

Distinguished Fellow Reflections on Thomas Schelling

Richard Zeckhauser

In Japan Thomas Schelling would be named a national treasure. Age cannot slow down his creativity, nor custom stifle his infinite variety.

Paul Samuelson¹

Thomas Crombie Schelling thinks about the essence of phenomena. In scanning everyday behavior, he sees patterns and paradoxes that others overlook. When each driver slows down almost imperceptibly for a look at a minor roadside distraction, he observes, the result can be a massive traffic tie-up. The world can be divided into weak and powerful parties, but in some situations excessive power can be a handicap. Someone who is overweight may pledge fealty to a strict diet, then cheat at night. Schelling assesses the fat man's intramural struggle with the thin man trying to get out, noting that, with variations in the context, the Jekyll-and-Hyde parable may apply to us all. Schelling distills such essences and demonstrates their presence in many important social phenomena. "It's hard to define or categorize Tom's work," notes James Coleman, the sociologist. "If you ask, 'Does he do research?' I have to answer 'No, not exactly.' Then if you ask what he does for a living, I have to answer that he lives by his wits."

¹All quotations that lack references come from personal communications.

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Those wits have significantly improved our understanding of the world around us, as the American Economic Association recently recognized by naming Schelling a Distinguished Fellow. Long before perfect and conjectural equilibria became part of the microtheorist's tool kit, Schelling showed the importance for economics of precise, clear concepts of promises, threats, commitments, randomized behavior, and "if *he* thinks that *I* think" reasoning. His best-known book, *The Strategy of Conflict* (1960), laid down a mother lode of strategic thinking that is still being mined. It became a classic across the social sciences, insinuating critical elements of economic thinking into such diverse fields as political science, sociology, and international relations. No reader of this volume can ever again think about interactive situations without considering the structure of payoffs; ways to change them for yourself and for your partner; the ability to undertake strategic actions; the sequencing of actions, information, and payoffs; and the subtle tension in economic and social situations between conflict and cooperation.

In the normal pattern of intellectual development, information-based and game theory applications in economics, principally developments of the 1970s and 1980s, would have percolated slowly into neighboring disciplines. Perhaps an elegant survey of the literature would have come along a few years later. Schelling's work simply preempted the process by a few decades, contributing fundamental game theory insights to political science, psychology, and sociology long before core economists found that conjectural equilibria and commitment difficulties were central to our discipline. Moreover, he wrote in a style that could be understood by broad audiences, despite the originality, brilliance, and rigorous underpinnings of what he was saying. Perhaps because he stayed away from the *Journal of Advanced Economic Gobbledygook*, Schelling's pathbreaking conceptual work received less attention from his home discipline than it deserved. Moreover, because his style is as unique as it is delightful, he has been little imitated and, within economics, insufficiently followed.

Schelling's doctoral students have been fortunate. Richard Nelson, for example, learned to think in an unconventional manner, perhaps stimulating his subsequent nontraditional work in industrial organization. Daniel Ellsberg, before winning fame in other realms, was inspired by Schelling to write some intriguing journal articles, such as "The Theory and Practice of Blackmail." A. Michael Spence was induced to ponder how we send signals to one another about unobservable characteristics. *Market Signaling* (1974) was one result. Spence reflects on Schelling's virtues as a mentor: "Very few people can legitimately claim the ability to teach others how to think, who by their example allow some of their own creative capacities to be transferred to their students. This is surely, for many of us, one of Tom's great gifts as a teacher."

Schelling has also had many distinguished students in his survey undergraduate course on "Conflict and Strategy," now approaching its 30th birthday, and his decade-old graduate course at the Kennedy School on the economic underpinnings of public policy formulation. These Schelling alumni include four of his tenured Harvard colleagues, scholars in many fields across the nation, and a much larger contingent of judges, financial wizards, government officials, and (assuredly, given the nature of the



Thomas Schelling

subject matter) more than one rascal. A semester with Thomas Schelling changed the way many of us thought about the world. At my 25th college reunion, the course was still the subject of discussion. And what better time than a reunion to play out Schelling's widely discussed lessons on tacit communication (1960, pp. 83–118): “[I]f you reflect hard, and place yourself in another's shoes, you can figure out where and when to meet on campus, say after initial arrangements have broken down.” (Schelling should have received royalties from *The Newlywed Game* and other television and parlor games relying on matching through tacit communication.)

