

The Law & Economics of *Survivor*

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*I really feel that I earned where I am. The first hour on the island I stepped into my strategy and thought, "I'm going to focus on how to establish an alliance with four people early on." I spent a lot of time thinking about who people are and why they interact the way they do. . . . I wanted this to be planned and I wanted it to be based on what I needed to do to win the game. I don't feel I was diabolical. There were ethics in this game. There was morality and I think that is a big part of why I won.*¹

Richard Hatch, *Survivor* winner

*My advice for anybody who plays this game is form an alliance and stick with it.*²

Rudy Boesch, Tagi alliance member

In recent years, the ubiquitous body of literature falling under the general header of “rational choice” has come under fire.³ Assaults have mounted across a wide range of disciplines, including but not limited to law,⁴ psychology,⁵ and political science.⁶ Drawing upon economics and experimental psychology, a body of literature has emerged in which legal scholars and economists operationalize formal games under laboratory

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¹ www.cbs.com/network/tvshows/mini/survivor/show/episode13

² www.cbs.com/network/tvshows/mini/survivor/survivors/rudy_f.shtml

³ Perhaps the most sophisticated recent assault is the widely known book, DONALD P. GREEN AND IAN SHAPIRO, *PATHOLOGIES OF RATIONAL CHOICE THEORY: A CRITIQUE OF APPLICATIONS IN POLITICAL SCIENCE* (1994). See also Christine Jolls, Cass R. Sunstein & Richard Thaler, *A Behavioral Approach to Law and Economics*, 50 STAN. L. REV. 1471 (1998); Christine Jolls, Cass R. Sunstein & Richard Thaler, *Theories and Tropes: A Reply to Posner and Kelman*, 50 STAN. L. REV. 1471 (1998). For a response to these and other attacks on rational choice, see Richard A. Posner, *Rational Choice, Behavioral Economics, and the Law*, 50 STAN. L. REV. 1551 (1998).

⁴ See generally Jolls, Sunstein & Thaler, *supra* note 3.

⁵ For a group of essays collecting relevant psychological literature, see *BEHAVIORAL LAW & ECONOMICS* (Cass R. Sunstein ed. 2000).

⁶ See generally Jonathan Cohn, *Irrational Exuberance*, THE NEW REPUBLIC, Oct. 25, 1999.

conditions, and then compare the resulting play against rational choice predictions.⁷ Because the experiments often fail to unfold in the manner predicted by formal theory, scholars have relied upon these studies to challenge both the underlying assumptions of rational choice and rational choice prescriptions for law and public policy.⁸

Rational choice scholars have offered several responses to such challenges. Theorists have argued that the rationality postulate holds if we understand that rationality itself is bounded,⁹ if we incorporate the costs of acquiring information,¹⁰ and if we consider the consumption value associated with certain forms of cooperative behavior.¹¹ For purposes of this essay, however, the most significant rational choice response has involved the unrealistically low stakes generally associated with various laboratory games.¹² It is not inconsistent with the premises of rational choice theory for participants to forfeit small payoffs to avoid appearing to be unpleasant, or even a jerk. But if the stakes were as significant as those involved in important questions of law and public policy, then we might see behavior that more closely reflects the predictions of formal theory. Of course, it is unrealistic in an academic setting to replicate the necessary stakes with which to demonstrate how actual players would respond when confronted with major decisions affecting their private well being or important questions of public policy.

⁷See Russell B. Korobkin & Thomas Ulen, *Law and Behavior Science: Removing the Rationality Assumption from Law and Economics*, 88 CALIF. L. REV. 1051, 1055-56 (2000) (summarizing literature comparing outcomes in experimental games against rational choice predictions); Herbert Hovenkamp, *The Limits of Preference-Based Legal Policy*, 89 NW. U. L. REV. 4 (1994) (asserting that the “economic concepts of ‘bounded rationality,’ risk aversion, and information costs owe much to psychology for their development”).

⁸See, e.g., Korobkin & Ulen, *supra* note 7, at 1055-56 (arguing against excessive reliance upon incentive effects of legal rules on the ground that experimental evidence belies rational choice predictions of interactive behavior).

⁹See Oliver E. Williamson, *Book Review*, 77 CALIF. L. REV. 223, 230 (1989) (reviewing R.H. COASE, *THE FIRM, THE MARKET, AND THE LAW* (U. Of Chicago Press 1988)) (“A comprehensive model should include cognitive assumptions (such as bounded rationality) and self-interest seeking assumptions (such as opportunism).”); Oliver E. Williamson, *Vertical Merger Guidelines: Interpreting the 1982 Reforms*, 71 CALIF. L. REV. 604, 612 (1983) (“Where human cognitive limitations are severe in relation to the complexity of the problems being faced, a condition of ‘bounded rationality’ occurs.... Bounded rationality and opportunism place great strain on the convenient fiction of comprehensive market contracting.”).

¹⁰On information costs and bounded rationality generally, see E.J. MACKAY, *ECONOMICS OF INFORMATION AND THE LAW* (1982); HERBERT A. SIMON, *ADMINISTRATIVE BEHAVIOR: A STUDY OF DECISION-MAKING PROCESSES IN ADMINISTRATIVE ORGANIZATION* (3d ed. 1976); Jonathan Baert Wiener, *On the Political Economy of Global Environmental Regulation*, 87 GEO. L.J. 749 (1999) (applying information cost analysis to rent seeking across nations).

¹¹See MAXWELL L. STEARNS, *PUBLIC CHOICE AND PUBLIC LAW: READINGS AND COMMENTARY* 921 (1997) (“In low stakes games, ... the desire to appear civil and cooperative, even with people we do not anticipate having interactions with in the future may well have the practical effect of lowering the payoffs for defection and raising the payoffs for cooperation.”).

¹²See, e.g., John M. Orbell & Robyn M. Dawes, *Social Welfare, Cooperators' Advantage, and the Option of Not Playing the Game*, 58 AM. SOC. REV. 787, 788, 791 (1993) (describing laboratory version of the prisoners' dilemma where participants highest payoff was \$5 for defection when the other party cooperated); Roderick M. Kramer & Marilyn B. Brewer, *Effects of Group Identity on Resource Use in a Simulated Commons Dilemma*, 46 J. PERSONALITY & SOC. PSYCHOL. 1044, 1055-56 (1984) (describing experimental game modeling in which participants could cash in acquired points for \$.05 each up to 300 points). See also STEARNS, *supra* note 11, at 921.

This past summer, the CBS network, motivated by its notoriously lagging ratings, conducted an experiment of its own. CBS ventured into the somewhat risky world of real life voyeuristic programming. While motivated by the desire to improve its position relative to that of the other major networks rather than by a desire to shed light on an interesting academic debate over the precepts of rational choice, the *Survivor* game nevertheless has significant implications for the merits of formal theory. *Survivor* pushed the programming envelope by constructing a real life endurance contest lasting thirty-nine days under strenuous conditions on a remote island on the South China Sea. From the perspective of CBS, *Survivor* offered an opportunity to generate high ratings at relatively low cost, at least as compared with a new drama or situation comedy. There would be no high priced actors and no scripts. Once the location was set up and the participants were selected and brought to the remote island, the camera crew simply recorded the players' unfolding real life drama. The audience viewed highlights from the unplanned interactions of the sixteen players for one hour per week during prime time.

The game's basic premise was simple: Eight men and eight women would compete on a remote island on the South China Sea for a single prize of \$1 million based upon who could "survive" for the full thirty-nine days. The castaways spanned in age from 22 to 72. Their backgrounds varied widely. The players included a lawyer, a river guide, a neurologist, a basketball coach, a homemaker, a truck driver, and a retired Navy SEAL. What makes the game interesting for formal theorists, however, is that the real challenge for the players was not limited to enduring tedious living conditions and eating disgusting food on a remote island with a harsh climate and relatively scarce natural resources. The true challenge was the ability to remain on the island after a series of competitions between two initial tribes of eight for both prizes and immunity, followed by a series of competitions among members of the merged tribe. Most notably, two competing tribes, and then the ten members of the merged tribe competed for immunity from being voted from the island until only two finalists remained. The players were simultaneously forced to rely on each other for survival and to vote against each other in an effort to win the game. When only two players remained, the final seven players voted off the island returned as a jury that selected the ultimate survivor. The final survivor received a cash prize of \$1 million and a new car. Each of the remaining players received prize money ranging from \$2500 for the first eliminated survivor to \$100,000 for the remaining finalist. The longer a castaway lasted on the island, the larger the cash prize.

There were, of course, additional stakes, which had the potential even to eclipse the seemingly generous ultimate CBS grand prize. In the event that the show was a ratings success, those who acquired the greatest public recognition had the potential to become multimillionaires through other media opportunities including commercial endorsements. Of course, those on the island had no idea just how high the ratings would actually go, and anecdotal evidence supports the intuition that those who were voted off were shocked by the extent of the fervor that came to surround the show.¹³ Because of their limited access to information, the players who remained on the island likely assumed that, holding all else constant, public recognition would be positively correlated with endurance, regardless of who ultimately received the first and second place cash prizes. In

¹³When asked: "Did you have any idea while you were on the island what a huge success the show would be?", Gervase, a member of the Pagong tribe who was voted off tenth responded: "We had no idea. I personally was hoping we would have the number one spot sometime in the summer. But this just took off from the beginning and it's been one incredible ride!" <http://chat.msn.com/msnlive/features/survivor10.asp>.

short, the players had an incentive to try to stay in the game as long as they could both to maximize their prize money and to benefit from possible future endorsement contracts or other media opportunities.

In *Survivor*, CBS effectively structured a high-stakes game. And in doing so, it offered cash payoffs of sufficient magnitude that the benefits of survival likely overwhelmed, at least for some players, the apparent costs of appearing to play strategically in an effort to win the game. Just as it is too easy to extrapolate from low stakes game theoretical experiments to important questions of public policy, so too it would be improper to draw too robust a set of implications from *Survivor*. But to the extent that *Survivor* offers a glimpse into how stakes affect interactive human behavior under carefully defined conditions, and into how success might well result from careful strategy rather than inherent merit – based for example upon physical endurance or contributions to the well being of the group as a whole – *Survivor* might well offer an important, if limited, antidote to the emerging literature critical of rational choice. It is with that narrow but important mission in mind that we embark upon this study into the law and economics of *Survivor*.

This essay will demonstrate that *Survivor* was largely played in a manner that is consistent with the predictions of rational choice theory. One suspects that if the game were played for thirty-nine minutes instead of thirty-nine days, and that if the ultimate and penultimate prizes had been \$100 and \$10 instead of \$1 million and \$100,000, we might not have been able to make such a claim. While we will readily concede that this observation, if proved, is alone insufficient to end debate on the merits of rational choice, we contend that it might well be sufficient to raise the question as to who has the burden of proof and what the nature of the required proof might be. Specifically, we believe that our study raises an important question as to the significance that should properly be attached to laboratory studies constructing hypothetical formal games as a means of discrediting rational choice models. If this essay achieves even that limited objective, then *Survivor* itself represents a significant play in an important ongoing academic game.

In Part I of this essay, we discuss two aspects of the *Survivor* game. First we establish what we will refer to as the “constitutional rules.” These rules were established by CBS and announced to the participants in advance. The constitutional rules are important because it is with knowledge of those rules that the participants selected and implemented their individual and collective gaming strategies. In addition, we will describe the actual history of the *Survivor* game as it was played over the course of the thirty-nine days. This history includes a series of spontaneously developed rules governing the conduct of the competing players. These spontaneously ordered rules sometimes operated in a complementary fashion, at least within certain coalitions, and sometimes operated in direct tension across groups or individuals.¹⁴ The important point for present purposes is that the players, having joined a particular group or having rejected overtures to join other groups, perceived themselves as bound not only by the constitutional rules established by CBS, but also by the spontaneously ordered rules established between and among the relevant players.¹⁵ In Part II, we set out three sets of rational choice concepts, one theorem and two formal games, which together help to refocus our understanding of the manner in which the actual *Survivor* game was, and was not, played. The relevant

¹⁴As we will explain in the next part, these rules were sometimes broken. See *infra* at 14-15 (explaining Kelly’s defection from the alliance).

¹⁵This is not to suggest that these informal rules led to predictable outcomes. Instead, the outcomes were a function of the constitutional and spontaneous rules, coupled with a series of seemingly random events that had the effect of limiting the payoffs for some members of following their selected play strategies.

concepts are as follows: (1) minimum winning coalitions and the Schelling point, (2) empty core bargaining, and (3) the iterated and noniterated prisoners' dilemma. Finally, in Part III, we recast the actual *Survivor* game, as described in Part I, in terms of the formal rational choice concepts and games articulated in Part II. This allows us to assess the extent to which *Survivor* was played in a manner consistent with the predictions of rational choice theory. We conclude that *Survivor* provides a rare and valuable opportunity to draw inferences that more realistically mirror the complex reality of high stakes political and legal strategies and choices than do the low stakes experiments conducted in academic laboratories.

