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Beyond the Chess Master Analogy: Game Theory and Divine Providence

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1. Introduction

Open theism is a theory of divine providence according to which God has sovereignly chosen to create a world in which his creatures have significant freedom to determine the direction of events. As a consequence of God's decision, there is no such thing as a completely settled future[1] for him (or anyone) to know. That is to say, there is no complete and unique sequence of events subsequent to the present that is or that is going to be *the* actual future. Instead, there is a branching array of possible futures. Events that occur on all possible futures are settled and are known by God as such. Events that occur on some but not all possible futures are open and they too are known by God as such.

An analogy commonly used to explain the open theist view of divine providence is the Chess Master analogy. To my knowledge, the first person to use this analogy in relation to divine providence was William James. He writes in "The Dilemma of Determinism" (1884):

> Suppose two men before a chessboard—the one a novice, the other an expert player of the game. The expert intends to beat. But he cannot foresee exactly what any one actual move of his adversary may be. He knows, however, all the *possible* moves of the latter; and he knows in advance how to meet each of them by a move of his own which leads in the direction of victory. And the victory infallibly arrives, after no matter how devious a course, in the one predestined form of check-mate to the novice's king.[2]

[1] For a more detailed explanation of the open theist view of the future see Alan R. Rhoda, Gregory A. Boyd, and Thomas G. Belt, "Open Theism, Omniscience, and the Nature of the Future," *Faith and Philosophy* 23 (2006): 432–459.
[2] William James, *Writings 1878–1899* (New York: The Library of America, 1992), 592–593.

Since then, the analogy has been used by many open theists, including Greg Boyd,[3] Peter Geach,[4] Brian Hebblethwaite,[5] Richard Rice,[6] and John Sanders.[7] Here is Geach's version:

> God, like some grand master of chess, can carry out his plan even if he has announced it beforehand. "On that square," says the Grand Master, "I will promote my pawn to Queen and deliver checkmate to my adversary": and it is even so. No line of play that finite players may think of can force God to improvise: his knowledge of the game already embraces all the possible variant lines of play, theirs does not.[8]

Both James' and Geach's versions of the analogy do an excellent job of capturing the important open theist idea that God knows all *possible* future developments, and so can do exhaustive contingency planning from the outset. As a realistic analogy of divine providence, however, the Chess Master analogy has significant limitations. In the next section I'll identify several of them. Following that, I'll consider several alternative analogies that open theists have proposed. I'll then turn to a consideration of *game theory*. In thinking about divine providence it is important to begin by contemplating the options at God's disposal with as much generality as possible, lest we overlook options that deserve attention. Game theory helps us to do just that. Beginning with a generic notion of a 'game' as, roughly, an event in which 'players' choose from the available 'strategies' with the intent of transforming an initial state into a consequent state with a preferred 'payoff', game theory classifies games into types and, for each type, tries to discover the basic principles that determine an optimum or 'winning' strategy. As a discipline, game theory has proven extremely useful in modeling a wide range of real-world decision situations, especially in

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[3] Gregory A. Boyd, *The God of the Possible* (Grand Rapids, MI: Baker, 2000), 127–128; and "The Open-Theism View," in James K. Beilby and Paul R. Eddy (Eds.), *Divine Foreknowledge: Four Views* (Downers Grove, IL: InterVarsity Press, 2001), 44–45.
[4] Peter Geach, *Providence and Evil* (Cambridge: Cambridge Univ. Press, 1977), 58.
[5] Brian Hebblethwaite, *Philosophical Theology and Christian Doctrine* (Oxford: Blackwell, 2005), 135–137.
[6] Richard Rice, *God's Foreknowledge and Man's Free Will* (Eugene, OR: Wipf and Stock, 2004), 66.
[7] John Sanders, *The God Who Risks*, Revised edition (Downers Grove, IL: InterVarsity Press, 2007), 243–244. All subsequent references to Sanders' work will be to this edition.
[8] Ibid.

the areas of economics, foreign policy, and warfare.[9] After outlining the basics of game theory, I'll illustrate its usefulness in relation to God's Old Testament dealings with the nation of Israel. Following that, I'll turn to the issue of creation. Given that God has a choice in what sort of 'Creation Game' to play, a natural question, and a key one for understanding divine providence, is why God would choose to play the sort of Creation Game that he has rather than some other kind of game. To answer that question we have to think about the *value* of a game. What sorts of factors tend to make a game worth playing? I will identify several such factors and argue that they suggest that God would, all things being equal, prefer to exercise his providence along open theist lines. Whether that conclusion be accepted or not, it is my hope to encourage further reflection on the application of game theory to divine providence.

2. Limitations of the Chess Master Analogy

While it's been a popular and helpful analogy for explaining the open theist model of divine providence, the Chess Master analogy has several limitations. I begin by noting a subtle difference between James' and Geach's versions. James claims that God, as the Chess Master, can guarantee ultimate victory, but not specifically how that victory is achieved. Geach, in contrast, seems to think that God can guarantee the final outcome with great specificity (e.g., checkmate on a particular square by promotion of a pawn). Those familiar with chess know that James' account is more realistic. At the start of a chess game one's opponent has too many options to make a specific outcome predictable. It is only when the opponent's options have been greatly constrained that specific outcomes like Geach's can be reliably predicted.

[9] It has also been applied to matters of divine providence by, surprisingly perhaps, an NYU political scientist. See Steven J. Brams, *Biblical Games: Game Theory and the Hebrew Bible* (Cambridge, MA: MIT Press, 2003); and *Superior Beings: If They Exist, How Would We Know?* 2nd edition (New York: Springer-Verlag, 2007).