Schelling's lessons about tacit communication are much more important than the simple scenarios—meeting in New York City, matching on numbers—he uses to capture their essence. The United States and the Soviet Union regularly engage in such communication, for example in determining the meaning of “glasnost.” Those who read Schelling and participate in his games learn a more general principle: In any interactive situation it is vitally important to look at matters from the side of the other party. (The other-people's-shoes approach is often recommended by soft-hearted promoters of compromise. The core principle, however, is that by understanding the other party's perspective you will improve your comprehension of the situation dramatically and will come out better yourself. This is an important lesson for hard hearts as well.) Surprisingly, many parties to important negotiations never grasp this simple principle.

Thomas Schelling's Intellectual Odyssey

Schelling was a member of the great postwar cohort of economists at Harvard. He served with the Marshall Plan in Europe, the White House, and the Executive Office of the President from 1948 to 1953. He wrote most of his dissertation on national income behavior working alone at night while in Europe. Upon leaving the government he joined the economics faculty at Yale, and in 1958 he was appointed Professor of Economics at Harvard. In 1969 he joined the Kennedy School, Harvard's graduate school addressed to government, on a half-time basis. James Tobin reflects on those early years:

Tom and I were fellow graduate students and good friends in those incomparable years just after the war, our "the war." Even then, Tom was always several steps wider and a few layers deeper than the rest of us and our professors. He always perceived a new angle, a surprising implication, or a puzzling problem in arguments and propositions that satisfied most of us. His pleasure in his intellectual discoveries, as he told them in seminars, Littauer corridors, and lunches, was wonderful to behold. He showed his wonder and excitement by the twinkles of his eyes and the lilt of his talk. The subject did not have to be economics, or social science. It could be his discoveries as a father and householder. (I do remember Tom's telling us after a dinner party that dentists and coffee merchants could join forces to promote black sugarless after-dinner coffee as a pleasant prophylaxis.)

Schelling began in traditional economist fashion. His first four articles were published in *Econometrica* (1946), the *American Economic Review* (1947, 1949), and the *Review of Economics and Statistics* (1948). His first two books were on national income behavior and international economics. Robert Solow speculates on when "T. C. Schelling became the Tom Schelling we know . . . [H]is 1951 book . . . was an elaborately detailed and worked-out education in static income determination . . . having none of the later Schelling's tendency to see things from an angle no one had ever tried before . . . [H]is [1958] textbook in *International Economics* picks up on such topics as foreign aid negotiations and cost-sharing arrangements . . . and it talks about them in characteristic ways that an ordinary economist would never have thought of." By 1956, in fact, Schelling was no longer a conventional economist but already "Something Else . . . The Later Schelling is thus only about 35 years old." (In fact, Thomas Schelling, born in 1921, works out regularly on Nautilus, scampers up mountains, carries not a spare ounce of flesh, and still sports a crew cut.)

Howard Raiffa describes the working of his mind: "Tom thinks orthogonally to the rest of us. By now, I just simply expect him to be brilliant, to relate some abstract subject of a seminar speaker to a problem that parents have with kids, or that general XYZ had in battle Q. The analogies keep tumbling out of his mind, as if he has an

almost endless tabulation of concrete examples in his personal micro-micro computer and each new thought automatically triggers a search routine.”

We shall chronicle three stages of his life, designated by the titles of his books. But first, an introductory rhapsody from Paul Samuelson:

Franz Schubert wrote hundreds of songs because melodies just bubbled out from inside of him. As a scientist, Tom Schelling is like that: he can't help having original ideas. Even when he began as only an economist, it was the paradoxical properties of macrosystems that caught his eye. Can throwing your bread on the waters, in the form of raising the wages you pay, in the end swell your profits? Schelling [1946] discovered when a stable system could display this property.² Before there was a mathematical *catastrophe* theory, he deduced how getting a worse cold might make you well sooner—unless, of course, it killed you! Once the vital game of survival in a nuclear age challenged Schelling's attention, mere economics could no longer contain him.