I. The *Survivor* Game

A. Constitutional Rules

CBS established a fairly minimal set of rules that it advertised to the participants in advance of their travel to the deserted island.¹⁶ First, CBS selected a group of sixteen players who would be stranded on a deserted island off the South China Sea. CBS split the sixteen members evenly into two tribes, Tagi and Pagong. The tribes were named for the beaches that each tribe inhabited, which were located on opposite ends of the island. Each tribe had four men and four women.¹⁷ Once on the remote island, the tribe members were responsible to scavenge for food, to build shelter, and to work together to assemble the minimal requirements for survival.¹⁸

Until the survivors from the two tribes eventually merged, the constitutional rules were generally structured in a manner that promoted intra-group cohesion and inter-group competition. One of the most interesting aspects of *Survivor* is that these competitions in and of themselves, appeared consistent with a positive sum game, in which cooperative behavior among tribal members yielded higher payouts to the group as a whole. To win *Survivor*, however, it was not sufficient to be part of a stronger tribe. Instead, one had to survive the series of tribal councils within the tribe that lost immunity, or within the eventually merged Rattana tribe. The payoffs for this game, however, were zero sum. Only one person would receive the ultimate one million dollar prize. For some players, the trappings of a positive sum game might have affected their decision to play in a manner that they regarded as cooperative, including favoring those who made the greatest contribution to group welfare, while other players, those who kept their eye on the ultimate prize, saw past such trappings and structured their relationships in a manner that offered the greatest likelihood of ultimate success.

The network provided incentives to cooperate by offering group rewards for the tribe who won each

¹⁶The discussion of the rules that follows, and the description of the manner in which *Survivor* was played in Part I.B., are primarily based upon two sources, the broadcast episodes of *Survivor*, recordings of which are on file with the authors, and the official survivor website, www.cbs.com/tvshows/mini/survivor. We will also provide specific references where appropriate.

¹⁷While CBS announced no formal requirement that the two tribes have equal numbers of men and women, it seems reasonable to infer that it was not a coincidence.

¹⁸CBS provided a small ration of rice to the survivors to supplement the food that they could hunt or catch on their own.

inter-tribe competition. In addition to the necessary team efforts to construct a camp and fend for food, in every three-day cycle, the tribes competed against each other in two independent challenges. These competitions required group cooperation to succeed. First, there was a reward challenge. The successful team in each reward challenge received some comfort or amenity such as food, a spice rack, beer, a sharp knife, pillows, or clean clothes. Food or devices that would allow the players to catch food were obviously coveted prizes because, with the exception of a small ration of rice provided by the network, the only available fare consisted of rats, eels, bugs, or fish, assuming that the tribe members were successful in hunting or catching them. The important point for our purposes is that when a tribe succeeded in a reward challenge, the tribe as a whole benefitted. At the end of each three-day cycle there was also an immunity challenge conducted between the two tribes. Like the reward challenge, the immunity challenge tended to promote intra-group cohesion because the winning tribe received immunity for all of its members for that cycle. The losing tribe would attend Tribal Council that night.

At Tribal Council, the host of the show would ask specific tribe members questions in front of the entire tribe. These questions could be about anything, including the events that took place in the preceding three days, the relationships between and among tribe members, or who felt vulnerable to or protected from being cast out at Tribal Council. After the question period, each tribe member was required to cast a secret ballot in succession against another for removal from the island.¹⁹ The member who received the most votes, which could be a plurality or a majority, would then be evicted from the tribe, and thus from the game.²⁰ In the event of a tie, the tribe members would remain in Tribal Council until a plurality vote could be reached based upon a series of repeat votes.²¹ Again, both the reward and immunity challenges promoted cohesion within each of the two tribes by providing an opportunity for reward that benefitted all tribe members at the expense of the other tribe. While the losing tribe under the immunity challenge obviously was subject to intra-tribe tension, given the obligation to rid itself of a member, the removed tribe member was unable to exact future retribution.²²

The game continued in this manner until only ten players remained on the island. At that point, the two separate tribes merged into a single tribe, regardless of how those ten players were broken down between the two original tribes. One delegate from each tribe was selected to visit the opposing tribe's beach and then the two delegates negotiated which beach the new, merged tribe would occupy and the name for the new tribe.

The members of the merged tribe then continued successive reward and immunity challenges. Because two tribes were no longer competing, however, these challenges pitted members of the new tribe against each

¹⁹The fact that the balloting for the non-immune team followed these two competitions for each three-day cycle likely furthered intra-group cooperation. In the absence of coalition strategies, players could reasonably assume that their performance in these competitions, and thus their contribution to the team as a whole, would significantly affect their prospects of surviving a vote for removal. Members of the immune team might have anticipated that those making particularly valuable contributions resulting in immunity would receive some protection against future eviction.

²⁰No deliberations were permitted among the players during the voting process. However, the players were free to discuss or collaborate on their votes prior to entering Tribal Council.

²¹Because there were no ties until cycle 13, the network did not announce whether the tie-breaking regime involved a runoff between the two tribe members who received the most votes or a series of new votes until a plurality or majority loser emerged. In cycle 13, Kelly broke the tie by switching her vote from Richard in the first ballot to Sue in the second.

²²As explained below, the final seven evicted players could exact retribution as jurors selecting the winner.

other. The winner in either challenge alone received the benefit. As a result, the zero sum nature of the game become increasingly apparent after the two tribes merged. Every three days one tribe member was voted off the island at Tribal Council by the remaining tribe members. In contrast with the two-tribe games, these games were not structured to promote cohesion among the players. Instead, the reward generally benefitted only one individual member at the expense of the remaining members of the tribe.²³

The game was conducted in this manner until only two survivors remained.²⁴ At this point, the final seven eliminated members of the merged tribe reconvened on the island to cast “secret” ballots for the final survivor.²⁵ Prior to casting these final and decisive ballots, each of the seven jurors was invited to ask the two finalists one question or to make a statement. The finalist were also permitted to make opening statements prior to the questions or comments and to make closing statements prior to voting. At the conclusion of all the questions or comments, the jurors voted one-by-one in a secret ballot for the ultimate survivor.

The final survivor received \$1 million plus a new car, subject to the important caveat that the prize money could not be shared with any of the other players.²⁶ The remaining fifteen players received smaller cash prizes. As with the ultimate survivor, the remaining players were also prohibited from sharing their prize money with other players.

B. Spontaneously Ordered Rules

The *Survivor* players supplemented the constitutional rules with their own sometimes formal and sometimes implicit agreements. While the game contained many seemingly random elements from the perspective of individual players, the resulting strategies and interactions ultimately proved decisive in predicting which players had the greatest likelihood of winning the game. In this subpart, we describe the series of events that took place during the thirteen cycles.²⁷ Each cycle is a three-day period with a reward and immunity challenge and a vote for eviction at Tribal Council for the non-immune tribe or for all non-immune members of the merged tribe.

The network determined the membership of both Pagong and Tagi. The Pagong tribe included:

²³Occasionally the winner of the reward challenge was given the option of selecting another tribe member with whom to share the reward. In contrast, only the winner benefitted from a successful immunity challenge.

²⁴When the final four survivors remained, the game was played out over three days with only immunity challenges and daily Tribal Council meetings. The next to last vote, when there were three players left, was subject to a slight variation, which did not affect the manner in which the game was played. The network assumed that when three players remained and when one of those players received immunity, the two non-immune members would vote each other off the island. This left the one immune member to break the tie. Rather than have all three players cast ballots and then evict the player who received the most votes, the immune member cast the decisive ballot.

²⁵While this was conducted in secret and without any deliberations, it was rather obvious that the two finalists would immediately become aware of who voted for whom.

²⁶Any attempt to solicit an agreement from another castaway to split, apportion, or share the prize would result in disqualification from the game. www.cbs.com/tvshows/mini/survivor/show/rules.

²⁷In Appendix A, we provide a breakdown of the votes in each cycle and in Appendix B we provide a summary of the *Survivor* game by cycle.

Colleen, a 23 year old college student; Gervase, a 30 year old youth basketball coach; Jenna, a 22 year old college student; Greg, a 24 year old Brown graduate with previous survival training; Gretchen, a 38 year old homemaker who spent six years in the Army as a survival instructor; Joel, a 28 year old traveling salesman; Ramona, a 29 year old chemist; and BB, a 64 year old contractor and civil engineer. The Tagi tribe included: Richard, a 39 year old corporate trainer with skin diving experience; Kelly, a 23 year old river guide; Rudy, a 72 year old retired Navy SEAL; Sue, a 38 year old truck driver; Sean, a 30 year old neurologist; Dirk, a 23 year old substitute teacher and dairy farmer; Stacey, a 27 year old attorney; and Sonja, a 63 year old musician (banjo player).

1. Cycle 1: Days 1-3

*Going in I thought this was going to be tough . . . But the hardest part, though, is the people. You gotta make them like you or they'll vote you off.*²⁸

Sue Hawk, Tagi alliance member

The sixteen survivors were stranded two miles off the coast of Pulau Tiga, an island twenty miles from of Borneo. During the first few days, the tribes arrived on the island at their respective beaches via rafts and began the process of building shelter. When the Tagi tribe members arrived at Tagi beach, with the exception of Richard, who sat in a tree, they all immediately began constructing a camp with a sleeping shelter and a latrine. Richard's fellow tribe members initially perceived him as lazy. Dirk and Sean began to form a friendship and Dirk frequently read from his Bible, the sole luxury item he brought with him to the island.²⁹ Stacey approached the three women in the tribe proposing to form a voting coalition and to eliminate Rudy, who they came to regard as surly and opinionated.

The Pagong tribe had difficulty paddling to shore and Ramona and Gretchen both got sick from swallowing sea water. When they arrived at the beach, the Pagong tribe members had a more relaxed approach to setting up camp. Most of the younger members lounged around on the beach while BB, the 62 year old contractor, anxiously began selecting a suitable site at which to construct a shelter. He chose an oceanfront location. The choice concerned Gretchen, who feared that it would become soaked during high tide. Although Gretchen was able to shake off her sickness almost immediately, Ramona remained sick and nauseated for several days. As a result, Ramona was unable to help build the camp. The Pagong members began to form friendships. Gervase and Ramona, for example, the only two African Americans, agreed never to vote against each other.

In the first cycle, the Pagong tribe won the immunity challenge. In this challenge, each tribe was required to swim to an off-shore raft. Once there, each tribe member coordinated holding and navigating the

²⁸www.cbs.com/network/tvshows/mini/survivor/show/episode1/story.

²⁹Each player was permitted to bring one luxury item to the island. Gervase brought a deck of cards; Sean brought a razor; Kelly brought a sewing and bead kit; Colleen brought soap; Richard, Ramona, and Jenna brought journals; Rudy and Gretchen brought toothbrushes; Greg brought a frisbee; Sue brought tweezers; Joel brought shampoo; Stacey brought a camera and film; BB brought a towel; and Sonja brought a ukelele.

raft, while lighting a series of torches. Once those torches were lit, the tribe members navigated the raft back to shore, where they lit another torch. Because Tagi lost the immunity challenge, the tribe conducted its first Tribal Council. The women's coalition was almost successful in voting off Rudy (he received three votes from Stacey, Sonja, and Kelly), except that Sue double-crossed the women by instead voting to eliminate Sonja. Sue perceived Sonja to be a physical liability in the competitions due to her age and frailty. Although Rudy and Richard were overbearing, Sue thought their strength and endurance would be important in future challenges. Sonja was evicted with four votes (Rudy, Sue, Dirk, and Sean).

2. Cycle 2: Days 3-6

During this second cycle, BB completed Pagong's shelter and located a water hole deep within the jungle. While BB worked the hardest, he publicly criticized his tribe members for laziness. At one point BB even suggested that he wanted off the island. During the same period, Colleen and Greg formed a friendship and began to spend a noticeable amount of time together and away from the remaining tribe members. Ramona, who was still sick from ingesting sea water, remained inactive for most of the first week on the island.

On Tagi beach, Sean and Dirk unsuccessfully tried fishing every day. Richard began the process of building an alliance to insulate its members from elimination by voting consistently as a bloc, and to maximize his own chances of being among the final four survivors. One of the interesting dynamics of Richard's strategy stems from the fact that he was openly gay. Richard selected Rudy, the 72 year old former Navy SEAL, as his first alliance partner, even though Rudy had made statements suggesting that he was homophobic. Despite the fact that Rudy did not appreciate Richard's propensity to walk around the camp nude, and despite Rudy's repeated characterizations of Richard as "queer" and "gay,"³⁰ Richard and Rudy succeeded in forging an alliance. Rudy's personal views notwithstanding, Richard likely appreciated that Rudy exhibited characteristics (including his prior military service) that made it appear that he would not renege upon any formal agreements. From Richard's perspective, Rudy appeared the most reliable and trustworthy of the Tagi members.

In the second cycle, the immunity challenge required the two tribes to race to eat live beetle larvae, squirming bugs considered to be a sushi-like delicacy to the Malaysian locals. The first tribe with a member refusing to eat the bugs lost the challenge. The challenge resulted in a tie because every castaway ate a bug. To break the tie, the most squeamish member of each tribe was forced to consume two live bugs in a race to determine who won immunity. Stacey appeared to be the most hesitant of the Tagi tribe and Gervase the most squeamish of the Pagong tribe. Because Stacey finished first, Tagi received immunity. At Tribal Council, Pagong voted off BB, the retired construction executive who, although instrumental in building the camp, had offended his tribe members with his critical comments. He received 6 out of the 7 available negative votes.

3. Cycle 3: Days 6-9

³⁰During Cycle 6 Rudy told the camera, "I pulled them Green Beret fellas aside [a group of Green Berets was on the island to construct an obstacle course for one of the challenges] and told them Richard was queer. That's the kind of thing they need to know." www.cbs.com/network/tvshows/mini/survivor/show/episode6/story.

During this cycle, it appeared to some members of Pagong that Colleen and Greg might have a budding romance. They frequently took walks alone on the beach, swam together, and wandered off into the jungle at night. Although they were not romantically involved, other tribe members were suspicious of their relationship. This suspicion did not, however, cause major concern over voting or alliances because the Pagong women, including Colleen, openly discussed their voting preferences. In the Tagi tribe there was an increasing dislike for Stacey who was generally quiet, but who often appeared aloof. It also appeared to Tagi tribe members that Stacey was not working very hard.