Geach's version is unrealistic in other respects as well. Just before the quoted passage, Geach says, "God cannot be surprised or thwarted or cheated or disappointed." These claims don't cohere well with the analogy. Certainly, the Chess Master can't be surprised by the opponent's making a move that was not foreseen as a possibility, but surely he can be surprised by the opponent's making a move that is highly improbable. ("Wow, I didn't expect you to make *that* move. I thought you'd play one of these other moves instead.") Similarly, while it is plausible that no one can thwart the Chess Master's *general* goal of victory, a determined opponent could easily thwart many of the Chess Master's *specific* goals, especially if they were announced beforehand. ("So you want to promote that pawn to a queen, eh? Well, just to spite you I'm going to take that pawn with my knight.") Finally, while I don't think anyone could cheat the Chess Master, there is no reason to think he would be immune to disappointment. Winning a chess game against a good opponent who plays well is rewarding, but winning against a weak opponent who blunders repeatedly is, frankly, not much fun. In fact, it can be rather disappointing.

Sanders criticizes Geach along similar lines:

> [I]t is doubtful that the chess-master analogy adequately handles the nature of the personal relationship between God and humans. . . . Geach claims that God is never disappointed. The Bible, however, repeatedly says that God is disappointed with sin and human rejection of the divine love (for example, Gen. 6:6). Creation has miscarried and it is not what God wanted it to be. This means that though God's overarching purposes for creation cannot be frustrated, his particular desires for individuals and situations can be frustrated.[10]

While these points are well-taken, Sanders overstates matters when he suggests that these are problems with the Chess Master analogy *per se*. They aren't. They are problems with Geach's *version* of the analogy. After all, there is nothing in the nature of a chess game, not even one involving a divine Chess Master, which precludes either genuine relations among the players or

[10] Sanders, *The God Who Risks*, 243–244.

divine disappointment. That said, however, the analogy has other limitations that mitigate its usefulness as a model of divine providence.

In the first place, chess has only two players (the pieces obviously don't count), whereas the world has billions, just counting humans. It's one thing for a Chess Master to anticipate the moves of a single opponent, quite another to anticipate the moves of a vast and shifting multitude of players. In addition, the population of players is constantly changing. New players enter the game through birth as older ones leave (this Earthly game) through death. Moreover, when a game has more than two players, they can form alliances with each other, and these alliances may shift around, as individuals or factions triangulate in an effort to gain a strategic advantage. Strategies that worked against earlier players may not work with equal effectiveness against newer ones, who may have the added bonus of hindsight. And strategies that work against individual players may not work so well against teams or broad coalitions of players.

In the second place, moves in chess are strictly sequential (White moves first, then Black, then White, and so on), and at each turn there is only a small, finite number of possible moves. Most real world interactions, however, take place in real time, not in alternating sequence. Moreover, the range of moves available to the players at any point in time may be vast, perhaps even non-denumerably infinite.

In the third place, the rules and objectives of chess are fixed and, aside from White's having the first move, are exactly the same for both players. A knight always moves in an L-shape. A king must always be taken out of check if possible. The ultimate goal, which determines what counts as a win, is always to checkmate the opponent's king. But in the real world players vary widely in the opportunities available to them. Some are in good health, others are not. Some occupy positions of privilege, others do not. Some live in free societies, others do

not. Some are intellectually or physically or artistically gifted, others are not. And no other players or coalitions of players have the same moving opportunities that God does. Moreover, it is doubtful that all players have the same ultimate objectives. Perhaps in some sense we all want to be happy, but what counts as happiness for one player may not count as happiness for another. A scholar's idea of heaven may look something like a cross between the Library of Congress and Plato's *Symposium*; an athlete's may look more like the Olympics.

Fourth, chess is a zero-sum game—if one player wins it is always at the other player's expense. But real life isn't this way. When God invites us into a loving relationship with himself, he's looking for a win–win outcome. We win in life not by competing with God, but by cooperating with him. Similarly, two people win in a marriage or in a friendship not by competing with each other, but by helping each other.

In the above ways, and surely others besides, real life is much more complex, dynamic, and interactive than chess. The Chess Master analogy does a fine job of getting across *some* aspects of the open theist view of divine providence, such as God's omnicompetence in dealing with contingencies, but it doesn't give us a good model for most realistic situations. It is not surprising, therefore, that several alternative open theist analogies have been proposed.

3. Other Open Theist Analogies

In place of the Chess Master analogy, which he deems inadequate, Sanders proposes various alternative analogies: God as Theatre Director, Expedition Leader, Discussion Leader, and Persian Rug-Maker.[11] Rice, who endorses the Chess Master analogy, also compares God to an Expedition Leader, as well as to a Master Composer.[12] Let's look briefly at these analogies.

[11] Sanders, *The God Who Risks*, 229–246.
[12] Rice, *God's Foreknowledge and Man's Free Will*, 58–59, 69.

God as Theatre Director. A director is responsible for the overall play, and makes or delegates the important decisions about casting, costuming, lighting, scripting, and set design. The director also gives the actors guidelines on how to play their roles, but, as Sanders notes, "a good director does not manipulate the actors but seeks to bring out their own creativity."[13] He works with the actors to develop and channel their individual talents and collaborative interactions so as to produce a fine play. By allowing the actors a significant degree of autonomy, however, the director runs the risk that the actors will not always cooperate.

God as Discussion Leader. This analogy is similar to the previous one. Sanders compares God to a professor who, instead of following a strict lecture format, has decided to allow room for serious class discussion. The professor will try to guide the discussion to the benefit of the whole class, but just like the Theatre Director, there is a risk that some students will be uncooperative or say things harmful to others in the class.

God as Persian Rug-Maker. God, a skilled rug-maker, lets us, his children, assist in producing a rug. As J. R. Lucas elaborates:

> The children fail to carry out their father's instructions exactly, but so great is their father's skill, that he adapts his design at his end to take in each error at his children's end, and work it into a new, constantly adapted, pattern. So too, God. He does not, cannot, have one single plan for the world, from which we by our errors, ignorances, and sins, are even further departing.[14]

God as Master Composer. Richard Rice describes this analogy as follows:

> We can think of God as a composer of infinite skill and of ourselves as producing the most rudimentary form of music. But He responds to our halting efforts and incorporates each of them, even the mistakes, into a symphony of transcendent

[13] Sanders, *The God Who Risks*, 229.
[14] From J. R. Lucas, *Freedom and Grace* (Grand Rapids, MI: Eerdmann's, 1976), 39–40. Quoted by Sanders, *The God Who Risks*, 245–246.