The Strategy of Conflict (SOC)

Schelling spent the summer of 1957 and then a full year beginning in September 1958 at the RAND Corporation, which had become a center for strategic thinking in the United States. National defense was the area of application, but the models used to work out theories of deterrence, arms races, stable systems and the like frequently were of significant generality. During his years in government, Schelling had already discovered that a substantial element of policymaking consisted of developing negotiating positions.

Schelling's next undertaking established a life pattern: extract the central lessons (in this case from international strategy), capture them in simple formulations, and describe them in language that is both lucid and vivid. The result was *The Strategy of Conflict*. Perhaps a third of the chapter titles incorporate words such as “war,” “attack,” and “disarmament.” But any description of specific weapon systems or historical battles is coincidental. Discussing a hypothetical duel in the Wild West, Schelling points out (p. 233) that “if both were assured of living long enough to shoot back with unimpaired aim, there would be no advantage in jumping the gun and little reason to fear that the other would try it.” Accordingly, he continues, “schemes to avert surprise attack have as their most immediate objective the safety of weapons rather than the safety of people.” Here and in dozens of instances in this book, Schelling takes a principle that confuses people when found in its best-known setting—the U.S.–U.S.S.R. conflict—and shows how simple it is in less emotional and complex surroundings. Such an example we might call a Schellingism.

²Using a linear model, Schelling demonstrated that if the sum of three “marginal propensities”—to consume out of pretax wages, to invest out of income, and for government to spend out of income—is greater than 1, then if firms raise wages, sufficient activity will be generated to actually increase aggregate profits.

Sophisticated game theorists might contend that such principles are easy to see. Yet 30 years later many discussions of arms control still get confused on the point that Schelling makes so simply. And even a genius such as Clausewitz did not clearly perceive the non-zero-sum nature of war, the fundamental property around which Schelling builds his models of cooperation and conflict—the yin and yang of most interactive situations.

The Strategy of Conflict broke new ground in many areas. Non-zero-sum game theory had had relatively little influence in the decade following the publication of von Neumann and Morgenstern's classic in 1944. Schelling applied it in a manner accessible to any thinking reader. His "Essay on Bargaining" lays bare the structural underpinnings of threats and promises, the importance of agendas and agents, secrecy and revelation. Though these principles may have been unconsciously understood by gifted negotiators, Schelling explains to the rest of us what they have been doing.

To elucidate the mechanisms for tacit communication when there are gains to coordination, Schelling created and deployed a questionnaire-based coordination game. Perhaps the best-remembered question (p. 56) is: "You are to meet somebody in New York City; you have no prior understanding with the person on where to meet... you will have to guess where to meet... and try to make your guesses coincide." Tobin remarks on the beginnings of "his inspired work on non-zero-sum and cooperative games... We [Yale] had great seminars where he made us decide where [to meet], how we would divide a joint surplus or a mapped plot of land... For weeks no one talked about anything else. Game theory has never been as much fun or as relevant." Schelling addresses the need for tacit communication in limited wars; economists might apply the lesson in other areas, such as setting prices or carving up markets or adopting compatible technologies.

Coincidentally Schelling had discovered an important technique for experimental research in economics: To understand behavior in interactive situations, get individuals to role play in laboratory settings. Experimental economics has since come of age, but some of Schelling's other lessons are still not understood by all: "There is no way to build a model for the interaction of two or more decision units, with the behavior and expectations of those decision units being derived by purely formal deduction... Some *essential* part of mixed-motive games is necessarily empirical." In an apt analogy (a Schelling specialty), he concludes (pp. 162–64), "One cannot, without empirical evidence, deduce whatever understandings can be perceived in a non-zero-sum game of maneuver any more than one can prove, by purely formal deduction, that a particular joke is bound to be funny."