During this cycle, the two tribes faced a reward challenge in which they had to swim to a buoy 100 yards off shore, dive ten feet to the ocean bottom, and drag a treasure chest to shore. The Tagi tribe won and their reward was a mask, fins, snorkel, and a fishing spear. The immunity challenge was a rescue mission. Each tribe would have to rescue one of its own members from deep within the island and carry her to the beach on a stretcher. Pagong won immunity. Five Tagi members voted Stacey off at Tribal Council (the four male tribe members plus Sue). By this second Tribal Council, the alliance between Richard and Rudy was firmly entrenched. The two men would vote together as a bloc for the remainder of the game.

1. Cycle 4: Days 9-12

After Tagi won the reward challenge in Cycle 3, Richard successfully used the equipment to catch fish for the tribe. In fact, Richard was the only tribe member who was able to do so. Sean and Dirk had again been completely unsuccessful. Rudy became the camp cook. Using a trap that Greg made, Pagong managed to catch, cook, and eat rats. Although members of the Pagong tribe had not forged any formal alliances, Jenna, Colleen, and Gretchen had become close friends. The result was a loose coalition, in which the three women shared information concerning how they intended to vote, although they did not coordinate their voting or vote as a bloc.

The reward challenge required each tribe to build a distress symbol that could be seen by a passing plane. The best distress symbol won a spice rack, a knife, a hammock, and other amenities. By spelling out SOS with their bodies while wearing yellow rain slickers and waving their arms and legs, Tagi defeated Pagong's smiley face made in the sand.

The immunity challenge required six members from each tribe to participate. Pagong selected Ramona to sit out despite the fact that she appeared to be stronger than Colleen or Jenna. The tribe grew accustomed to operating without Ramona during the first week on the island because of her dehydration and nausea. The immunity challenge was a relay race which ultimately required tribe members to dig six feet to recover a treasure chest, lift it out of the ground, and then to carry it across the finish line down the shore. Rudy and Richard gave strong performances for Tagi, which won the competition.

At Tribal Council, four Pagong members voted off Ramona (Colleen, Jenna, Gretchen, and Joel). At the end of this Tribal Council, each tribe was down to six members.

1. Cycle 5: Days 12-15

Richard successfully caught fish each day for the Tagi tribe. Shortly after recruiting Rudy as the first member of his alliance, Richard began to court Sue and Kelly, who were becoming friends and confidants, to

join. Sue convinced Kelly that they ought to join the alliance and vote as a bloc at least until they reached the final four. Sue and Kelly pledged their own sub-alliance in which they would vote as a bloc when the full alliance emerged as the final four players.

The reward challenge required three members of each tribe to participate. One member from each tribe used a blow gun to hit fruit that the successful tribe would then keep. Another used a sling shot to get more fruit. The final member of each tribe threw spears thirty feet to a target. The tribe whose throw landed closest to a bulls-eye won all the fruit hit in the blow gun and sling shot contests, in addition to three chickens. Both tribes were given advance notice of the skills needed to succeed and allowed to practice. Each tribe selected the most skilled member. Joel from Pagong defeated Sue from Tagi in the spear throwing context.

Pagong also won the immunity challenge, a kayak race. The four members of the Tagi alliance (Richard, Rudy, Kelly, and Sue) successfully voted to expel Dirk. While Dirk had proven himself an asset in the physical reward and immunity challenges, the Tagi members had become concerned about his significant weight loss and uncomfortable with his constant expressions of religious belief. This event marked a shift in voting strategy among the tribe members. Prior to this Tribal Council, the stronger, more athletic members of each tribe were generally safe from being voted off the island. The remaining members had treated such members as necessary to the tribe's overall success both in the survival and immunity challenges. Most of the early castaways that were voted off were perceived as liabilities as a result of either physical weakness or laziness (Ramona, Stacey, and Sonja) or because of personality issues (BB and Stacey). Following this Tribal Council, Tagi was down to five members: the four member alliance – Richard, Rudy, Kelly, and Sue – plus Sean.

1. Cycle 6: Days 15-18

At the beginning of this cycle, the remaining members of each tribe frequently discussed how the dynamics of the game would change when the two tribes merged at the start of the next cycle. The Tagi alliance agreed to continue functioning as a voting bloc until they were the final four survivors. Although invited to join the alliance, Sean refused, suggesting that such a strategy was not a fair way to play the game. In response to a question, Sean stated “I am a little bit worried, you know, with the upcoming immunity challenge that we are going to be having especially since [the alliance] kicked Dirk off last time.”³¹

The reward challenge required the tribe members to don night-vision goggles, enter an abandoned barracks on the island, and rummage through the barracks to scavenge for listed items. Despite finishing first, Tagi lost when Richard blundered by returning with a duplicate item rather than the third listed item. The Pagong tribe won canned goods and chocolate.

The immunity challenge was a half mile obstacle course that required participation by four tribe members. With Rudy sitting out, Tagi won. At Tribal Council, Jenna, Colleen, Gretchen, and Greg voted Joel out of the Pagong tribe. In the preceding days, Gervase had analogized all women to cows in a conversation and Joel laughed profusely. Although Gervase made the offensive joke, the women attributed their votes to Joel's reaction to that joke and to what they perceived as Joel's generally condescending manner toward the women in the tribe.

³¹www.cbs.com/network/tvshows/mini/survivor/show/episode6/story_pt2.shtml

1. Cycle 7: Days 18-21: The tribes merge.

At the end of the prior cycle, each tribe had five members. At this point, the two tribes merged.³² One member represented each tribe as a delegate to the other tribe's beach. Jenna represented Pagong and Sean represented Tagi.³³ After visiting the other tribe's camp, the two delegates got together, had dinner, and hammered out the details of the merger. In particular, the delegates were required to settle upon which of the two beaches the tribes would occupy and to select a new tribe name. Jenna and Sean selected Tagi beach and named the new merged tribe Rattana.

During their first immunity challenge as a single tribe, all members competed against each other. The first part of the competition required the survivors to hold their breath under water. The three that held their breath the longest, Gervase, Greg, and Sean, advanced to the second phase of the challenge. The three finalists then swam underwater along a rope line and released attached buoys. The first one to reach the end of the rope won immunity. Greg won the competition.

There was speculation about a Tagi alliance among former Pagong members, but the rumors were sufficiently speculative that each member continued with their prior voting strategies without the benefit of a coordinated response. At the first Tribal Council for the merged tribe, the four member Tagi alliance alone succeeded in voting to eliminate Gretchen. As Richard explained, "[she] was a threat to win."³⁴ Her physical strength and survival training made her the best able to endure their meager surroundings. Prior to this vote, Gretchen had not received a single vote in any of the previous Tribal Councils within Pagong. The other Rattana tribe members were divided, and each voted to eliminate a different person. Sean, a former Tagi member, had decided to cast his votes in an alphabetical voting scheme. In accordance with this scheme, his first vote was against Colleen. He defended the logic of his scheme on the ground that the Pagong tribe members had names at the front of the alphabet (Colleen, Gervase, Greg, Gretchen, Jenna) and that the Tagi member names were all later in the alphabet (Kelly, Richard, Rudy, Sue). If discovered, the scheme might have provided a means of signaling cooperation with the alliance, while also allowing Sean to continue his claim that he had not joined it. Sean expressed the view that this strategy would allow him to avoid animosity and possible future retribution. At this point, the other Rattana members were not aware of Sean's voting strategy. Following Gretchen's expulsion, all evicted members of Rattana would serve as jurors who would choose the winner from the two finalists.

1. Cycle 8: Days 21-24

The Rattana tribe now had nine members: five former Tagi members (the alliance plus Sean) and four former Pagong members (Jenna, Colleen, Gervase, and Greg). Although Colleen and Jenna had become

³²It was a coincidence that each of the original tribes was left with five members at the time they merged. The network rules required a merger when the total population was ten, regardless of the relative composition between the tribes.

³³While we can only speculate as to why the Tagi alliance selected Sean, the only remaining Tagi member, it seems plausible to assume that in doing so, they were signaling some level of loyalty to him when the two tribes merged.

³⁴www.cbs.com/network/tvshows/mini/survivor/show/episode7/story.shtml (quoting Richard).

friends, as had Colleen and Greg, there were no cohesive alliances among the former Pagong tribe members. At this point, the former Pagong members had become suspicious about a possible Tagi alliance. Richard, still the only successful fisherman, speared a three foot shark which fed the entire tribe.

The reward challenge involved archery. The winner was given an opportunity to watch a five minute video from friends and relatives at home. At this point, the survivors had been stranded on the island for 23 days with no contact from the outside world, other than the network employees. The network provided a teaser to each tribe member, revealing thirty seconds from each video before the challenge. After Greg won the reward challenge he was given the option of watching his video alone or inviting any of the Rattana tribe members to watch it with him. He invited the entire tribe.

In the immunity challenge, the tribe members were tethered to a rope with a harness. The members had to run an obstacle course while attached to the rope. The first survivor to race the entire course around trees, over logs, and through thickets without becoming separated from the rope won immunity. Gervase succeeded.

During Tribal Council, the host asked Sue whether there was a voting alliance. She denied it. The host then asked Kelly the same question, to which she responded, “[d]o I have to answer that?” The remaining players were then certain of the Tagi alliance. The four Tagi alliance members plus Jenna and Sean succeeded in voting off Greg. While this vote was consistent with Sean’s alphabetical voting strategy, the Tagi alliance did not discover that strategy until the next cycle. Under his scheme, Sean would have voted in this cycle for Gervase, but voted for Greg because Gervase had immunity. After this vote, eight players remained.

1. Cycle 9: Days 24-27

Through discussions with castaways, Sean revealed his alphabetical voting scheme. He explained that he had voted for Colleen, then skipped Gervase because he won immunity, then Greg, and would next vote for Jenna. Kelly exhibited signs of remorse concerning the alliance. Kelly was much younger than the other alliance members and appeared to be forming friendships with Jenna and Colleen, who were closer in age.

The reward challenge required the survivors to navigate a jungle rope course and to collect 16 medallions without ever detaching themselves from the ropes. Colleen was the first to collect all sixteen and to complete the race. Her reward was a barbeque dinner. She was allowed to invite only one member of the Tribe to join and she selected Jenna. During the barbeque, Colleen and Jenna forged their own alliance. With eight members remaining, and a competing alliance of four, Colleen and Jenna decided to recruit Gervase and either Sean or Kelly, in an effort to vote Richard off the island. Richard’s quirky habits of walking around naked, his tendency to brag about his fish catching ability, and his general arrogance annoyed the other tribe members. Gervase agreed to vote with Colleen and Jenna. The three then approached Kelly and Sean separately. Sean conditioned his vote on whether they could get Kelly to defect from the Tagi alliance, thus ensuring a fifth vote against Richard. Otherwise, Sean refused to join the Pagong alliance, which threatened to produce no more than a stalemate, with the four member Tagi alliance (Richard, Rudy, Sue, Kelly) against the alternative alliance (Colleen, Jenna, Gervase, Sean). While Richard and Sue sensed that Kelly was struggling with her commitment to the Tagi alliance, they were unaware of the Pagong members’ attempts to recruit Kelly to form a competing alliance. As a result of their concern, Richard and Sue tried to reinforce to Kelly the importance of abiding her earlier commitment.

The immunity challenge was a large board game with the survivors as the playing pieces. The game had 100 two-by-two pieces of plywood board. The survivors were required to move one block at a time, flipping over each piece of wood upon which they had been standing. The survivors were not permitted to step onto any board that had been flipped over. Rudy, the last member able to move, won immunity.

Without knowing that Kelly had defected, but armed with knowledge of Sean's alphabetical voting scheme, three members of the Tagi alliance (Richard, Rudy, and Sue) plus Sean succeeded in voting to eliminate Jenna. Kelly voted instead to eliminate Sean because she disliked him and his alphabet voting strategy. Gervase, Colleen, and Jenna voted for Richard. The three active members of the original Tagi alliance did not yet learn about Kelly's defection because the host stopped reading the ballots once Jenna's elimination was certain. Had he read all the votes, the alliance members would have learned about the defection because they were aware of Sean's vote against Jenna, and had reason to suspect Kelly of defecting. The three committed members of the Tagi alliance entered Cycle 10 without knowing the extent of Kelly's commitment.

1. Cycle 10: Days 27-30

With seven castaways remaining, if the alliance remained intact, it could guarantee its members' success as the final four survivors.³⁵ The alliance discussed Kelly's increasing discomfort over lying to the Pagong tribe members about the voting alliance. After realizing that his alphabetical voting strategy was responsible for Jenna's elimination in the previous Tribal Council, Sean abandoned this strategy.

Gervase won the reward challenge, which required the survivors to run across narrow bamboo poles over water. He won a slice of pizza which he shared with the entire tribe (giving each survivor one bite), and a phone call home. He called his girlfriend who had just given birth to his son days before. The immunity challenge was a race to assemble brush, branches, and leaves to build a fire in a pit that would burn through a rope several feet above. The first survivor whose fire burned through the rope won. Richard won and thus received immunity.

In preparation for the next tribal council, Colleen used tape to draw a duck and the words "Sitting Duck" on her T-shirt. Gervase drew a bulls eye with the word "Target" on his T-shirt. They entered the Tribal Council confident of their imminent elimination. Gervase began the Tribal Council with an unusual plea:

You better vote me off . . . because if you don't, I'm going to win every challenge and hold immunity for the rest of the game. No one else will stand a chance of winning. If you know what's best for you, you'll vote Gervase off.³⁶

The four alliance members plus Sean voted Gervase off.