> grandeur. So great is His creative genius that nothing we do is cast aside. Every note, however discordant, receives a fitting place in the final work.[15]

These analogies do overcome some of the shortcomings of the Chess Master analogy. Specifically, they illustrate the idea of God's working simultaneously with numerous free agents, each with unique skills and interests, to bring about a win–win situation for everyone. Without further development, however, these analogies don't do anything to capture the idea of *long-term strategic planning*, something that the Chess Master analogy does quite well. Instead, they emphasize God's ability to make competent decisions "on the fly." If we're looking for an open-theist model of divine *providence*, however, then long-term strategizing is going to have to play a central role in the model, as discussion of the next analogy makes clear.

God as Expedition Leader. Sanders and Rice both develop this analogy, but in different directions. Sanders uses it to emphasize God's *ad hoc* resourcefulness:

> The leader is responsible to plan for routes and supplies. As the party climbs, occasional ad hoc decisions will be made in light of the specifics of the terrain and the condition of the climbers. If someone injures a hand, the route may have to be modified, since the preselected path will no longer be possible.[16]

In contrast, Rice uses the analogy to emphasize God's "perfect anticipation"[17] of all possibilities, and his consequent ability to prepare for them in advance, as opposed to responding in an *ad hoc* fashion:

> [L]et us imagine two hikers on a seven-day trek. One is vastly experienced. The other is on his first backpacking trip. Suppose … that the expert has perfectly anticipated the trip. The first day it rains. The expert pitches a waterproof tent,

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[15] Rice, *God's Foreknowledge and Man's Free Will*, 69.
[16] Sanders, *The God Who Risks*, 229.
[17] This is the same as what Boyd has called God's "infinite intelligence." See Gregory A. Boyd, "Neo-Molinism and the Infinite Intelligence of God," *Philosophia Christi* 5 (2003): 187–204.

> and the two sit out the storm. The next day the novice suffers a snakebite. The expert calmly applies a tourniquet and administers an injection of antivenin serum. Thereafter a bear attacks them, and the expert dispatches it with his high-powered rifle. The novice breaks his leg, which the expert, an orthopedic surgeon, carefully sets. Finally the two are rescued from an avalanche by a helicopter that the expert summons with his portable radio transmitter. … The complete adequacy of the expert's response testifies to his perfect preparation for the trip, which includes an awareness of all that could happen, but not necessarily to an advance knowledge of what actually would happen.[18]

Both versions involve simultaneous, cooperative interaction. Rice's version, however, is closer in spirit to the Chess Master analogy, both with respect to his limiting things to only two hikers and, more importantly, with respect to his emphasis on God's perfect anticipation. A God who does exhaustive contingency planning, one who, for *every* possibility, has formed a conditional resolution—if this should happen, then I will respond thusly—has no need for *ad hoc* decision-making. The *decisions* have already been made. What remains to be seen is which conditional resolutions will be carried out, that is, what *actions* God will perform in response to his creatures. Sanders' version helpfully drops the unnecessary restriction to two hikers, speaking instead of the hiking "party." His is also more realistic on a human level, but not, unfortunately, in a way that is advantageous for thinking about divine providence, for Sanders' emphasis on the need for *ad hoc* decisions suggests that God has *not* perfectly anticipated all of the possibilities. If that's what Sanders intends, then I think it's problematic. Either God is able to do exhaustive contingency planning or he is not. If he is not, then that must be because he *cannot* anticipate all of the possibilities. But on a theistic worldview, all possibilities ultimately derive either from God's nature or from God's will,[19] and so inability to anticipate all possibilities would seem to

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[18] Rice, *God's Foreknowledge and Man's Free Will*, 58–59.

[19] On standard versions of theism, whatever exists is included in God and/or included in God's creation. As Peter van Inwagen has recently put it, God is the "creator of such things other than God as there may be" (*The Problem of Evil* (Oxford: Oxford Univ. Press, 2006), 30). The only plausible exceptions for a theist are abstract entities like numbers (Platonically construed), which an omniscient God would be fully acquainted with nonetheless.

point to a failure of *self-knowledge* on God's part, a failure that in turn seems diametrically at odds with the core theistic idea that God is a perfect knower. Alternatively, if God *can* do exhaustive contingency planning, then why wouldn't he? It wouldn't take a taxing effort on God's part to do so, and not to do so would be to court unnecessary risks that might endanger not only God's chances of obtaining his goals for creation but also the long-term prospects of those creatures who have allied themselves to God.[20] I submit that this would amount to inexcusable recklessness on God's part. If God *can* do exhaustive contingency planning, he definitely should.

Given that all analogies have their weaknesses, the question to ask is what kind of model would best serve our interest in developing an open theist account of divine providence? In light of the preceding, I believe we can identify several features that such a model ideally would have:

(1) It should be consistent with the core commitments of open theism, i.e., 'broadly classical' theism, future contingency, and the (partial) epistemic openness of the future for God.[21]

(2) It should preserve the idea that God does exhaustive contingency planning *ab initio*.

(3) It should be flexible in terms of the number and identity of the agents involved and allow the roles that particular agents play to change over time.

(4) It should allow for ongoing, simultaneous, multi-lateral interaction among the agents.

(5) It should allow for cooperation or collaboration among the agents.

(6) It should be at least partially formalizable so as to permit some rigorous inferences regarding divine providence.

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[20] Some computer chess programs allow one to specify the search depth (the number of moves in advance that it calculates). All other things equal, the lower the search depth, the easier the computer is to beat. The best chess programs are able to search many, many moves ahead, but to absolutely unbeatable it would have to be able to anticipate and accurately assess *all* of the possibilities.