Many mathematical game theorists, who are likely to focus on the formal properties of payoff matrices, would not accept the need for empiricism. When confronted with one of Schelling's problems, say to choose among multiple equilibria in a non-zero-sum game, they might propose an axiomatic method. Schelling would have no objection—he takes all the help he can get—but he would probably observe that for most players a mathematically irrelevant feature that nevertheless conveys a tacit signal is likely to prove more reliable. Schelling, in essence, plays his games in a world that is richer than most game theory analyses. He acknowledges that players

may choose “dominated” strategies not only to create reputations, but to adhere to ethics, build self-respect, or reflect generosity. To say that Schelling is merely exploring metagames, while perhaps technically correct, seems to miss the richness.

Schelling’s work on strategic interaction established a pattern that still continues. He weaves back and forth between attacking a field of insufficiently understood real world problems and deducing conceptual models of widespread relevance. The chicken-egg enigma is not unraveled in the work, though Schelling himself indicates that it often takes the lure of a real-world problem to get him thinking. Alain Enthoven, the original Pentagon whiz kid, remembers Schelling in “the Golden Age of strategic studies at the RAND Corporation,” the late 1950s. “He contributed many insights about the logic of threats,” Enthoven recalls, “what makes them credible and effective versus incredible and ineffective. I associate with him an emphasis on the importance of such qualitative distinctions as nuclear versus non-nuclear weapons, our territory versus their territory, and the like.”

During the 1960s Schelling’s principal focus was on defense and deterrence, and he produced a couple of dozen articles and the influential book *Arms and Influence* (1966). Through that decade and the 1970s, Schelling was one of the most widely cited authors in the field of international relations. And as McPherson (1984, p. 238) observes, “Schelling’s early analyses of the dilemmas of deterrence in *The Strategy of Conflict* formed the academic foundation of the academic subject ‘strategic studies.’”

Micromotives and Macrobehavior (M&M)

In the late 1960s Schelling was looking for new, relevant topics for his undergraduate course on game theory. Racial segregation was a profound problem confronting the nation. Among the troubling policy issues was the question of why people chose to live in segregated fashion; what mechanisms enforced segregation? Schelling pondered the possibility that perhaps no one chooses the particular patterns or degrees of segregation, just as no one selects the price that prevails in a competitive market. Rather, such aggregate outcomes can be the product of many individual choices. With segregation, however, the naturally resulting outcome may be inferior—from all parties’ perspectives—to others. To make these points, Schelling developed a series of models in which he arranged pennies on a checkerboard, heads and tails for blacks and whites. One’s neighborhood consisted of the eight surrounding pennies. People differed in their preferences for the color composition of their neighborhood; they moved when dissatisfied. Schelling’s most startling result was that extreme segregation can result from very slight preferences for residing in neighborhoods where one’s own type predominates. As he phrased it: “The underlying motivation can be far less extreme than the observable patterns of separation.” His penny models also show how delicate balances can be in collective equilibria.

Schelling’s major point (pp. 88–89) is:

... there is no universal teleology relating individual adaptations to collective results. Some adaptive processes work out fine and some do not Consumer competition in longer, heavier cars can be self-defeating. Non-market competi-

tion distributes young people not too badly among the different sports and their scarce playing fields, even among positions on the teams Small children learn to trade stamps with an acumen that the real estate fraternity can only envy, but their parents can travel incommunicado behind a slow truck on a mountain grade without finding a way to make it worth the truck driver's time to pull off the road for fifteen seconds.

This is vintage Schelling, drawing on diverse simple contexts to make profound points. In the words of James Tobin, "Tom's genius for making a great deal of economic and social theory from everyday experience and observation is unmatched."