1. Cycle 11: Days 30-33

³⁵This holds until the tribe has only five members (the four alliance members, plus a non-alliance member). At that point, if the non-alliance member receives immunity, then the tribe members have to eliminate one of their own. But provided that there are at least two non-alliance members, then the alliance can target a non-alliance member regardless of who receives immunity.

³⁶www.cbs.com/network/tvshows/mini/survivor/show/episode10.

With only six remaining players, the alliance members, Sean, and Colleen, tensions were high. Colleen saw the immunity challenge as her only chance of remaining on the island. The reward challenge required the castaways to answer questions in a game show format about island living. Sean won. The prize was a night on a luxury yacht where he could take a shower, get a massage, eat a nice meal with a surprise guest (his father), and sleep in a bed. Sean was permitted to invite one other player to join him on the yacht for breakfast and he invited Richard. In response to questioning, Sean explained that he thought that with the in fighting between Sue and Kelly, by inviting Richard he might provide the final necessary wedge capable of dividing the Tagi alliance.

The immunity challenge involved balancing on a plank above the water for hours. The last one standing, Kelly, won immunity. Prior to this cycle, the alliance members had become concerned that Kelly was behaving in a manner that was inconsistent with the interests of the alliance. While the alliance lacked any formal confirmation that Kelly had broken ranks in voting, at a minimum it appeared that Kelly was befriendng former Pagong members to curry favor with future jurors. In fact, in this cycle, the alliance members confirmed that Kelly had chosen to vote inconsistently with the alliance. While three committed alliance members, Richard, Sue, and Rudy, plus Sean, voted Colleen off the island, the alliance members were able to identify Kelly and Colleen as the two Rattana members who voted for Sean.

1. Cycle 12: Days 33-36

With all of the former Pagong tribe members eliminated, only the original alliance members (Richard, Rudy, Sue, and Kelly) and Sean remained. As a result of Kelly's known defection from the alliance, the relationship between Sue and Kelly substantially deteriorated. Sue approached Richard trying to form a suballiance with him. At the same time, Richard and Rudy reaffirmed their commitment to their own suballiance. Sue informed Kelly that she intended to do everything in her power to eliminate her because she had double-crossed the alliance. Kelly tried to convince Richard that she had always been true to the alliance and that by befriendng the Pagong women, she was suggesting the absence of an alliance. Sean was convinced that unless he won immunity he would be voted off since he was the last strong, young male tribe member and therefore posed a threat to win future immunity challenges.

The reward challenge was a mud collection contest. The survivors used their bodies to move as much mud from a pit as possible into a can. Kelly won and received a trip to a bar with the host of the show where she got to drink, eat, and watch a tape of the first survivor episode. Kelly also won the immunity challenge, which required the survivors to run through the jungle and find carved masks containing trivia questions about island superstitions. At each carved mask, the player had to read the question and state the correct answer into a video camera. Kelly was the first to successfully answer all the questions. The four alliance members voted off Sean. At this point, Kelly appeared to have rejoined the alliance, although even without her, the committed alliance members would have had the necessary three votes with which to eliminate Sean.

2. Cycle 13 (Days 36-39): And then there were four.

In the final three days, only the members of the original Tagi alliance remained. In this cycle, there were daily immunity challenges and daily Tribal Councils. The first immunity challenge was a trivia contest in which

the final four were asked questions about the eliminated tribe members. Kelly won. At Tribal Council, there were two votes for Richard (from Sue and Kelly) and two votes for Sue (from Richard and Rudy). Since no Tribal Council can end in a tie, there had to be another vote. At this point, Kelly switched her vote to Sue, resulting in Sue's elimination.

In the next immunity challenge, the following day, the players were required to slather themselves in mud and walk across hot coals. After doing so, they had to stand balanced upon posts in the hot sun with their hand upon the immunity idol. After a while, the host required the members to continue holding onto the idol, but to move every half hour from post to post. The last person to remove his or her hand from the idol won. After a short time, Richard voluntarily removed his hand, stating that he was unlikely to outlast Rudy and Kelly.³⁷

After four hours and eleven minutes, Rudy accidentally removed his hand when changing positions. Kelly thus won her fifth straight challenge, and with it she won the right to eliminate either Rudy or Richard. As explained above, in this round only Kelly was asked to vote. In effect, Kelly had to select whom she thought she would have the best possibility of defeating in the final Tribal Council. Kelly voted to eliminate Rudy.

The final Tribal Council took place the following evening, after Kelly, with Richard's help, burned down the camp. At the final Tribal Council, the seven most recent ex-survivors (in the reverse order of their removal) -- Rudy, Sue, Sean, Colleen, Gervase, Jenna, and Greg -- returned to the island to determine the outcome. Richard and Kelly were allowed to make opening statements to the jury. Kelly stressed that the jurors should select the best person to win. Richard argued that he came to the island to play the game with a successful strategy and that he had done so. He further stated that he had no regrets or apologies for the manner in which he played the game. He asked the jurors to base their votes upon who best played the game.

Jenna and Colleen were virtually certain to vote for their friend Kelly rather than Richard, whom they had unsuccessfully tried to evict earlier in the game. Rudy and Sue were equally certain to vote for Richard based upon the alliance and Kelly's disloyalty to it. Kelly likely anticipated that Gervase would vote for her since he was part of the previously unsuccessful Pagong alliance seeking to eliminate Richard. Greg and Sean would prove decisive.

After the opening remarks, each juror asked a question or made a statement. Jenna asked Kelly and Richard who they would select if asked to choose two other survivors to stand in their place. Richard selected Greg and Rudy (both on the jury). The selection of Rudy was obvious; the selection of Greg might have been strategic. While Richard's stated explanation (that during a conversation with him, Greg appeared impressive) seemed weak, Richard might have surmised that Greg would be the critical vote determining the outcome. In a substantially less strategic response, Kelly selected Gretchen and Sonja (neither of whom were on the jury), stating that she did so because of the strength that they exhibited in the game.

Greg asked Richard and Kelly to select a number between one and ten. Richard selected seven and Kelly selected three.³⁸ The most notable final statement came from Sue who thrust accusations at both

³⁷As we will argue, *infra* at 33, Richard's decision to withdraw from this challenge was likely a carefully executed strategy.

³⁸Selecting three appears flawed. After Richard selected seven, the number that would have maximized her chance of being closest to Greg's chosen number would have been six. It is possible that she was aware of this but sought to avoid appearing overly strategic. Alternatively, she might have simply made a mistake. Ultimately, it would

survivors accusing Richard of being a snake and Kelly of being a rat and who concluded by stating that as in nature, the snake should eat the rat.

After the questions and statements, Richard and Kelly got to make closing statements to the jury about why they should win. The jurors then cast their votes one-by-one. The final vote was four to three in favor of Richard. The former Tagi tribe members, Rudy, Sue, and Sean, and the former Pagong member, Greg, all successfully voted for Richard. Former Pagong members Gervase, Colleen, and Jenna, voted for Kelly.

II. A Brief Review of Some Related Games

As we will demonstrate in Part III, the constitutional *Survivor* rules described in part I.A. encouraged certain rational strategies that can be modeled using fairly basic rational choice and game theoretical tools. In this part, we will sketch out three sets of rational choice principles, including one theorem and two formal games. Together, in the next part, these insights will help us to compare the actual manner in which the *Survivor* game was played against rational choice predictions. The relevant principles are: (1) minimum winning coalitions, a theorem that allows us to predict the size of stable coalitions; (2) empty core bargaining, a game that allows us to predict when stable coalitions are unlikely to arise; and (3) the iterated and noniterated prisoners' dilemma, a game that allows us to predict when players are prone to cooperate or defect. Together, these principles provide an essential framework for predicting rational play under the established rules of *Survivor*. We can then compare those predictions with the actual play in *Survivor* to test the empirical validity of our assertion that the predictability of rational choice models is positively and significantly correlated with stakes.

A. The Theory of Minimum Winning Coalitions

While the theory of minimum winning coalitions is not generally understood as a formal game, it is a basic insight of rational choice theory that has profound implications for any number of constructed games. In the discussion to follow, we will combine this theory with another rational choice concept known as the Schelling Point.³⁹ Together, these two insights allow us to compare the voting strategies in *Survivor* against rational choice predictions.

William H. Riker formalized the theory of minimum winning coalitions as follows: "In *n* person, zero-sum games, where side-payments are permitted, where players are rational, and where they have perfect information, only minimum winning coalitions will occur."⁴⁰ We will now express the theorem less formally, and with an admitted, albeit temporary, loss of precision: When players anticipate that forming a coalition will empower them to make a decision or series of decisions resulting in a net benefit to the coalition members, the most stable coalition will be a simple majority. In addition to the stylized assumption of perfect information, two details are now necessary to restore the integrity of the original formulation. First, the theorem requires that the

not have mattered if we assume that Greg was truthful in claiming to have selected the number ten.

³⁹See THOMAS C. SCHELLING, *THE STRATEGY OF CONFLICT* (1960).

⁴⁰WILLIAM H. RIKER, *THE THEORY OF POLITICAL COALITIONS* 32 (1962).

decisions be fully allocative, and thus that they occur within an game in which the payoffs are zero sum. In other words, the coalition is not understood to be creating any public goods, which would therefore enlarge the pie by adding to societal wealth.⁴¹ In addition, the theorem assumes that the members of the coalition can issue side payments that will flatten out “lumpy” distributions that have the effect of benefitting some coalition members over others.

The theorem’s essential logic is highly intuitive. Under the specified conditions, the most stable coalitions will be simple majorities because subgroups within any larger coalition can benefit by ridding themselves of excess membership and by reconstituting as a simple majority. As stated above, the requirement that side payments are permitted means that the benefits of all allocative decisions accrue equally to all coalition members, thus removing any incentive for defection. Any supermajority coalition is inherently unstable because a subset consisting of a simple majority can assure each of its members a greater per capita payoff. But once a simple majority coalition forms, no superior coalition is capable of increasing the payoffs to the coalition members.

This is most easily illustrated in the context of a parliamentary legislature seeking to form a governing coalition. To remain consistent with the theory’s premises, we will assume first that all relevant legislation is redistributive, meaning that it consists of private rather than public goods, and second that coalition members fully flatten uneven distributions through side payments. Now assume that we have a sixty member parliament with three equal-size parties, each with twenty members. Any two of the parties can form an initial super-majority coalition of forty members, which would then be a governing coalition. Assume that two parties, A and B, form a governing coalition, thus excluding party C. Now consider whether the resulting coalition represents a stable equilibrium. The theory of minimum winning coalitions suggests that it is not. To illustrate, imagine that the members of party C approach a subset of either party A or party B with the following proposal: If a subset of just 11 members of A defects and forms A prime, then a new coalition (A prime, C) can form which will then afford each of its coalition members a higher per capita payout than that which the members of A prime would have received as members of the original (A,B) coalition.

The minimum winning coalition might not form in one iteration, but the logic of the theorem is unaffected by whether the ultimate stable coalition is the product of one iteration or of several. Regardless of the number of iterations following the initial (A,B) coalition, the intuition remains that once the coalition achieves minimum winning size, that result represents a stable equilibrium. If we continue to assume that all governing coalition members receive an equal per capita payout, the (A prime, C) coalition is stable because none of the members of party B or of the former excluded members of party A can bribe a subset of that coalition with a higher payout. The minimum winning, or simple majority, coalition affords each member the maximum payout under these specified conditions, and thus represents a stable equilibrium outcome to the game.⁴²

⁴¹For the classic definition of public goods, see Paul Samuelson, *The Pure Theory of Public Expenditure*, 36 REV. ECON. & STAT. 387 (1954). Public goods are defined as goods that are neither diminished by consumption (meaning that the marginal cost of additional consumption is zero) nor capable of being withheld from those who fail to contribute to the cost of their production. See also Maxwell L. Stearns, *The Public Choice Case Against the Item Veto*, 49 WASH. & LEE L. REV. 385, 403 (1992) (contrasting public goods and private bads and collecting authorities).

⁴²This basic model should not be read to suggest that actual legislative coalitions invariably approach minimum winning size. Instead, the model is helpful in explaining features of modern democratic forms of governance that make it more difficult for minimum winning coalitions to form. See generally Stearns, *supra* note 41, at 408-09. It is also

Before explaining the next game, it is worth considering the relationship between the theory of minimum winning coalitions and a concept referred to as the Schelling Point.⁴³ The Schelling Point is a logical stopping place that individuals would mutually identify in the absence of an ability to communicate and to reach an express agreement. For example, if a couple had planned ten years earlier to meet at a particular location in New York City with a commitment not to communicate in the interim,⁴⁴ but upon arrival they discovered that the location had been destroyed, one can identify a couple of likely alternative locations where the couple would instead meet.⁴⁵ One obvious possibility is the top of the Empire State Building, because it is a singularly famous location, or of the World Trade Center, because it is the highest point in the city.

The Schelling Point is significant here because at least some players in *Survivor* who shared common goals with others for even limited periods might have had compelling reasons not to join them in a coalition. In the absence of formal agreement, we might intuit that they would pick up on certain clues that would reveal potential Schelling Points. In a plurality voting regime, a minimum winning coalition could be either a majority or a plurality that succeeded in selecting a nonmember, whether or not a formal coalition, thus preventing themselves from being the victim of a larger number of negative votes.⁴⁶

In the next subpart we consider an alternative model that is also relevant to the *Survivor* game in which the repeated process of breaking down existing coalitions in favor of alternative coalitions fails to produce a stable equilibrium outcome. Instead, the effect is to generate a kind of instability in which for any given coalition, an alternative coalition exists that can improve the plight of an alternative majority of the players.