[21] For discussion of the core commitments of open theism, see Alan R. Rhoda, "Generic Open Theism and Some Varieties Thereof," *Religious Studies* 44 (2008): 225–234.

(7) It should illuminate God's decision-making by helping us to think about the comparative *value* of God's choices.[22]

The Chess Master analogy does a great job with (1), (2), and (6),[23] but it limps badly when it comes to (3), (4), and (5), and it is largely silent on (7). Several other analogies (Theatre Director, Discussion Leader, Persian Rug-Maker, and Master Composer) do a great job with (3), (4), and (5) and are consistent with (1), but, at least as developed so far, do little or nothing to accommodate either (2), (6), or (7). The Expedition Leader preserves the strengths of those analogies and does a somewhat better job with (2), but it too has nothing to say with respect to either (6) or (7). Indeed, with the exception of the Chess Master, all of the others are completely informal and so fail miserably with respect to (6). And none of them shed much light on (7). Is there a way forward, one that builds on the strengths of the Chess Master analogy, particularly (2) and (6), but does so in a way that can more adequately accommodate (3), (4), (5), and (7)? I believe there is, and it involves the mathematical discipline of game theory.

4. Introduction to Game Theory

Chess is a game, a strategically challenging and elegant game, but a game nonetheless. As we've seen, it provides the basis for a helpful, albeit limited open theist model of divine providence, the Chess Master analogy. The limitations of the analogy stem not from the fact that chess is a game, but rather from the specific kind of game that chess is—its being strictly two-player, zero-sum, and so forth. What if we step back from the particulars of chess and think about the structure of games in general? When we do so, we enter the field of *game theory*, a mathematical discipline pioneered in 1944 by mathematician John Von Neumann and economist

[22] This list of desiderata is, of course, not exhaustive.
[23] The Chess Master analogy satisfies (6) because chess is well-structured game in which the possibilities at any point can be completely specified. That's why computers can be *programmed* to play chess.

Oskar Morgenstern.[24] Since its introduction, game theory has undergone extensive development and has found a wide range of important applications, from economics to military strategy to foreign policy. In this section, I'm going to give a brief overview of game theory. In the following section, I'll look at what it has to offer for our thinking about God's interactive governance of creation.

First of all, a 'game', in the most generic sense, may be defined as an event in which one or more 'players' choose from among one or more available 'strategies' in order hopefully to transform an initial state into a consequent state with an optimum expected 'payoff'. Generally, however, game theorists restrict their attention to games of two or more competing players, where each player has two or more available strategies. One-player games are typically relegated to the province of decision theory, though they can be regarded as two-player games in which 'nature' or 'chance' plays the role of the second player. Hence, decision theory is really a special case of game theory, despite the customary distinction between the two disciplines. As for the focus on competitive games, the reason for this is that we can simplify non-competitive games by regarding the players collectively as a 'team'. That is, we can regard them as one player (the team) rather than as several individual players. Moreover, game theorists generally presume that all of the players are 'rational', meaning that they will always try the best they can to secure the best outcome for themselves in accordance with *their own* values and preferences.[25] Finally, we should bear in mind that complex games, like chess, can be analyzed into series of 'sub-games' or 'mini-games'. For example, if two people play ten rounds of Rock-Paper-Scissors, we can regard it either as *one* ten-round game or, alternatively, as *ten* one-round games.

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[24] John von Neumann and Oskar Morgenstern, *Theory of Games and Economic Behavior*, 3rd edition (Princeton, NJ: Princeton Univ. Press, 1953).

[25] This is a reasonable assumption to make about actual human agents if we accept, with Aquinas, that when we act intentionally, we do so *sub ratione boni*, that is, with a view toward some apparent good.

Within the class of competitive, multi-player, multi-strategy games there are several important variables. Two of the most important ones are the number of players and the number of strategies available to each. The simplest scenario is a 2×2 game, meaning two players with two strategies each. If each player has three strategies, as in Rock-Paper-Scissors, then we have a 3×3 game. If there are three players, each with two strategies, then we have a 2×2×2 game, and so on. These numbers are important because the more players and the more strategies per player the more complex the game becomes, and the harder it is to calculate an optimum strategy. Another important variable is whether the game is 'zero-sum' or not. A zero-sum game is one in which the only way a player can gain is at the expense of the other players. A non-zero-sum game is one in which the players can win or lose together. A fourth variable is whether the game is 'cooperative' or not, where a cooperative game is one in which the players can make binding and enforceable agreements. This requires communication among the players, which, of course, is not always feasible. Yet another variable concerns how much information each player has about the available strategies and preferences of the other players. In games of 'complete information' all strategies and preferences are known. Games of incomplete information are harder to deal with because they require a degree of probabilistic guess-work. All of these variables, and any others that may be of relevance, help to specify the 'rules' of a particular game. Hence, game theorists sometime define a game in terms of a set of rules.[26]

Two-player games are most commonly represented in a 'payoff matrix' format. The strategies available to each player are assigned to different rows (columns) to form a matrix. In the squares of the matrix the respective payoffs for one or both of the players are given. Here, for example, is a payoff matrix representation of the game "Chicken," in which two drivers proceed

[26] Brams defines a 'game' as "the totality of rules which describe it" (Steven J. Brams, *Theory of Moves* (Cambridge, MA: Cambridge Univ. Press, 1994), 222).

on a collision course hoping that the other will swerve first and thereby cede bragging rights to one that didn't swerve. The outcome preferences for both players have been ranked from 4 (best) to 1 (worst).

"Chicken" Payoff Matrix		Player B	
		Swerve	Don't swerve
Player A	Swerve	Both swerve (3,3)	A swerves; B doesn't (2,4)
	Don't swerve	B swerves; A doesn't (4,2)	Neither swerves – collision (1,1)

The above matrix tells us that Player's A's best result (4,2) occurs when Player B swerves and Player A doesn't. If neither swerves, then the players will crash, yielding the worst result (1,1) for both. If both swerve (3,3), then they avert collision, but neither player earns bragging rights. Obviously, this a non-zero-sum game since it is possible for both players to lose (1,1) and for neither to lose (3,3).