By the mid-1970s Schelling had developed the grist for a book that would examine situations grave and whimsical "where a person reacting, responding, and adapting to his surroundings fails to perceive, or doesn't care, how his actions combine with the actions of others to produce unanticipated results" (M&M, back cover). The flip side of this observation is that it may be impossible to infer individual intentions from group outcomes. In *Micromotives and Macrobehavior*, Schelling explored a range of sorting and mixing models (as with the pennies on the checkerboard, patterns are produced when people with different characteristics and preferences choose which groups to join), developed a sub rosa economics of critical mass phenomena (such as racial tipping into and out of neighborhoods) and suggested a simple graphical apparatus to explore group outcomes when individuals' choices are binary. Binary phenomena encompass an extremely wide range of behavior; Schelling's models are sufficiently parsimonious that he can explore heterogeneity in preferences, the properties of different equilibria, stability and tipping, and the possible effects of policy interventions, all with diagrams accessible to any hard thinker.

A. Michael Spence talks about sorting out Schelling on sorting out:

I recall one of our many lunches. I began by worrying about non-market mechanisms by which people sorted themselves out. After listening to me for a while, Tom started to talk about swimmers and surfers on a southern California beach. I can remember quite vividly thinking he was nuts. About fifteen minutes later, it slowly dawned on me that this was a counterexample of the principle I had enunciated. Tom and I discussed several variants of the surfer-swimmer problem, and I emerged with a much better sense of sorting mechanisms and externalities, sensitized to whether the latter were directionally two way or just one way.

This branch of Schelling's investigation fit well with his burgeoning interest in a range of policy issues: segregation on any dimension, congestion and pollution, any problem of the commons, good collective outcomes and bad collective outcomes.

Choice and Consequence (C&C)

The late 1970s brought Schelling back to some interests first highlighted in *The Strategy of Conflict*: what is rationality, and how might individuals control their own

behavior? The proximate stimulus to take these subjects seriously was an extended National Academy of Sciences effort addressed to substance abuse (heroin, cigarettes, alcohol, and for the obese, food). Schelling asks (p. 59):

How shall we conceptualize this rational consumer whom all of us know and who some of us are, who in self-disgust grinds his cigarettes down the disposal swearing that this time he means never again to risk orphaning his children with lung cancer and is on the street three hours later looking for a store that's still open to buy cigarettes... However we end up reconciling, if we do reconcile, these behaviors with the notion of a consumer's having reasonably stable values, knowing his values, and having the intellectual capacity to make choices that satisfy those values, there seems to be for many among us a problem of self-management.

The struggle of the individual with himself has been a predominant conceptual theme of Schelling's work in recent years (for example, Schelling, 1984a, 1988a). Perhaps this is the logical culmination of his two-decade struggle with such fundamental questions as: What is the value of a human life? What institutional arrangements to permit one's death are acceptable? Should human organs be bartered? Should we manipulate our genes to aid our children? A policy question always lurks in the background: if I can not choose for myself, then on what basis can others decide that I should not be afforded this freedom?

Getting to the Heart of Matters

Thomas Schelling occupies himself with children, parlor games, everyday social occurrences. He takes delight in surprising outcomes. He is so often a radical thinker, so willing to sweep aside conventional wisdom, so free with his associations between the everyday and the deeply profound, that first-time observers cannot always tell whether he is serious. He is; that is just the way he thinks. Schelling devoted the better part of two decades to understanding the great power confrontation between the United States and the Soviet Union. For the past half-dozen years his principal policy interest has been in methods to encourage the cessation of smoking. For each endeavor he traveled the world; he heads up an institute on smoking policy and behavior at Harvard.

Charles Hitch observed Schelling in action on unfamiliar turf, his first meeting of the Finance Committee of the Board of Trustees of the Aerospace Corporation. He was struck by Schelling's "ability to transform unfocused discussions into focused ones, directed toward answering what he has identified as the right question."

The pension investment issues being addressed by the committee were typical of those addressed in similar corporate settings—appropriate risk/return tradeoffs, criteria for hiring and firing money managers, opportunities for greater diversi-

fication of assets, etc.—all aimed at our doing the job better. Then Tom spoke up: in his opinion, instead of trying to do the job better, we should be exploring ways to get rid of it and turn it over to others whose performance could well be at least as good as ours . . . My point is not that Tom had all the answers and the whole truth on his side. What he did achieve, however, was important and typical. He raised the level and changed the direction of the discourse.