A. The Empty Core Bargaining Game

One of the defining characteristics of the theory of minimum winning coalitions is the fluidity of membership within a given group or party. In the three-party illustration, for example, we are able to posit a play or set of plays generating a stable simple majority equilibrium. This assumes that party membership is sufficiently fluid to allow new parties of different sizes to form and to join proposed alternative governing

important to note that this model has a greater direct application in the context of a parliamentary system, in which a majority coalition selects the head of state than in the context of a direct presidential election system, in which the head of state is selected independently of the governing legislative coalition. See generally MAXWELL L. STEARNS, CONSTITUTIONAL PROCESS: A SOCIAL CHOICE ANALYSIS OF SUPREME COURT DECISION MAKING 133-35 and accompanying notes (U. Md. Press 2000) (comparing logic of minimum winning coalition theory in parliamentary and direct presidential election systems); STEARNS, *supra* note 11, at 126-29.

⁴³See SCHELLING, *supra* note 39.

⁴⁴The Hollywood rendition of the Schelling Point is *Same Time Next Year*.

⁴⁵For purposes of exposition, assume that for whatever reason the couple cannot meet at the physical location of the original site.

⁴⁶One might respond that this example defies the logic of minimum winning coalitions because it involves the production of a public good. While the coalition members insulated themselves from being voted off the island, they also insulated all nonmembers of the coalition including the member who revealed the Schelling Point, with the exception of their common victim, at least temporarily. On the other hand, if one takes a longer view, it is apparent that for the coalition members, each successful Schelling Point target increased their solidarity, thus generating a private good of equal value to their members, as they would then sequentially target all noncoalition members.

coalitions. But does the assumption of membership fluidity universally hold? And if not, what happens when that assumption is relaxed? For present purposes, this assumption might fail for either of two reasons. First, it might fail in the event that the sanctions for defection are sufficiently high to act as a deterrent to defection or in the event that the group is otherwise sufficiently cohesive that the entire group must be treated as a single unit. In the *Survivor* context, the fluidity assumption only holds if the units forming a superior coalition can be further subdivided. While parties can be further subdivided, individuals cannot be.⁴⁷ In either case, defection might have different implications and generate different outcomes than in a game in which we assume constant group fluidity and in which members can act upon the incentives to break down and reform existing units or parties to allow all members of the newly formed entity to increase their per capita payoffs.

To illustrate, consider a simple bargaining game that involves three persons, ABC, who are going to determine how to allocate an unanticipated capital gain.⁴⁸ Assume, for example, that we have a three-member parliament and that the majority coalition is going to divide any gains from its distributive program in a manner determined by the members of the governing coalition. Critically, the agreed upon division need not be an equal payoff to all coalition members.⁴⁹ Assume that the gains are worth \$100. In this game, imagine that A and B again form an initial coalition, and that they plan to split the gains evenly, such that each will take \$50. In this play, the total payoffs for ABC are (50,50,0). Now assume that C, the excluded player approaches A and offers the following bribe. If A will defect from the coalition with B, and instead join C, C will allocate the gains as follows (75,0,25). If we assume that A cannot be punished for defection, then it is rational for A to join this superior coalition, which offers each coalition member \$25 more than under the prior, inferior coalition. Now assume that B, the excluded member, approaches C and offers another bribe. If C will join B, the new coalition will divide the payoffs as follows (0,50,50). This time, B receives an additional \$50 relative to the prior inferior coalition, and C receives an additional \$25. Finally, assume that A approaches B and offers B a higher payoff if B defects and rejoins the initial (A,B) coalition, with the following payoffs (25,75,0). This time both A and B receive a \$25 higher payout than under the inferior (B,C) coalition. We have now come full circle, with coalition (A,B) followed by (C,A) followed by (B,C) followed by (A,B). But coalition (A,B) is no more stable than it was as the starting point.

One might imagine that a supermajority coalition (A,B,C) in which each member receives an equal payoff, represents a stable outcome.⁵⁰ In fact, it does not. A can approach B and offer to provide each a

⁴⁷If a minimum winning coalition is comprised of individuals rather than parties or groups, new coalitions can only form if an individual necessary to the formation of that coalition defects. In the case of a coalition of three persons, which is of minimum winning size, for example two out of three, the result is stable. Thus, a two-person coalition in a three-person game likely represents a stable outcome. In contrast, a two-party coalition in a three-party game might not be stable if one of the parties can be subdivided to form an alternative superior coalition.

⁴⁸The same logic would apply if the players were trying to allocate the burdens of a capital loss. See Maxwell L. Stearns, *The Misguided Renaissance of Social Choice*, 103 YALE L.J. 1219 (1994) (illustrating empty core bargaining games with unanticipated capital gain and unanticipated capital loss).

⁴⁹This assumption varies from that in the minimum winning coalition game in which we assumed equal per capita payouts to all coalition members.

⁵⁰See Daniel A. Farber & Philip P. Frickey, *Legislative Intent and Public Choice*, 74 VA. L. REV. 423, 433 n.42 (1988) (explaining that “one common problem in designing voting experiments is the risk that participants will vote for ‘fair’ rather than individually rational outcomes”). While these authors describe equal division as an inherently fair

superior payoff by an amount of \$16.66 if the two defect and form coalition (A,B), with payoffs of (50,50,0). At this point, we are simply back to our initial unstable starting point under the two person coalition game. The difficulty is that we have constructed a game that has an empty core.

We are now ready to provide a formal definition of the concept we have just illustrated. An empty core arises when for any starting coalition, there exists a superior coalition that consists of the initially excluded party plus a defector from the starting coalition and that will improve the payoffs to the superior coalition members.⁵¹ Because the same holds for any potential superior coalition, which then becomes the new starting coalition for defection in the next round, no coalition is stable. In a game in which the minimum winning coalition is comprised of individuals, and in which the continuous play between and among three persons yields a potentially superior coalition for any starting coalition, there is no possibility of forming a stable minimum winning coalition that will block all other potentially superior coalitions. It was only because party membership is potentially fluid and because the side payments ensured equal payoffs for all coalition members that the minimum winning coalition game generated a stable equilibrium.

In the next and final game, we consider the conditions under which individual players might be able to bond themselves to avoid the kind of defection that gives rise to an empty core bargaining game. In this circumstance it is at least conceivable that multiple players can behave as a single unit and thus avoid detrimental mutual defection.

B. The Prisoners' Dilemma

The classic prisoners' dilemma is presented with criminal sanctions that result from their decisions to provide testimony against the other prisoner or to remain silent.⁵² The factual context of the classic prisoners' makes unlimited repeat play appear strained. In the discussion that follows, therefore, we will use a legislative context in which repeat play becomes more intuitive.

Assume a single period in which two legislators are elected on a platform of fiscal restraint, and specifically on a plan to discontinue special interest legislation benefitting narrow constituencies, including those in their own districts. Further assume that during their first terms in office, each of the two legislators is subject to lobbying for a special interest program, which if passed will further her support among the benefitting constituency, thus increasing her re-election prospects. While the program contradicts her general platform of fiscal constraint, assume that the program can be packaged in an obfuscatory manner that will allow appeasement of an important special interest, while allowing a re-election campaign focused on reducing special

outcome that represents a natural equilibrium, the empirical question remains whether in a game with sufficiently high stakes, this outcome actually does represent a stable equilibrium. We would posit that the evidence from *Survivor*, while not conclusive on this narrow question, fails to bolster the intuition that equal division should be assumed to be an equilibrium point in high stakes empty core games.

⁵¹See John S. Wiley Jr., *Antitrust and Core Theory*, 54 U. CHI. L. REV. 556, 557 (1987) (defining empty core).

⁵²For a general discussion of the prisoners' dilemma phenomenon, including single period and unlimited iterations with or without unraveling, see STEARNS, *supra* note 11, at 541-43; see also Erin O'Hara, *Social Constraint or Implicit Collusion? Toward a Game Theoretical Analysis of Stare Decisis*, 24 SETON HALL L. REV. 736 (1993) (applying prisoners' dilemma analysis to stare decisis); Linda Cohen & Matthew Spitzer, *Term Limits*, 80 GEO. L.J. 477 (1992) (applying prisoners' dilemma analysis to term limits).

interest legislation in general. If both legislators cooperate, meaning that they honor their commitments to limit special interest programs, they receive 10 utils. This reflects the general reduction in wasteful spending, which benefits them slightly given that their own constituents pay only a fraction of the cost of such wasteful spending, less the loss of utility associated with the failure to procure a special interest project benefitting an important but narrow constituency.

Assume that each of the two legislators would benefit most if she received her own special interest legislation, while the other legislator honored his agreement not to procure special interest legislation for his district. In this case, assume that the defecting member (the one who procures the special interest legislation) receives 12 utils, while the one who cooperates (denying his constituents the special interest legislation) receives only 5 utils. The payoffs reflect the fact that the defecting member can continue to campaign as a fiscal conservative with the knowledge that the narrow constituency benefitting from the special interest item will offer greater support for reelection. On the other hand, while the cooperating legislator can continue to campaign as a fiscal conservative, his constituents have had to fund the project of the defecting congressman and thus may realize that they have been duped by an ineffective representative. Finally, assume that if both members defect, their payoffs are each 7 utils. This reflects the narrow special interest benefit to their constituents less the reduction in credibility as a fiscal conservative in the district as a whole, given her support for the proliferation of special interest projects across the relevant districts. Table 1 depicts the payoffs.

(Legislator 1, Legislator 2)	Legislator 1 cooperates	Legislator 1 defects
Legislator 2 cooperates	10, 10	12, 5
Legislator 2 defects	5, 12	7, 7

Table 1: Special Interest Legislation Prisoners' Dilemma in a Single Period

The precise numbers are less important than are the relationships between and among those numbers. The relationships are reciprocal, thus providing both legislators with the same incentives. In this example, both legislators have an incentive to defect even though the aggregate payoff from mutual defection is the lowest of the four boxes. If Legislator 2 cooperates, Legislator 1 can increase his payoffs from 10 to 12 by defecting. And if Legislator 2 defects, Legislator 1 can increase her payout from 5 to 7 utils by defecting. The same incentives confront Legislator 2, without regard to the actions of Legislator 1.

Now assume that while the special interest legislation is opaque for constituents, it is transparent to the other legislator,⁵³ and that both Legislators 1 and 2 anticipate endless future interactions. Further assume that each anticipates that in the event of defection, the other legislator will impose some future punishment. The punishment can take any number of forms, including failing to support other legislative proposals of interest to the defecting legislator, failure to support the defector's move to a key committee post, or even publicizing the true special interest nature of bills benefitting the defector that would otherwise be successfully masked as in

⁵³Another way to express this is that while constituents in a benefitting district might presume that the legislative procurement is generally for the good, nonconstituents might instead presume that such projects generally benefit special interests.

the general interest, and thus compromising his support among those constituents who did not benefit from the defection. In this example, assume that mutual cooperation yields each legislator 15 utils, reflecting the benefits of maintaining a fruitful relationship with a powerful long term colleague, the fact that the failure to procure the special interest legislation will not be viewed as the product of ineffective representation given that special interest legislation has been reduced overall, but minus the potential added support of the group that would have benefitted from defection. Assume that defection by one legislator results in a payoff of 10 for the nondefector and a payoff of 7 for the defector. While the defector receives the one time benefit of procuring a special interest perk, in the next period he anticipates one or more of the specified punishments, thus risking his re-election prospects with the constituents who did not benefit, plus a lack of support from an important colleague on future legislative initiatives. Conversely, the nondefector anticipates the benefits of punishing the defector in the future period minus the loss associated with having prevented his colleague from procuring a special interest benefit. Finally, assume that mutual defection yields both legislators 5 utils, as each must fund two special interest projects and anticipate a loss of mutual trust and support. Table 2 depicts the payoffs and incentives under this iterated legislative matrix.

(Legislator 1, Legislator 2)	Legislator 1 cooperates	Legislator 1 defects
Legislator 2 cooperates	15, 15	10, 7
Legislator 2 defects	7, 10	5, 5

Table 2: Iterated Legislative Matrix

In this game, the payouts are again reciprocal. But as a result of the changed payoffs associated with unlimited repeat play and the threat of future punishment for defection, the dominant strategy is mutual cooperation. Assume that Legislator 2 cooperates. In that case, Legislator 1 receives 15 utils by cooperating, but only 10 from defecting. The particular benefit associated with the single period special interest item for a narrow constituency is overwhelmed by the anticipated negative value of being punished by Legislator 2 in a future period. Now assume that Legislator 2 defects. In this case, Legislator 1 benefits receives 7 utils by cooperating, but only 5 by defecting. While she again forfeits the one-time special interest projects, she also anticipates that she will be able to punish Legislator 2 in a future period, thus limiting her colleague's future defections. Legislator 1 further anticipates that if she defects, Legislator 2 will not cooperate with her in future periods. Because the payoffs are reciprocal, the dominant strategy with endless anticipated iterations is mutual cooperation.

One of the difficulties with the iterated prisoners' dilemma is the ambition of its underlying assumptions. If instead of endless anticipated iterations, we anticipate a known end period, for example under a term limited regime, then the payoffs for the players fall subject to the phenomenon of "unraveling." By unraveling, the payoffs revert to those in the single period prisoner's dilemma, in which mutual defection is the dominant strategy. To illustrate, assume that the legislators are subject to a game involving 6 known voting periods. They are certain that period six will be the final period. While one might assume that first period payoffs would remain those in the iterated matrix, in fact under specified assumptions, even in that period the payoffs revert

to those of the single period prisoners' dilemma.