I have said enough, I think, to convey a general sense of what game theory is. I now want to illustrate its usefulness for thinking about divine providence.

5. Game Theory and Divine Providence

Consider the following passage from Jeremiah 18:7–10 (NASB):

> At one moment I might speak concerning a nation or concerning a kingdom to uproot, to pull down, or to destroy it; if that nation against which I have spoken turns from its evil, I will relent concerning the calamity I planned to bring on it. Or at another moment I might speak concerning a nation or concerning a kingdom to build up or to plant it; if it does evil in My sight by not obeying My voice, then I will think better of the good with which I had promised to bless it.

This passage tells us that God will adjust his strategy from blessing to punishing (or vice-versa) in response to whether a particular nation submits to God or rebels against him. Throughout the Old Testament we see this dynamic at work: the people rebel, God chastises them, the people repent, God blesses them, the people rebel, etc. We can model this interaction by employing an extension of standard game theory called the 'theory of moves',[27] in which players are allowed to change their strategy in response to what the other players do. Before we can construct a game-theoretical model, though, we have to make some assumptions about the values or preferences of the respective players. I suggest the following:

a. The people unequivocally prefer for God to bless rather than punish them.
b. All other things being equal, the people would prefer not to obey God.
c. God unequivocally prefers to bless the obedient and to punish the disobedient.[28]
d. All other things being equal, God prefers obedience over disobedience.[29]

Employing these assumptions gives us the following payoff matrix:

[27] Brams, *Theory of Moves*.
[28] A loving God would, of course, prefer not to have to punish anyone, but given disobedience, it is nonetheless true that a loving God would prefer to punish than to let the disobedient get off scot-free. "The Lord disciplines those he loves" (Prov. 3:12; Heb. 12:6, NIV). In addition, we should remind ourselves that divine punishment need not involve special divine intervention, an idea colorfully depicted in one of Gary Larson's *The Far Side* comic strips, in which God is sitting at a computer terminal poised to press the "smite" button. Rather, more often than not, God punishes us by simply letting us reap the consequences of our sins (cf. Romans 1:24–27). See J. Budziszewski, *The Revenge of Conscience* (Dallas: Spence Publishing, 1999), for a detailed account of how sin, if not dealt with by confession and repentance, leads us down a path of self-destruction.
[29] While I think these assumptions are Biblically plausible, they are purely for illustrative purposes. Different assumptions would alter the dynamics of the game, but they would not invalidate the applicability of game theory, which is what I'm trying to illustrate.

		God	
		Bless	Punish
Israel	Obey	God blesses an obedient Israel (3,4)	God punishes an obedient Israel (1,2)
	Disobey	God blesses a disobedient Israel (4,1)	God punishes a disobedient Israel (2,3)

Given God's assumed preferences, the Obey/Bless state is his ideal. Next-best is the Disobey/Punish state because, despite the people's disobedience, his justice is maintained. Next-worst is the Obey/Punish state because, while the obedience of the people is desirable, punishing obedience is at odds with God's justice. Finally, God's worst state is one in which the people are blessed even though they are disobedient.[30] As for the people of Israel, given their assumed preferences the ideal state is one in which they can "have their cake and eat it too" by enjoying God's blessings without the supposed burdens of obedience. Next-best for them is to enjoy God's blessings while remaining obedient to God. Next-worst for them is to be punished by God for their disobedience. And the worst state would be to suffer the chastisement of God in addition to the putative burdens of continued obedience. It is important to bear in mind here that the numbers (1–4) are ordinal *rankings*, not absolute values. So it is possible that God's best state (Obey/Bless) is *much* more preferable for him than any of the other states.

Now, under standard game theory, each player is assumed to select a strategy and to stick with it (at least until the next round of play). Given just a single round of play, we would expect this game to have a Disobey/Punish result since Israel has a dominant strategy[31] of disobeying

[30] One might wonder whether these last two make sense given that God is necessarily just. I think they do for, this side of the eschaton, God's blessings and punishments are often mixed, just as obedience and disobedience are often mixed in our lives. Thus, God graciously "causes His sun to rise on the evil and the good, and sends rain on the righteous and the unrighteous" (Matt. 5:45, NASB). Likewise, God allows trials to come upon the saints so that they may become "mature and complete" (James 1:3–4, NIV). A just God will not bless disobedience *per se* or punish obedience *per se*, but he can bless (punish) in some respects those who are disobedient (obedient) in other respects.

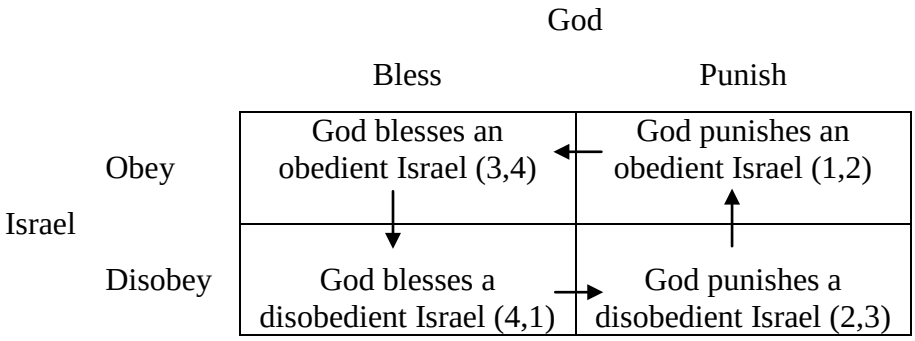
[31] A strategy is *dominant* for a player if it always leads to outcomes that are at least as good, and sometimes better, than those of any alternative strategy.

and, knowing that, God's preference would be to punish. But in reality neither side is locked into these strategies. In standard game theory, we could imagine a series of repeated plays of the same game. In such situations, the best overall strategy may be a 'mixed' one, in which one randomly alternates between two or more different strategies in a ratio determined by the relative values of the payoffs.[32] Unfortunately, we can't do this kind of calculation here because we know only the relative *rankings* of the payoffs, not their relative *values*. This is where the 'theory of moves' comes in. Rather than thinking about repeated plays of the game from a hypothetically neutral starting position, we can start out *in* one of the four possible outcome positions (Obey/Bless, Obey/Punish, Disobey/Bless, Disobey/Punish) and think about whether one player or the other would have an incentive to *move* to a different result by altering their strategy.