Charles E. Lindblom recalls a colleague whose aura reflected his thought processes: “[T]he broad smile; his delight in ideas, often transforming his face and activating his whole body, and his eagerness touched with impudence. The lucidity of his speech too. A tonic.” Nathan Glazer remembers his first encounter with Schelling at a time of student disorders in the late 1960s: “There had been a bomb threat at Harvard, and Tom said, ‘Anyone with a handful of dimes can close down any institution.’” Thomas Schelling gets to the heart of matters.

Given his many contributions, it is no surprise that Thomas Schelling has been elected to the Institute of Medicine and the National Academy of Sciences, that he is a fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Science, and the Association for Public Policy and Management. His election as a Distinguished Fellow of the American Economic Association is a fitting honor from his home discipline. Schelling’s work and his passions incorporate attributes usually found in the most valuable economic theorizing: relevance and accessibility. His writings thus follows his own dictum, as paraphrased by Spence: “If you’re going to do theory and develop concepts that you hope will help people have a deeper sense of the structure of some part of the world, then give them concepts they can use easily.”

Albert Hirschman notes,

Any appraisal of Tom Schelling will (and should) obviously deal primarily with his positive contributions, his many brilliant and fruitful analyses and ideas. I shall do something different here and point to a little noted *negative* characteristic of Tom’s work and intellectual style: even though his writings are anything but mainstream, he hardly ever writes in an adversarial, disputatious tone. He leaves it to others to expatiate on the “failures” or the “irrelevance” of economics, on “What’s Wrong With Economics.” He simply walks away from the whole scene—in the subtitle of his last book he defines himself as an “errant economist.”

This is actually a strange way of behaving. We are all supposed to have been thoroughly socialized (“brainwashed”) into the prevailing paradigm so that breaking away from it exacts considerable intellectual travail as well as psychological stress. This experience of the apostate is then apt to leave traces behind, in the shape of 1) extensive imprecations against the forsaken orthodoxy, and 2) the formulation of, or adhesion to, some alternative paradigm. These two reactions to dissent from orthodoxy tend to be closely conjoined. It may

therefore be conjectured that Tom refrains from the imprecations because he has absolutely no use for the related activity: the construction of an alternative paradigm. He does not want to fall into the trap of exchanging one straitjacket for another.

As a result, he is one of the freest spirits of our profession.

Most of the problems Schelling has worked on have fallen outside the traditional domains of economics. He recently remarked: "If you move into a field economists don't touch, pay dirt is likely to be close to the surface." He has had many strikes. Perhaps other economists have not followed quickly because Schelling's intellectual derring-do is required to venture out so boldly. Whereas traditional economists study representative consumers and producers, Schelling focuses on specific groups and outliers, commanders and children, heroin addicts and hockey professionals. Like a constitutional lawyer, he weighs principles in test cases. Like most economists, he loves to assess arenas where the players are anonymous, the outcomes uncoordinated. But Schelling generally leaves the much-studied market to others, puzzling instead over a congested highway, an auditorium where no one sits near the front, or the distribution of sunbathers on a beach. In their attention to incentives, his writings fit readily in the economics literature, but monetary prices are hard to find.

One of Schelling's own models provides a fitting conclusion to these reflections. In his discussion of micromotives he identifies a class of situations in which the more people who choose *B* over *A*, the more willing other people will be to make that choice because of a positive externality. (Selection of a word-processing language is an example.) Multiple equilibria are obviously possible.

Within economics, Thomas Schelling, though admired by the masters, has been less read by the masses. Let us put Schelling aficionados at *B*, Schelling illiterates at *A*. (Surely the remaining classes are sparsely populated.) This latest honor to Thomas Schelling, primarily through information contagion, will attract more *B*'s. These newcomers will gain a glorious revelation of what they were missing. Both old and new *B*'s will benefit from an expansion of the universe in which intellectual discourse may be leavened by Schellingisms and enlightened by his models.

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