To illustrate, recall that the players are aware that in period 6, there is no subsequent period in which to mete out punishment in the event of a defection by the other player. As a result, in the final period, each player conceives the payoffs as those in the single period prisoners' dilemma. Under those payoffs, reflected in Table 1, mutual defection is the dominant strategy. Now consider the second to final period, period 5. The players are now aware that the sixth period game will be played as a single period prisoners' dilemma. Because mutual defection is the dominant strategy in period 6, there is no prospect of rewarding cooperative behavior in period 5 during the play in period 6. As a result, like period 6, period 5 reverts to the payoffs associated with the single period prisoners' dilemma. The same logic holds in periods 4, 3, 2, and all the way down to the initial period. With a known end period, the legislators treat the game as though they were already in the end period, regardless of which period they are in. As a result, if there is a known end period, the higher payoffs associated with endless iterations unravel and the payoffs become those in a true prisoners' dilemma for each period.

While the iterated prisoners' dilemma breaks down in the case of a known end period, we do not universally witness mutual defection. One question is whether there are other methods of achieving a kind of bonding that is independent of the threat of future punishment following a period of defection. The most obvious method of ensuring cooperation is to select players who we anticipate will share values that correlate with the appearance of cooperative behavior, and thus who have an incentive to behave as if they are cooperating that is independent of formal payoffs. It is important to note that this insight is by no means inconsistent with rational choice. Conservative constituents might fear defection as a result of unraveling. They might therefore select as their representative a person who shares their preferences for fiscal constraint, and who will therefore play as if subject to the threat of punishment, albeit for independent reasons. This makes empirical testability difficult for much the same reason that low stakes make it difficult to determine if the players are avoiding rational play or preferring to exhibit cooperative behavior because they value the benefits of doing so more highly than they value the formal payoffs under laboratory conditions.

Before applying these insights, we should also note that it is also possible that in some complex games, one group of participants might view those features that are consistent with a positive sum payoffs as dominant, while others might view those features that are consistent with zero sum payoffs as dominant. Should this occur, the resulting outcome might not be mutual defection or mutual cooperation, but instead partial defection and partial cooperation. With these insights we are now ready to apply these rational choice principles to the actual *Survivor* game.

III. Applying the Models to *Survivor*

To support our claim that the actual *Survivor* game was played in a manner consistent with the predictions of rational choice, it is necessary to establish two important, and related, propositions. First we must establish that the specific games described in Part II are in some significant sense parallel to salient aspects of the *Survivor* game and specifically to its constitutional and spontaneously ordered rules. Second, we must establish that those features of the actual game that do not obviously match up to the underlying assumptions of the game theoretical models can nonetheless be understood, and thus expressed, in a manner that is consistent with those models, and that therefore does not undermine the integrity of those models.

In virtually every application of a formal model, a considerable amount of translation is inevitable. Simply put, we do not live in a world that assumes away the myriad complexities of daily living, and truthfully, and perhaps ironically, any truly rational person must find that a source of comfort rather than concern. Translation is invariably difficult, however, because models necessarily abstract away the very complexities that make real life situations, especially complicated ones, rich and enticing. And yet, without such translation, the models remain stale proofs of propositions whose relevance remains untested. To make such a translation relevant and meaningful, therefore, it is important that we carefully delimit our argument.

While the *Survivor* rules set by CBS seem relatively straightforward, they tended to send mixed signals regarding the payoffs for cooperative behavior. In addition, the actual game unfolded in a manner that was the product of the subtle and sometimes complex interactions of 16 people, with strikingly different personalities, operating under harsh and strenuous conditions. During the course of their interactions, which ranged from three to thirty-nine days, the tribe members developed sometimes genuine, sometimes feigned, friendships, animosities, and alliances. The conditions under which these individuals voluntarily placed themselves rendered them prone to a wide range of intense and conflicting emotions. And we have no doubt that these emotions considerably affected the manner in which many, perhaps even most, of the players developed their own strategies, responded to the actual or perceived strategies of others, and ultimately cast their ballots concerning who should be evicted from the island.

Among those who are critical of rational choice, it might appear inconsistent to maintain that while agree to, and indeed embrace, all of this, we further maintain that the actual game was played in a manner that is largely consistent with the predictions of rational choice. This seeming incongruity dissipates, however, once we express the limits of our underlying claim. We do not claim that rational choice alone predicts the manner in which the *Survivor* game was played. Instead, we maintain that the simplifying assumption of rationality has allowed theorists to develop models, which we can now apply to provide more robust explanations concerning the nature of the actual game than those that we could develop using any alternative set of simplifying assumptions. So viewed, the complexity of emotions, friendships, and hatreds might even strengthen our intuition about the inherent value of rational choice. While a complex array of emotions undoubtedly affected the decisions and strategies of even the vast majority of players, such mixed strategies might well have had a mutual canceling effect. Thus, to the extent that emotion, rather than strategy, predominated for even a majority of players, rational choice helps to identify why a minority of players, those who instead focused on how their strategic interactions promoted their likelihood of success, ultimately had the greatest prospect of winning the game.

Before proceeding, it is important to add one further qualification. Rational choice cannot be used to model who would ultimately win the game. Instead, rational choice helps to model those strategies that allowed a small minority of players to best position themselves to win the game. If the optimal strategy generated a 50%, or even a more modest 25%, likelihood of winning, that strategy was one of tremendous value to those who employed it. And if we extend this insight to the legislative context for example, in which participants do not play for a unique prize at the end of a single game, but rather for multiple packages of legislative benefits over numerous repeat plays, then the value of such a statistical likelihood for success proves even greater. With these insights, we are now ready to consider the law and economics of *Survivor*.

A. The Basic Story

The essential story combines elements from each of the three sets of rational choice principles described in Part II. In this subpart, we will provide a rough sketch of that story, and then in the subparts to follow, we will consider each piece of the puzzle in greater detail.

The survivor game began with sixteen players, divided into two tribes, each with eight members. At the end of three-day intervals, the tribe that lost the immunity challenge was forced to vote a member off in a secret ballot. Among the factors that might have weighed in the decision concerning who to evict are the value provided to the tribe, the contribution to the inter-tribe competitions for rewards and immunity, and innumerable personal characteristics.⁵⁴ After the combined memberships of the two tribes was reduced to ten members, the tribes then merged and the reward and immunity challenges benefitted only individual members.

The theory of minimum winning coalitions predicts that under specified conditions, a subgroup within one or both tribes would try to form in an effort to prolong the prospects for survival of their individual members. While the ultimate prize would benefit only one player, other benefits, including future endorsements or other media opportunities, provided an incentive to remain in the game as long as possible. And of course only by remaining in the game until close to the end can one have a prospect of ultimate victory. The question then becomes what is the size of the optimal coalition. In the very first cycle, it appears that a minimum winning coalition would be five. This would allow a simple majority within a group of eight, although it would not represent a simple majority of the merged tribe of ten. Nevertheless, five would be sufficient to prevent any single member from receiving more votes than a member outside the coalition. While the five member coalition might appear optimal, the ultimate four member coalition that emerged as the Tagi alliance might prove more rational. First, following the prior logic, within Tagi itself, the four member coalition was sufficient to prevent any member from receiving more votes than a non-coalition member. In addition, a supermajority coalition within a group of eight might have required an excessive and early degree of coordination that risked disclosure. With only three nonmembers, maintaining complete secrecy among an alliance of five might have appeared unlikely. Finally, as shown in the next subpart, if the four member coalition remained both stable and secret, this might well have proved sufficient to block the removal of any coalition member for the first two votes, until Rattana was down to eight members.⁵⁵ This is especially true if the coalition members had reason to believe that they could predict the vote of any other single tribe member, which would then serve as a sort of Schelling Point.

One difficulty with this simple explanation for the success of the Tagi alliance is the possible defection by one or more members in favor of a superior coalition.⁵⁶ Kelly's consideration of an alliance with Colleen and Jenna, and her temporary defection from the coalition when Richard identified those two tribe members

⁵⁴We are not arguing that the tribe members are rewarding past contributions, but rather that they are assuming that past contributions might signal future value.

⁵⁵As stated previously, while Richard began forming his alliance immediately, he did not succeed in finalizing the Tagi alliance until Cycle 5. The question addressed in the text is why Richard entered the game intending to form a 4 member alliance.

⁵⁶It is important to note that there are several potential layers of defection, ranging from voting inconsistently with the chosen target of an alliance that one has joined, voting against a member of an alliance that one has joined, or forming an alternative alliance to that which one has joined. In the discussion that precedes this note, we are referring to the first form of defection. Other uses of defection should be clear from context.

for eviction, to move in the direction of an empty core game in which the Tagi alliance proved unstable. In spite of Kelly's defection, however, the Tagi alliance remained sufficiently stable to generate a high probability that the members (assuming that Kelly was not caught and punished) would emerge the final four. One of the necessary features of an empty core bargaining game is constant participation by all players. It is the possibility of continuous defections from present and inferior coalitions to new and superior coalitions that renders any given result unstable. But in the *Survivor* game, this condition was not met. Instead, the membership was steadily shrinking by one member every cycle. As a result, the targets among those not in the Tagi alliance had to constantly and immediately reformulate if they were to have sufficient votes to target the Tagi alliance members in succession. This would have required a level of immediate coordination in the very first round of voting within Tagi, or within the first two rounds of voting within Rattana. From the perspective of the Tagi members, it probably appeared reasonable to assume that such immediate and opposite coordination was unlikely to occur.

The most difficult aspect of the *Survivor* game, perhaps, involved the interactions among the Tagi alliance members themselves. The difficulty arose at two levels. First, assuming that the Tagi alliance remained stable, then among the four members there was a credible risk of an empty core game concerning who would be selected as the final two members. The intervening immunity competitions complicated this calculation by preventing the members from targeting one member, who would not be known in advance. This might have had some inhibiting effect on forming and reforming subcoalitions.

More importantly for present purposes, a subgroup of members might have chosen to defect by targeting one of their members before the final round if they perceived that member as having a greater prospect of ultimate survival. So viewed, the coalition members were in a prisoners' dilemma in which the optimal aggregate payoff was mutual cooperation, the optimal payoff for any single member was his or her own defection coupled with cooperation by all others, and the worst result was mutual defection, which would thwart all benefits of forming a coalition. Of course, the coalition members were subject to thirteen repeat voting iterations, and thus the threat of punishment for actual or even the perceived threat of defection loomed large. A review of Appendix A reveals sufficient division among the nonalliance members that even a subcoalition of three could potentially succeed in punishing a known defector with eviction. In a game with unlimited plays, we could appreciate the threat of punishment to alter the payoffs such that regardless of what the others did, the maximizing strategy is cooperation. In that case, the coalition would remain intact. But we also know that there was a known end period, thus introducing the phenomenon of unraveling. This, of course, restores the payoffs to the original prisoners' dilemma. How then did the coalition remain stable? It is here that Richard strategy appears most careful.

The best solution to the problem of defection in a prisoners' dilemma context to select a player who has independent character traits that encourage cooperative behavior in spite of nominal prisoners' dilemma payoffs. While it might have appeared peculiar to the average television viewer that the outwardly gay player, Richard, joined forces with the equally outwardly homophobic, Rudy, from a rational choice perspective, there was likely no other choice for Richard within the Tagi tribe. Rudy, a 72-year old former Navy SEAL, possessed virtually all characteristics needed to signal no threat of defection. And thus, together, Richard and Rudy themselves signaled to Sue and Kelly, that they had the necessary cohesion to punish any revealed sub defection within the alliance of four. While Kelly's own behavior reveals the limits of even a credible threat of punishment, the constant implicit threat that together Richard and Rudy would punish defection was an

entirely rational basis for forming the alliance from an *ex ante* perspective. In the subparts that remain, we will put flesh on the bones of this basic rational choice.

B. A More Detailed Application

We will now consider the implications for each of the models for the actual manner in which the *Survivor* game was played. This section will be divided into three parts, based upon the rational choice principles set out in Part II.

1. When Size is Important: Optimal Coalition Formation Within the *Survivor* Tribes

We begin with the premise that the players anticipated that they had much to gain by staying in the game as long as possible. The *Survivor* rules prohibited any redistribution of the cash prizes through side payments or otherwise. And all players lacked perfect information about what the others were planning to do. Nonetheless, we can roughly equate the benefits of long term survival with a payoff benefitting only successful alliance members. Only those persons had a chance at winning the large cash prizes. And only those who stayed in the game the longest likely perceived themselves as receiving whatever benefits long term media exposure might provide. So viewed, *Survivor* closely resembled a zero sum game in which the essential logic of a minimum winning coalition strategy applies.

As Richard made plain in the quotation with which we open this essay, he began the *Survivor* game intending to form a four person alliance. While the incentive to form an alliance is now familiar, the decision to form one with four members appears curious. The Riker Theorem predicts the most stable coalition to be a simple majority. For four of the thirteen *Survivor* cycles – cycle 1 (within Tagi) and cycles 7 through 9 (within Rattana) -- a four member coalition was not of minimum winning size.⁵⁷ In cycles 1, 7, 8, and 9, the four member coalition could not guarantee removing a nonmember. If at least four nonmembers created an alternative coalition, then at best the Tagi alliance could guarantee an impasse. And in cycles 7 and 8, if an alternative coalition of five joined forces, that coalition could remove members of the Tagi alliance from the island.