Let's assume, for example, that God and Israel start out in the Obey/Bless state. Given Israel's assumed preferences, so long as the people think they can get away with disobedience, they have an incentive to disobey. Thus, after the people have enjoyed God's blessings for awhile, they start taking those blessings for granted and suppose that obedience is not necessary to continue receiving them. If they make this inference, they will move the game from Obey/Bless to Disobey/Bless. But, clearly, this development is intolerable for God. He cannot allow disobedience to go unpunished. So in response he naturally adjusts his strategy and moves the game to Disobey/Punish. Now under the chastisement of God, Israel is in an undesirable position. To go back to enjoying God's blessings they have to shift their strategy back to Obey. This moves the game to Obey/Punish, which leads God to change his strategy to Bless since he doesn't want to discourage obedience by continuing the punishment. So the people repent, and God relents, and

[32] For example, in repeated plays of Rock-Paper-Scissors, the best overall strategy is a mixed one in which players randomly choose between the three options in an even 1:1:1 ratio. All other overall strategies will give an astute opponent a long-term advantage. For details, see J. D. Williams, *The Complete Strategyst: Being a Primer on the Theory of Games of Strategy* (New York: Dover, 1986), 98–100.

the game returns to its starting point of Obey/Bless. We can illustrate the cyclic nature of this game by adding arrows to the payoff matrix:



What we see with this example is that game theory can be used to model dynamic interactions among players over time. In this case, it helps us to model, with some degree of accuracy, actual historical interactions between God and Israel. The cyclical nature of this particular game stems from the faulty assumption,[33] that disobedience is (all other things equal) preferable to obedience, so that if one can plausibly "get away with it," one should. Replacing that with the assumption that obedience is categorically better than disobedience changes the game to a win–win situation in which both parties agree that Obey/Bless is the optimum state and neither side has an incentive to change strategies:

		God	
		Bless	Punish
Israel	Obey	God blesses an obedient Israel (4,4)	God punishes an obedient Israel (3,2)
	Disobey	God blesses a disobedient Israel (2,1)	God punishes a disobedient Israel (1,3)

[33] First proposed to Eve by the serpent in the Garden of Eden (Genesis 3:4–5).

It must be stressed that *changing preferences changes the game*. Hence, unlike the Chess Master and other analogies, game theory does not give us a *single* concrete model for divine providence. Instead, it gives us an abstract and flexible tool that can be used in developing concrete models for specific occasions. From a game-theoretical perspective, God emerges as a supremely wise, infinitely intelligent Game Master who is simultaneously playing countlessly many games involving different players with different preferences in a variety of different situations. The constant in all of these games is the essentially wise and loving nature of God, who is working in all situations to bring about the best results not only for himself, but also for the other players as well. But given the different situations in which various players are situated, God's best strategy for dealing with one person may not be the same as his best strategy for dealing with another. Different situations constitute different games, which require different strategies. The nice thing about game theory is that it gives us a systematic framework for thinking about interactive decision-making in which we can make our analyses as fine-grained as we wish to accommodate whatever factors we deem relevant. This gives us tremendous flexibility in thinking about divine providence and in so doing it marks a considerable advance over the Chess Master and other analogies.

There are a few general results of game theory, both in its standard and dynamic (i.e., theory of moves) variants, that are of interest with regard to divine providence. One important result from the standard theory is that one's best overall strategy is often a 'mixed' one. This result may be helpful in addressing the problem of evil. The question is often asked why if God intervenes to eliminate or prevent suffering in *some* cases, he doesn't do so in *all* relevantly similar cases. The answer suggested by game theory is that, given God's value preferences, a mixed strategy in which he sometimes intervenes and sometimes doesn't is the overall optimum

strategy for God. Developing and defending this response, of course, would require spelling out what God's value preferences might be and showing, in light of those preferences, that a mixed strategy is indeed God's overall optimum strategy. I shall not attempt to do that here.[34] I'm simply pointing out that this is a way in which game theory may be able to help us deal with one aspect of the problem of evil.

Some results from the theory of moves also deserve mention. Steven J. Brams, a chief architect of the theory, has identified several different types of 'power' that a player can use to influence the moves that other players make.[35] These different types of power may be helpful in illuminating aspects of God's omnipotence. One type of power that Brams identifies is 'threat power'—sometimes a player can influence the other players by threatening a *mutually disadvantageous* outcome. In the Bible, God exercised this kind of power when he sent prophets to the Israelites to warn them of punishment if they didn't repent. God didn't *want* to punish the Israelites. Nor did the Israelites want to be punished. So Disobey/Punish was a mutually disadvantageous result. But since God is willing and able to enter that state should the people persist in rebellion, he wields a credible threat. Closely connected with God's threat power is God's 'staying power'. In a mutually disadvantageous situation, the player that has the ability or the resources to "hold out" longer can generally induce the other player to compromise on the former's terms. For example, in Chicken, the more courageous (or, rather, foolhardy) driver will usually win because he is prepared to hold out under the threat of collision longer than the other player. Similarly, since God is generally prepared to mete out punishment longer than we are

[34] Though he doesn't make any explicit appeals to game theory, William Hasker's (2008) recent argument that God is justified in allowing some gratuitous evils effectively amounts to a defense of a 'mixed strategy' on God's part. See William Hasker, *The Triumph of God over Evil: Theodicy for a World of Suffering* (Downers Grove, IL: InterVarsity Press, 2008).

