–538.

McCabe, Donald and Linda Klebe Trevino. 1995. "Cheating Among Business Students". *Journal of Management Education* 19(2): 205–218.

McCabe, Donald, Kennith Butterfield and Linda Klebe Trevino. 2006. "Academic Dishonesty in Graduate Business Programs". *Academy of Management Learning and Education* 5(3): 294–305.

Miller, Dale. 1999. "The Norm of Self-Interest". *American Psychologist* 54: 1–8.

Miller, Gary J. 1997. "The impact of economics on contemporary political sciences". *Journal of Economic Literature* 35(3): 1173–1204.

Mirowski, Philip. 1989. *More Heat Than Light: Economics as Social Physics, Physics as Nature's Economics*. Historical Perspectives on Modern Economics. Cambridge and New York: Cambridge University Press.

Mirowski, Philip. 2002. *Machine Dreams: Economics Becomes a Cyborg Science*. New York: Cambridge University Press.

Mueller, Dennis C. 2003. *Public Choice III*. Cambridge: Cambridge University Press.

Myerson, Roger B. 1991. *Game Theory: Analysis of Conflict*. Cambridge, MA: Harvard University Press.

Nash, John F. 1950. "The Bargaining Problem". *Econometrica* 18(2): 155–162.

Nash, John F. 1996. *Essays on Game Theory*. Cheltenham, UK; Brookfield, VT: E. Elgar.

Nonacs, Peter. 2013. "Cheating to Learn: How a UCLA Professor Gamed a Game Theory Midterm". April 13, https://curious.kcrw.com/2013/04/cheating-to-learn-how-a-ucla-professor-gamed-a-game-theory-midterm#.VtqnHfEw8q8 (accessed March 5, 2016).

North, Douglass Cecil. 1990. *Institutions, Institutional Change, and Economic Performance. The Political Economy of Institutions and Decisions*. New York: Cambridge University Press.

Pettit, Philip. 2002. "Virtus Normativa: Rational Choice Perspectives". In Philip Pettit (ed.). *Rules, Reasons, and Norms*. Oxford: Clarendon Press.

Posner, Richard A. 1984. "Wealth Maximization and Judicial Decision-making". *International Review of Law and Economics* 4(2): 131–135.

Posner, Richard A. 1985. "Wealth Maximization Revisited". *Notre Dame Journal of Law, Ethics, and Public Policy* 2: 85–106.

Rand, David G., Joshua D. Greene and Martin A. Nowak. 2012. "Spontaneous Giving and Calculated Greed". *Nature* 489: 427–430.

Rapoport, Anatol and Albert M. Chammah. 1965. *Prisoner's Dilemma; a Study in Conflict and Cooperation*. Ann Arbor: University of Michigan Press.

Rawls, John. 1971. *A Theory of Justice*. Cambridge, MA: Belknap Press of Harvard University Press.

Riker, William H. and Peter C. Ordeshook. 1973. *An Introduction to Positive Political Theory*. Prentice Hall Contemporary Political Theory Series. Englewood Cliffs, NJ: Prentice Hall.

Robbins, Lionel. 1935. *An Essay on the Nature & Significance of Economic Science*. Second edition. London: Macmillan.

Schelling, Thomas C. 1960. *Strategy and Conflict*. Cambridge, MA: Harvard University Press.

Schelling, Thomas C. 1973. "Hockey Helmets, Concealed Weapons, and Daylight Saving: A Study of Binary Choices with Externalities". *The Journal of Conflict Resolution* 17(3): 381–428.

Schelling, Thomas C. 1978. *Micromotives and Macrobehavior*. New York: Norton & Co.

Schelling, Thomas C. and Morton H. Halperin. 1961. *Strategy and Arms Control*. New York: Twentieth Century Fund.

Sen, Amartya K. 1977. "Rational Fools: A Critique of the Behavioral Foundations of Economic Theory". *Philosophy and Public Affairs* 6(4): 317–344.

Sen, Amartya K. 2002. "Goals, Commitment, and Identity". In *Rationality and Freedom*. Cambridge, MA: Belknap Press.

Shubik, Martin. 1982. *Game Theory in the Social Science: Concepts and Solutions*. Cambridge, MA: MIT Press.

Smith, Adam. 1982 [1759]. *The Theory of Moral Sentiments*. Edited by D.D. Macfie Raphael and A.L. Macfie Raphael. Indianapolis: Liberty Fund.

Smith, Maynard. 1982. *Evolution and the Theory of Games*. New York: Cambridge University Press.

Stern, N.H. 2006. *Stern Review: The Economics of Climate Change*. London: HMS Treasury.

Stigler, George. 1984. "Economics – The Imperial Science?" *Scandinavian Journal of Economics* 86: 301–313.

Stokey, Edith and Richard Zeckhauser. 1978. *A Primer for Policy Analysis*. New York: W.W. Norton.

Taylor, Michael. 1976. *Anarchy and Cooperation*. New York: Wiley.

Thaler, Richard and Cass Sunstein. 2009. *Nudge: Improving Decisions about Health, Wealth, and Happiness*. New York: Penguin.

Thomas, William. 2015. *Rational Action: The Sciences of Policy in Britain and America, 1940–60*. Cambridge, MA: MIT Press.

Trivers, Robert L. 1971. "The Evolution of Reciprocal Altruism". *Quarterly Review of Biology* 46: 35–37.

Tuck, Richard. 2008. *Free Riding*. Cambridge, MA: Harvard University Press.

Von Neumann, John and Oskar Morgenstern. 1947 [1944]. *Theory of Games and Economic Behavior*. Princeton, NJ: Princeton University Press.