The question then arises why Richard pursued a four member alliance. While the members of the Tagi alliance were theoretically at risk in the event that an alternative coalition of minimum winning size formed in any of these cycles, Richard had to weigh that risk against the risks of disclosure and breakdown as the alliance grew. It is noteworthy that even Richard did not form a complete four member alliance until cycle 5. This was largely based upon his need to observe the interactions of the other Tagi members and partly the result of a failed overture toward Sean. As a two-member alliance, Richard and Rudy remained subject to expulsion. Richard likely anticipated that anyone trying to form an alternative coalition was subject to the very same

⁵⁷The total tribe memberships in relevant cycles for Tagi (cycles 1, 3, and 5) and for Rattana (cycles 7 through 13), and the resulting sizes of the minimum winning coalitions (“mwc”) are as follows: cycle 1 (players 8, mwc 5); cycle 3 (players 7, mwc 4); cycle 5 (players 6, mwc 4); cycle 7 (players 10, mwc 6); cycle 8 (players 9, mwc 5); cycle 9 (players 8, mwc 5); cycle 10 (players 7, mwc 4); cycle 11 (players 6, mwc 4); cycle 12 (players 5, mwc 3); cycle 13, round 1 (players 4, mwc 3); cycle 13, round 2 (players 3, mwc 2).

difficulties in identifying trustworthy partners. Once he succeeded in forming the four member Tagi alliance in cycle 5, Richard likely understood that the Pagong members would not be able to outflank that alliance unless they managed to form an alternative stable alliance of no fewer than five. For the same reason that it was difficult and time consuming for Richard to forge the four member alliance, he could safely assume that anyone trying to do so in Pagong would confront similar difficulties.

Within Pagong, Ramona and Gervase formed an alliance in the first cycle, and Colleen, Jenna and Gretchen formed an informal arrangement to discuss voting in cycle 3. Not until the remaining members of the two tribes merged into Rattana in cycle 7 did Pagong make a serious effort to forge a competing alliance. And that was reactive; it was only *after* they suspected a Tagi alliance was in place. It is noteworthy that in cycle 8, when the tribe was down to eight members, Jenna, Colleen, and Gervase approached Sean to join them, and he insisted upon a majority coalition of five, including Kelly (regarded as the most reluctant Tagi alliance member) as a precondition to joining. Because Kelly was unwilling to formally join, the Pagong alliance failed. Since Kelly actually did defect from the Tagi alliance by voting against Sean, if Sean had joined the Pagong alliance, it would have successfully eliminated Richard with four votes.

It appears that in the context of a small group of persons intimately involved with one another for an extended period of time, Richard rationally calculated that the slight risk of being part of a coalition that would be one half, rather than a simple majority, in all but the first two rounds of the joined tribes outweighed the potential cost of disclosure to nonmembers. To illustrate the logic of his calculation, it is helpful to introduce a related analysis offered by Professors James Buchanan and Gordon Tullock.⁵⁸

Professors Buchanan and Tullock present an optimal size legislature as a function of two costs, agency costs, which are negatively correlated with the number of representatives, and decision costs, which are positively correlated with the number of representatives. Agency costs are negatively correlated because as you increase the size of the legislative body relative to the total constituency, you reduce the likelihood of a substantial divergence between legislative output and constituent wants. Thus, if the ratio was one-to-one (for example in the near mythical New England town meeting), there could be no divergence since the constituents themselves are setting legislative policy. In contrast, as you increase the size of the legislature, you require greater coordination to accomplish anything, thus raising decision costs. The optimum point, according to Buchanan and Tullock, is that which minimizes the sum of agency and decision costs.

By analogy, while Richard likely realized that a minimum winning coalition had six members in cycle 7 (immediately after the Tagi and Pagong tribes merged into Rattana), and five members in cycle 1 (within Tagi) and cycles 8 and 9 (within Rattana), he very likely also appreciated that in forming a successful coalition, he faced what we can best describe as an inverse set of cost functions. These two conflicting costs, which are both a function of coalition size, pit the benefits of safety in numbers against the risks of disclosure to non-alliance members. As in the Buchanan and Tullock formulation, as coalition membership grows, the members are increasingly protected against the possibility of a counter-alliance and this analysis applies beyond the point at which a minimum coalition forms. As the size of the coalition increases, the members are increasingly protected against the risk that a member will defect in favor of an alternative coalition. Conversely, as coalition size increases, the members face an increased risk of disclosure, which could lead to a coalition breakdown. The

⁵⁸JAMES BUCHANAN AND GORDON TULLOCK, *THE CALCULUS OF CONSENT* (1962).

optimal size coalition can best be understood as one that minimizes the sum of these two costs or risks. It appears rational to assume that from an *ex ante* perspective, a coalition of four appeared optimal, even though in four out of the ten relevant cycles, this did not represent a minimum winning coalition. This is especially true if Richard, in observing the remaining members of the Tagi and Rattana tribes had reason to believe that they did not form a cohesive group. With the exception of cycle 7 (immediately after the Tagi and Rattana tribes merged), the individual members of the Tagi alliance secure against any effort to remove them by the remaining tribe members provided that at least one member outside the alliance voted differently than the others. And in cycle 7 itself, which placed the Tagi alliance at greatest numerical risk (given the six non-alliance members), Richard had reason to assume it unlikely that Sean would immediately form a competing coalition with the former members of Pagong, or even that the former members of Pagong would act as a unified whole.

In addition, Richard might have calculated that over time he would gain some insight into the voting pattern of one or more non-alliance players, which he could then use to his advantage. In essence, he gained the benefit of Sean's membership after the two tribes joined, without the cost of commitment to him. Sean's alphabetical voting scheme allowed the Tagi alliance to gain an effective additional member in cycles 8 through 11. This provided some hedge against defection by a member, as occurred with Kelly in cycles 9 and 11, and also ensured the requisite number of votes to remove a member in the event that an alternative coalition had formed. The alphabetical voting scheme seemed peculiar, but had the benefit of signaling to the Tagi alliance that Sean's intent was not hostile. As Sean explained, the alphabetical ordering of the first names was such that his scheme allowed him to target the former Pagong members (Colleen, Gervase, Greg, Gretchen, and Jenna), before targeting the alliance members (Kelly, Richard, Rudy, and Sue). It further served as a kind of Schelling point. By voting with Sean (as long as he targeted nonalliance member), the four person alliance was virtually certain to succeed in removing targeted nonmembers.⁵⁹

The minimum winning coalition theory is relevant not only to the formation of the four-member Tagi alliance, but also within the alliance itself. A minimum winning coalition of four is three. The same analysis employed above explains why Richard did not elect to form a three-member suballiance within the total four-member alliance. While this would have prevented a counter-alliance of two, thus threatening a stalemate against his suballiance with Rudy, it would also have substantially increased the risk of disclosure, and thus of an alliance breakdown among the remaining members. Instead, Richard and Rudy formed a two-member suballiance early on, which they maintained throughout the game.⁶⁰ Sue and Kelly likely intuited the existence of this suballiance and thus initially formed one of their own. Following Kelly's perceived defection, that suballiance broke down, leaving both women vulnerable. For that very reason, Kelly understood that her only

⁵⁹There were at least two other potential Schelling points that appear to have affected tribal council voting. In cycle 2, within Pagong, BB presented a Schelling point by raising the question whether the tribe wanted to win the immunity challenge and by constantly criticizing his fellow tribe members for laziness. In cycle 10, after the tribes merged, Gervase presented a Schelling point by giving his peculiar speech at tribal council. *See supra* at 14. There was also a potential Schelling point in cycle 8. Jenna had a particularly emotional reaction to the lack of a teaser home video, revealing her to be intensely homesick. This might explain why her former Pagong members, Colleen, Gervase, and Greg, voted to remove her. But consistent with Sean's alphabetical voting scheme, the alliance members (plus Sean and Jenna) instead voted to remove Greg.

⁶⁰As discussed *infra* at 33, one could view Richard's voluntary withdrawal from the final immunity contest as a form of defection from that alliance.

prospect of emerging within the final two players involved repeated success at the immunity challenges.

One peculiarity emerges from this analysis. Because Sue and Kelly had reason to suspect that they would be subject to the suballiance formed by Richard and Rudy in the final periods of voting, we might have predicted that one or both of them would have attempted to form alternative alliances in an effort to rid the tribe of Richard and Rudy. Having done so, the active defector could then position herself in the same manner that Richard had with the original alliance by forging a protective suballiance of two. The next subpart will consider why this might not have occurred.

2. Whither *Survivor's* Empty Core

To understand why those not in the Tagi alliance failed in their efforts to form a superior coalition that would have included some defecting members of the Tagi alliance, we must reconsider the empty core bargaining game. For at least some members of the alliance (most notably Sue and Kelly), we can readily conceive a superior coalition. If we accept that the Richard/Rudy suballiance was likely more stable, and thus more of a threat to its nonmembers, than was the shaky Kelly/Sue suballiance, then it is easy to conceive a superior coalition in which Sue or Kelly join forces with three others, including former Pagong members or Sean. The formative leader would then have been ideally positioned to create a beneficial suballiance of two, thus increasing the prospect of emerging among the final two players from the new alliance, rather than only among the final four players from the Tagi alliance. And in theory, this could have led to further iterations if discovered. Thus upon learning of the breakdown of their own alliance, Richard or Rudy could try to form an alternative, superior coalition by approaching a subset of the new alliance members (most likely those who they suspected would not be part of the suballiance of two). The original Tagi alliance member could propose to one of the proposed defectors to form a suballiance of two, which again would position that defector better than remaining in the new alliance by increasing the likelihood that he or she would emerge among the final two rather than only in the final four. At this point one of the excluded members from the second round alliance (initiated by Kelly or Sue) could approach a subset of the newest alliance and start the ball rolling all over again.

While the actual *Survivor* game witnessed some efforts on the part of former Pagong members and Kelly to create a superior alliance, ultimately the Tagi alliance was not defeated by any superior coalition. The question then is what features of the empty core bargaining game were missing from *Survivor*. Two features distinguish *Survivor* from an empty core game. First, the total group of players was constantly being reduced by one player in each successive round.⁶¹ As a result, those motivated to create superior coalitions had to constantly reassess their strategies based upon who was voted off the island and who remained. Second, from the perspective of any individual player, the remaining players were not fungible. The players had varying degrees of knowledge about, and confidence in, the other players, based in part upon the amount of time that they had spent with them. It is not surprising, therefore, that after the remaining members of the two tribes merged into Rattana, the former Tagi members tended to operate as a unit as did the former Pagong members. We might also not be surprised that when the former members of one tribe eventually approached the former

⁶¹It is important to note that in theory an endless number of iterations could have occurred even within a single period if repeated defections in favor of newer, superior coalitions were discovered prior to final voting. The only limit on such successive rounds was the eventual vote at the end of the three-day cycle.

members of the other with an overture to form an alternative alliance, the proposal was met with a certain degree of distrust. This distrust ultimately proved fatal. Thus, in cycle 9, when Colleen, Jenna, and Gervase (from Pagong), approached Sean and Kelly (from Tagi), Sean insisted that he would not join unless at least one of the Tagi alliance members did as well. This would have produced a minimum winning coalition, but it also revealed that he had less confidence in the integrity of the proposed counter-alliance than in the integrity of the original Tagi alliance. And even as one who had not joined, Sean likely assumed that relative to the former Pagong members, he would benefit from some degree of loyalty from the Tagi alliance. But if he actually joined an alternative alliance, he likely assumed that all bets were off. For that reason, Sean insisted upon a true majority alliance, but in doing so, ensured the ultimate success of the Tagi alliance.

The shrinking population and the unique personal characteristics of the players rendered the game one which did not replicate empty core bargaining. But within the four-member Tagi alliance, one might well have imagined an empty core. As stated earlier, Sue and Kelly had reason to suspect the Richard/Rudy suballiance, and in the formative cycle (cycle 5), they responded by forming a suballiance of their own. Eventually, it became apparent that the Sue/Kelly suballiance had broken down. Setting aside immunity, therefore, the two women were vulnerable to the Richard/Rudy suballiance once the Tagi alliance members emerged as the final four players. In anticipation of this, it is not surprising that Kelly considered joining an alternative alliance. As explained above, mutual distrust prevented the formation of that potentially superior alliance. It is also not surprising that in cycle 12, Sue attempted to form a suballiance with Richard. Of course, Richard and Rudy had already formed a suballiance and thus Richard had little to gain by breaking that agreement. It is possible, as explained in the next subpart, however, that had Sue approached Rudy, it might well have been rational for Rudy to defect. On the other hand, the premise of the Richard/Rudy alliance was that neither would defect: Richard understood that Rudy would remain loyal out of principle. Rudy assumed that Richard would remain loyal having initially forged the alliance. While Richard engaged in a strategy that could be regarded as a form of defection, as shown below, the two formally continued as members of a loyal sub-alliance until the very end of the game.