[35] Brams, *Theory of Moves*, esp. chapters 4 and 5.

prepared to endure it, he can often induce repentance (at least for a time).[36] A third kind of power identified by Brams is 'moving power'. A player has this kind of power in a cyclic game[37] if she can keep going (switching strategies, etc.) longer than the other player(s). An analogy is that of a boxer who has the stamina to go more rounds than the opponent. God's eternality guarantees that he will normally have this kind of advantage in cyclic games. By outlasting the other players, he may be able eventually to get them to compromise on his terms (assuming the game runs long enough).

There's a lot more that could be said here in terms of modeling divine providence by means of game theory. Ideally, we would like to be able to come up with an accurate description of the 'Pre-Creation Game', a model of God's options and preferences prior to creating[38] that explains why God chose to create the kind of world that, as far as we can tell, he has created. But given the limited amount of information we have about God's creative preferences, probably the best we can hope for is a plausible rough sketch. Toward that end, I offer in the next section some reflections on the *value* that different strategies might have for God in the Pre-Creation Game.

6. The Value of a Game

The Pre-Creation Game is a preliminary or meta-game in which God chooses what type of Creation Game he wants to play. According to the traditional theistic position, one of God's available strategies in the Pre-Creation Game is not to create. He could have refrained from playing any sort of Creation Game. Though that idea is disputed by process theists, even they will agree that God did not have to create the particular sort of world that he has. He could have

[36] This depends, of course, on whether those being punished recognize that it is a consequence of their sins.
[37] A cyclic game is one like the Bless/Punish game discussed above in which play tends to go in recurring cycles.
[38] I intend "prior" here to have sense of *explanatory* priority and remain noncommittal on the relation between that and *chronological* priority.

chosen to play a different kind of Creation Game than the one he has in fact chosen to play. In any case, God had a wide array of creational strategies to choose from. Does he enter into a Creation Game involving other free and rational players? If so, what kinds of players? What abilities will they have? What kinds of preferences will they (typically) have? And so on. As with any game, to model it we need to specify the *value preferences* that the players have with respect to the possible outcomes of their available strategies. For that reason, application of game theory to divine providence encourages, indeed, *requires* us to think about the comparative *value* of God's choices. As already noted, neither the Chess Master nor any of the other analogies that we've looked at explicitly lend themselves to this sort of reflection.

With respect to the Pre-Creation Game, I therefore pose the questions: What possible motivation could God have for creating this kind of world, or any world at all? Why would God prefer to play one kind of Creation Game as opposed to one of the alternatives? While we should bear in mind that what God values in a game may differ significantly from what we tend to value in a game, we should nonetheless hope that we can understand how those differences follow from the differences between divine and human nature. I say we should "hope" this because, to the extent that *we* cannot make sense of the differences between divine and human motivation, to that extent *we* will not be able to spell out the Pre-Creation Game in a manner that sheds light on God's providential wisdom in creation. In what follows, therefore, I operate on the assumption that God's ways, though "higher" than our ways (Isaiah 55:9), are analogically related to our ways sufficiently closely for us to make tentative inferences about the structure of the Pre-Creation Game.

Intuitively, there are at least four overlapping factors that can make a game intrinsically more worth playing, at least where human players are concerned. These are *strategic complexity*,

artistic elegance, *significant and diverse outcomes*, and *uncertain outcomes*. We can appreciate the relevance of degree of strategic complexity by contrasting chess with, say, tic-tac-toe. The latter is such a simple game that it is of little interest to anyone but the very young, who quickly outgrow it. As for chess, it is sufficiently complex that, despite centuries of close analysis, it continues to yield new tactical surprises. While it is easy to learn the basics of chess, it requires considerable analytic and imaginative skill to play well. Of course, if a game is *too complex*—if it overtaxes the capacities of the players to find reasonable strategies—then no one will want to play it. For an infinitely intelligent God, however, over-complexity is simply not an issue. Hence, if there is any value in God's placing limits on the complexity of the Creation game, it seems that those limits would have to stem from his desire to accommodate other, *finite* players, to make the game one that would engage and maintain *their* interest, one that *they* could effectively participate in, one in which he could communicate to *them* something of the grandeur of his power, intelligence, wisdom, and love. All other things being equal, therefore, we should expect that God would choose to play a Creation Game having a relatively high degree of strategic complexity.[39] Clearly, this corresponds rather well to what we see in the world, namely, a game played on a cosmic scale over an enormous span of time and involving vast multitudes of free and rational players.

In addition, the best games (for us) are not merely strategically complex, but also have an elegant, aesthetically pleasing sort of complexity. Chess, for example, is an elegant game. It is structured in a coherent and balanced manner that allows for a high degree of strategic and tactical creativity. When well-played, it is an art form. In games involving teams, such as soccer or basketball or an orchestral production, there can be artistry not only in the individual performances of a Pelé, a Michael Jordan, or a Yo-Yo Ma, but also in the coordination of the

[39] Relatively high, that is, as judged from our perspective.

team or group as a whole. As the one who has created us and given us our basic aesthetic sensibilities, it is reasonable to expect that God would prefer to play a Creation Game that has a fundamental elegance to it. Again, this corresponds well to the world as we know it from the natural sciences. The fine-tuning of the cosmos, the elegant simplicity of the fundamental physical equations, and the natural beauty of the Earth all testify to the idea that God values artistic elegance.[40]

Another desideratum (for us) is that a game have significant and diverse outcomes in which differences in outcomes are predictably, though not necessarily inexorably, correlated with the players' strategic choices. Thus, in the game of life in which we all find ourselves, we each have a variety of strategies to choose from. For this choice to be worth taking seriously, for the game to be worth taking seriously, for it to be worth our while to commit significant time and energy to a given course of action, there must be a reasonable likelihood that our commitment will result in a significant good or prevent a significant harm or both. In other words, if none of our choices tended toward outcomes that were significantly better or worse than others, then it wouldn't much matter what choices we made. Hence, it wouldn't much matter whether we played the game well or poorly, or whether we played the game at all. Games that offer significant outcomes are, therefore, better games, more worth playing, than those that don't. If that's right, then it is reasonable to expect that God would prefer to play a Creation Game in which the stakes, both for himself, and for the other players, are non-trivial. As evidenced by, among other things, the crucifixion of Jesus, it seems that God has chosen to play a very significant game indeed.

Finally, the best games (for us) have uncertain outcomes. Of course, we wouldn't want outcomes to be *completely* uncertain, otherwise there would be no predictable correlations

[40] On the impressive evidence for cosmic fine-tuning, see John Leslie, *Universes* (London: Routledge, 1989). On the ways in which Earth is ideally situated in the universe, see Guillermo Gonzales and Jay W. Richards, *The Privileged Planet: How Our Place in the Cosmos is Designed for Discovery* (Washington, DC: Regnery Publishing, 2004).

between strategies and outcomes. And if that were the case, then winning would be a matter of sheer luck, not skill. When outcomes are only partially uncertain, the game becomes a risky one, but one in which skill can make a real difference. The main reason why the best games have uncertain outcomes is because those that don't are comparatively *boring*. That's why so many games involve randomizing devices, like dice or shuffled cards. That's why people don't want to know in advance who is going to win the Super Bowl or the World Series. It eliminates the suspense. For games like chess, knowing exactly how the game was going to go would obviate any reason for actually playing it through. One could just contemplate the series of moves in one's head. Similarly, if God knew exactly how the Creation Game was going to play out, then one wonders why he would actually initiate the game rather than simply contemplate a virtual "creation." To be sure, an orchestral performance has a predictable outcome and can still be enjoyable to experience, but that's because our imagination is not as vivid as the actual experience itself. But there is every reason to believe that God's imagination is perfect, that he can contemplate a possibility as vividly as if it were actual. Hence, it is at least somewhat unclear why God would choose to initiate a Creation Game unless it were one in which not even he could predict with certainty exactly how it would turn out. At any rate, there is some Biblical confirmation that this is indeed the sort of Creation Game that God has decided to play.[41]

In summary, reflection on the factors that contribute to the value a game has for us, in conjunction with the assumption that divine motivation is analogically similar to human motivation, suggests that God would prefer to play a Creation Game in which there is a high degree of strategic complexity involving large numbers of free players with a wide variety of skills. It suggests that the Creation Game as a whole would have a high degree of artistic elegance, in

[41] For example, Boyd, *God of the Possible*; Sanders, *The God Who Risks*; Michael R. Saia, *Does God Know the Future?* (Fairfax, VA: Xulon Press, 2002); and Clark Pinnock *et al*., *The Openness of God* (Downers Grove, IL: InterVarsity Press, 1994).

which the basic 'pieces' cohere together in profound and beautiful ways. It suggests that God would want the Creation Game to be a meaningful one, with potentially high stakes for the players involved, including God himself. And, finally, it suggests that God would rather have a Creation Game in which there is some degree of genuine risk for him, such that there is no advance guarantee that all of his specific preferences will be met. In short, these reflections suggest that God would play the very sort of Creation Game that open theists believe he is playing.

From a *non-open* theist perspective, God's rationale for playing any sort of creation game remains somewhat opaque. According to theological determinists like John Calvin and Jonathan Edwards, God has chosen a risk-free strategy that involves his ordaining what all of the created players will do. But if that's so, then created players are not genuine *players* in the game-theoretical sense.[42] Instead, they are like the pawns on the chessboard and it is as though God were playing chess with himself. Alternatively, the type of Creation Game envisaged by theological determinists is analogous to God's playing a game of solitaire with a stacked deck. For us, playing that sort of game might be a way to "kill time," but it would hardly be very interesting or challenging. Thus, it is unclear at best why God would choose to play such a game. The standard Calvinist answer, which appeals to God's glory, is not very convincing. Didn't God already have all the glory? And what's so glorious about winning at a game when you minutely control all the variables? Matters stand somewhat better for non-open *free will* theists, such as Molinists. On their account, created players are genuine players. God doesn't exhaustively control them. But, nevertheless, God has risk-free certainty exactly how the game will unfold. Still, there remain a difficulty here in explaining why God would create at all. Why wouldn't a virtual "creation" be just as good from God's perspective?

[42] Brams defines a 'rational player' as "an actor with free will who makes rational choices, in light of the presumed rational choices of other players in a game" (Brams, *Theory of Moves*, 226).

7. Conclusion

My goal in this paper has been to move beyond the Chess Master analogy for the open theist model of divine providence by moving, not to another concrete analogy, but to a more abstract level of reflection that draws on the resources of game theory. To that end, I began by discussing the comparative strengths and weaknesses of several analogies to show that all of them fail to satisfy one or more criteria that an open theist model of providence ought to meet. That led us to game theory, which, because it starts at a very high level of generality, has the flexibility to capture the strategic nuances of God's providential dealings, and to do so in a way permits us to draw inferences from a model more rigorously than we could do otherwise. After outlining the basics of game theory, I illustrated its usefulness in illuminating the cyclical pattern of God's dealings with Israel, as recorded in the Old Testament. Following that, I turned to the question of *value*, an issue that game theory explicitly calls to our attention. Reflections on the factors that contribute to the value of a game, I argued, suggest that the sort of Creation Game envisaged by open theists is the very sort of game that God would choose to play. Whether or not that is right, however, my main contention is that game theory is useful for thinking about divine providence and a valuable resource for moving beyond half-baked analogies.[43]

[43] My sincere thanks go to Kevin Diller and Joseph Jedwab for helpful comments on an earlier draft of this paper.