3. The *Survivor* Prisoners' Dilemma

Perhaps the most interesting aspect of *Survivor* are the two underlying prisoners' dilemma games. The most significant game, ultimately, was played within the Tagi alliance itself. But there was also an important game played among the members of each of the tribes. To illustrate, imagine that a majority group of tribe members viewed the game in positive sum terms. They viewed the game as one that rewards cooperative behavior, and they viewed those who contribute the most to the group as a whole as most "worthy" for continued participation in future cycles. As a result, this majority group eschews any alliances in favor of playing solely on what they regard as merit. Voting would be conducted based upon who contributed to the tribe's physical well being and who was the most significant player in the reward and immunity challenges. Within the two initial tribes (Tagi and Pagong), such a scheme would allow the best players to survive and to have the best prospect of challenging the best players from the other tribe when the two tribes merged. Analogizing to the single period prisoners' dilemma depicted in Table 1, the resulting payoffs from a merits-based game readily translate into those for mutual cooperation in the upper left box. But assume that a minority of players views the game as zero sum, and is therefore unwilling to "cooperate" by limiting their play to this form of merit-based

cooperation. From the perspective of these players, the optimal strategy is to “defect” from the majoritarian norm of merit-based play by instead forming an alliance. If all non-alliance members remain committed to norm of mutual cooperation (in this case meaning failing to form alliances in favor of merit-based play), then those who refuse to abide that norm and who instead form an alliance receive the maximum payoff. Within the framework of Table 1, if the alliance members are player A and those playing based upon merit are player B, then this is equivalent to the payoffs in the upper right box.⁶² While no competing alliances are formed (as others would be duped into believing that the game would be played solely on the merits), the alliance members will have protected themselves against eviction regardless of their lack of merit as viewed by the majority of players. Finally, from the perspective of those forming an alliance, player A in Table 1, if the remaining players, player B, also form an alliance, it remains optimal to continue to form an alliance. While this will place the players in the lower right box with the lowest aggregate payoffs, the alternative would reverse the prior situation, thus placing player A in the worst position, represented in the lower left box. Thus, the situation facing the players can be readily analogized to a classic prisoners’ dilemma in which regardless of what the other group chose to do, it remained rational to pursue an alliance strategy.

As a result of the repeat cycles in *Survivor*, one might imagine that those not forming alliances could punish those who do. The suggestion suffers, however, from a *Catch-22* quality. To punish the alliance members, those not in an alliance would have to create an alliance. Ultimately, this is no different than the prior assertion that the dominant strategy is mutual defection in a single period prisoners’ dilemma. The analysis is further consistent with the intuition that as a result of the known end period, rational players assume themselves to be in a true prisoners’ dilemma rather than in a game with altered payoffs that promote mutual cooperation as a result of endless iterations. Whether or not the players intuit the unraveling phenomenon, the effect is the same; rational players will recognize that an alliance strategy is optimal regardless of what the other players do.

The prisoners’ dilemma also helps to explain the dynamics within the Tagi alliance. Among the alliance members, the seemingly fairest way to play the game would be to eschew any internal suballiances. Once the four members emerge in the final round, the players would then be free to follow their individual voting preference without coordination. Referring again to Table 1, this would place the players in the upper left hand box. But for the same reason that rejecting any formation of alliances within the tribes is not a stable equilibrium, nor is rejecting suballiances a stable equilibrium. Instead, from the perspective of any member of the four member alliance, it is rational to defect from this norm and form a two-member suballiance that will increase the probability of emerging within the final two. Thus, it is not surprising that Richard and Rudy formed a suballiance early on and that in cycle 5, Sue and Kelly formed what turned out to be an ill fated suballiance. The relative insecurity of the Sue/Kelly suballiance obviously placed Richard and Rudy in a superior position. And yet, from Richard’s perspective, ending with himself and Rudy was a risky strategy. Rudy was clearly a more well liked player among those who would return as jurors. As a result of this, Richard engaged in what turns out to be his most clever strategic maneuver, one which ensured that with respect to Rudy, Richard would receive the benefits of payoffs associated with player A in the upper right hand box of Table 1, while Rudy’s payoffs would be the lowest possible (those of player B in the same box).

⁶²One might characterize this as either a form of defection from a majoritarian norm or as two different conceptions as to the rules of the game. This difference in characterization does not undermine the analysis in the text, however. Viewed either way, the payoffs for the group that rejects the majority’s preferred merits-based norm receives payoffs that are equivalent to unilateral defection within a single period prisoners’ dilemma.

In the final round, Kelly changed her vote from Richard to Susan, resulting in only three remaining members. The three players then entered the final immunity competition. The strenuous nature of the competition helped Richard to justify a decision that was ultimately a well disguised defection from his suballiance with Rudy. Recall that Richard withdrew from the competition, claiming that he knew he would not win. If one construes the Richard/Rudy suballiance as a commitment to do whatever they can to ensure that they emerge as the finalists (a result in the upper left box in Table 1), then by withdrawing, Richard defected. To see why consider how the game was necessarily played as a result of Richard's decision. Had Rudy won the competition, he would have voted to keep Richard on as a finalist, consistent with his commitment to the suballiance. Because Kelly preferred Rudy to Richard (as shown in her first vote in cycle 13), this would have risked a 4 to 3 vote for Rudy by the jury. (This assumes that the remaining six jurors vote as they did.). But if Kelly won the game, then she would choose between Rudy and Richard. She knew that either of them would vote for the other as a juror. The only question from her perspective was who was more popular with the remaining jurors. As Richard likely knew, Rudy was more popular, meaning that if Kelly won, Richard would still be selected as a finalist. In contrast, if Richard stayed in the immunity contest and won, he faced another *Catch-22*. If he voted to keep Rudy, then Kelly would vote for Rudy as a juror, and as a result, Richard would lose (again assuming the other jurors voted as they did). And if he voted for Kelly, then he would violate the express terms of the suballiance with Rudy, and risk Rudy's retribution. If Rudy also defected, then Kelly would win. The only way that Richard could reduce the likelihood of this result was to withdraw from the game. While he would remain a finalist regardless of whether Rudy or Kelly won, he hoped that Kelly would win because she would eliminate his toughest final competitor. In effect, by removing himself from the immunity contest, Richard secured himself the upper right payoffs from Table 1. While securing Rudy's commitment in the jury vote, Richard's withdrawal *and defection* from the final immunity game afforded him the maximal upper right payoffs.

Conclusion

At the beginning of this essay, we posited that *Survivor* was played in a manner that was consistent with the predictions of rational choice theory. We certainly do not suggest that every player played in a manner that optimized his or her prospects for winning. Indeed, that is largely the point. At each step in the game, those who best positioned themselves to win were the ones who played in a rational and strategic manner. Again borrowing the prisoners' dilemma metaphor, this suggests that in the real world, the dominant result of payoffs that match those in a single period prisoners' dilemma is not always mutual defection. If those who value cooperation are unable to bond those who do not, then for the cooperative players, the results can be even worse. Our claim that *Survivor* was played consistently with the predictions of rational choice thus has significance not only for the debate over the merits of rational choice theory, but also for real world institutions and relationships. In any number of contexts, for example in legislatures or other lawmaking bodies, it might prove optimal to form coalitions with those who will play as if they are bound, independent of the formal payoffs, and then use that foundation to build a coalition of sufficient size to achieve desired policy objectives. Optimal coalitions might prove fundamentally more important than the merits of any particular proposal or set of proposals. In addition, optimal networks or

coalitions need not be of minimum winning size. Sometimes less truly is more. One might have a better chance at influencing policy by initially establishing key relationships than by offering up seemingly superior policy proposals. The old adage “it’s not what you know; it’s who you know,” might prove to be an empirical observation that is well rooted in rational choice. In the end, we do not expect to bring rational choice detractors into the fold. But we remain confident that when we compare *Survivor* with fairly simple rational choice games, the theory comes out a winner.

Appendix A
Sequential Order of Voting for Elimination By Individual Tribe Members

TAGI	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 6
Immunity Won	NO	YES	NO	YES	NO	YES
Richard	Stacey		Stacey		Dirk	
Kelly	Rudy		Rudy		Dirk	
Rudy	Sonja		Stacey		Dirk	
Susan	Sonja		Stacey		Dirk	
Sean	Sonja		Stacey		Rudy	
Dirk	Sonja		Stacey		Susan	
Stacey	Rudy		Rudy			
Sonja	Rudy					
TOTALS	Sonja 4 votes		Stacey 5 votes		Dirk 4 votes	

PAGONG	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5	Cycle 6
Immunity Won	YES	NO	YES	NO	YES	NO
Colleen		BB		Ramona		Joel
Gervase		BB		Colleen		Jenna
Jenna		BB		Ramona		Joel
Greg		Ramona		Jenna		Joel
Gretchen		BB		Ramona		Joel
Joel		BB		Ramona		Jenna
Ramona		BB		Colleen		
BB		Ramona				
TOTALS		BB 6 votes		Ramona 4 votes		Joel 4 votes

NOTE: Within each tribe, the members are listed according to their length of time on the island. The first listed member survived the longest; the last listed member was the first eliminated. Within each cycle, in the row that follows the name

of each tribe member, is the name of the person that tribe member voted to eliminate.

Sequential Order of Voting within Merged Rattana Tribe

	Cycle 7	Cycle 8	Cycle 9	Cycle 10	Cycle 11	Cycle 12	Cycle 13	Cycle 13	Cycle 13
TAGI									
Richard	Gretchen	Greg	Jenna	Gervase	Colleen	Sean	Susan		
Kelly	Gretchen	Greg	Sean	Gervase	Sean	Sean	Richard (tie) – Susan	Rudy	
Rudy	Gretchen	Greg	Jenna	Gervase	Colleen	Sean	Susan		Richard
Susan	Gretchen	Greg	Jenna	Gervase	Colleen	Sean	Richard		Richard
Sean	Colleen	Greg	Jenna	Gervase	Colleen	Susan			Richard
PAGONG									
Colleen	Richard	Jenna	Richard	Sean	Sean				Kelly
Gervase	Susan	Jenna	Richard	Sean					Kelly
Jenna	Gervase	Greg	Richard						Kelly
Greg	Jenna	Jenna							Richard
Gretchen	Rudy								
Immunity Won	Greg	Gervase	Rudy	Richard	Kelly	Kelly	Kelly	Kelly	
Voted Off	Gretchen 4 votes	Greg 6 votes	Jenna 4 votes	Gervase 5 votes	Colleen 4 votes	Sean 4 votes	Susan 3 votes	Rudy 1 vote	Richard WINS 4-3

NOTE: Although there are no longer two separate tribes, Rattana tribe members are sorted by their prior tribe affiliation and then by their order of longevity within the tribe. By coincidence, the order would be identical had we not split the two tribes.

Appendix B

Summary of Survivor Game By Cycle

	Reward Winner	Immunity Winner	Eliminated Member	Coalition Maneuvers and Friendships Formed or Broken	Information Acquired
Cycle 1	Pagong	Pagong	Sonja	<i>Tagi:</i> Dirk and Sean formed a friendship. Stacey unsuccessfully tried to form a Tagi womens' alliance. <i>Pagong:</i> Ramona and Gervase agreed never to vote against each other.	Ramona was sick. Sonja was perceived as the physically weakest member of Tagi.
Cycle 2		Tagi	BB	<i>Tagi:</i> Richard and Rudy formed a voting alliance. <i>Pagong:</i> Colleen and Greg formed a friendship that others thought might be a budding romance.	Ramona remained sick with dehydration and nausea. BB complained about everyone.
Cycle 3	Tagi	Pagong	Stacey	<i>Pagong:</i> Colleen, Jenna, and Gretchen formed a friendship and discussed their voting preferences, but did not formally align.	No new alliances formed.
Cycle 4	Tagi	Tagi	Ramona	<i>Tagi:</i> The Sean and Dirk friendship continued, but no voting alliance formed.	Richard was the only Tagi tribe member able to catch fish. Greg from Pagong caught rats. Ramona sat out of the immunity challenge after being sick for a week.
Cycle 5	Pagong	Pagong	Dirk	<i>Tagi:</i> Richard got Kelly and Sue to join the Tagi alliance. Kelly and Sue forge a sub-alliance.	Tagi tribe members were concerned over Dirk's weight loss and did not like his constant religious references.
Cycle 6	Pagong	Tagi	Joel	<i>Tagi:</i> The Tagi alliance of Richard, Rudy, Sue, and Kelly was firmly entrenched.	Richard blundered the reward challenge. Sean refused to join the alliance. Joel was perceived as being sexist.

Cycle 7	NONE	Greg	Gretchen		The tribes merged. Sean adopted an Alphabet Voting Strategy but no one knew about it. Gretchen was perceived as the strongest player.
Cycle 8	Greg (invited all)	Gervase	Greg	Colleen, Jenna, and Kelly formed a friendship.	Richard was still the only tribe member who had caught any fish. Former Pagong members became certain about the Tagi alliance.
Cycle 9	Colleen (invited Jenna)	Rudy	Jenna	Colleen, Jenna, and Gervase formed an alliance in an unsuccessful attempt to vote off Richard. They tried to recruit Sean and to get Kelly to defect from the Tagi alliance, but Sean's insistence that Kelly join proved fatal. Kelly's vote against the alliance was not disclosed.	Sean disclosed his alphabet voting strategy and that Jenna was next. The Tagi alliance became increasingly uncertain of Kelly's allegiance.
Cycle 10	Gervase (invited all)	Richard	Gervase	With seven castaways remaining, the Tagi alliance had an absolute majority.	
Cycle 11	Sean (invited Richard)	Kelly	Colleen	Kelly refused to vote with the Tagi alliance to eliminate Colleen.	All learned of Kelly's defection. After this point, Kelly's involvement was not needed for the alliance to succeed.
Cycle 12	Kelly	Kelly	Sean	Kelly voted with the Tagi alliance to eliminate Sean. Sue tried to get Richard to sub-align with her.	Sue threatened to have Kelly eliminated at her first opportunity.
Cycle 13	NONE	Kelly	Susan	The Richard and Rudy sub-alliance remained intact, voting to eliminate Sue.	Kelly switched her vote from Richard to Sue after a tie resulted in a 2-2 vote.
	NONE	Kelly	Rudy		Richard voluntarily gave up in the immunity contest. Kelly won immunity and therefore had the only vote. She voted to eliminate Rudy.