

Genes in Genesis: Evolutionary Psychology and the Bible as Literature

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Introduction

“The Old and New Testaments are the Great Code of Art,” proclaimed William Blake in one of the captions of his etching, *Laocoon*.¹ In *The Great Code: The Bible and Literature*, Northrop Frye replicated part of that proclamation and elaborated some of its implied claims.² If indeed the Bible can be said to encode a substantial portion of Western culture’s imaginative, historical and legal heritage, then its first book, Genesis, can be regarded as the Code for the Great Code, since so much of what appears in the subsequent 65 books seems to grow out of it. Genesis’ title is amplified in the names of some of its recurrent themes and images: generation, generations, genealogy, gender, genitalia. The common root of all these words suggests yet another code: that which is carried by genes.³

Frye observed that Genesis’ “primary concern is expressed in the Biblical phrase “life more abundant,” and J.P. Fokkelman showed coherence in the book’s motley mosaic of stories with the discovery that its “overriding concern [is] life-survival-offspring-fertility-continuity,”⁴ but neither critic associated these concerns with the evolutionary perspective they suggest. Until recently it’s been left to contemporary novelists versed in biology and literature to explore some of the rich meanings that flow from the convergence of Genesis and evolutionary principles, for instance Ruth Ozeki in *All Over Creation* and Barbara Kingsolver in *Prodigal Summer*.⁵

Genesis rewards literary analysis because of its complex structure and plot, its concentrated characterization, its vibrant language and its rich but submerged themes, accompanied by what Robert Alter calls “the high fun of the act of literary communication... the lively inventiveness ...[which] repeatedly exceeds the needs of the message, though it often also deepens and complicates the message.”⁶ Such analysis can be enriched by combining the relatively rigorous scientific methods of evolutionary psychology with some of the inventive and fanciful tactics of traditional Midrashic interpretation to the task of making sense of the book.⁷ That combination seems appropriate to a work which is itself a product of literary evolution--the outcome of a thousand-year history of competition among oral traditions, written documents, individual and group authors and editors assembled in the palimpsest of the received text.⁸

Genesis prompts Darwinian analysis because it traces human history back to its beginnings, where it locates the origin of what came later. It chronicles a period of prehistory that figuratively parallels the one and a half million year Pleistocene period that Darwinists refer to as the Environment of Evolutionary Adaptation (EEA), the span

of time long enough to allow most human traits to evolve.⁹

Darwinian interpretation explores the operation of the principle of evolution in literary works, depicting what Jonathan Gottschall calls

the fascinating multiplicity of ways characters react to and manipulate their environment (the setting and the other characters) to accomplish the prime directive of all life: to live long enough to reproduce and, in species where parental care is necessary (like ours), rear young to reproduce again....¹⁰

Genesis personifies that principle in its characterization of the Creator. Its God designs both animal and human life during their common emergence on days five and six by pronouncing the two parts of evolution's "prime directive": "I have given you every seed bearing plant ...for food...and to all which has the breath of life within it." (1.29) "...be fruitful and multiply and fill the earth..."(1.28)

Genesis' God repeatedly affirms evolution's positive outcome of reproductive success as the reward of those whom He has chosen and trained--from Adam at the beginning of the book to the sons of Israel at the end: "I will greatly bless you and will greatly multiply your seed, as the stars in the heavens and as the sand on the shore of the sea, and your seed shall take hold of its enemies' gate."(22:17)

Genesis' word for "seed" --*zera* in the original Hebrew—has several meanings that converge with those of "gene."¹¹ It signifies the originating kernels as well as the foodstuff of fruit and grain--the source of sustenance for animals and humans. It signifies semen, half of the material agency of reproduction. It signifies individual progenitors and progeny connected by inheritance--the generations of genetic relatives who extend personal existence beyond the bounds of individual mortality. It signifies lineage, the mark of kinship drawing individuals together into a survival unit, a community, and eventually, a nation.¹²

Joseph, the culminating hero of Genesis, epitomizes all of these meanings of "seed." He distributes seed during famine; he preserves enough grain to feed the world; he procreates two sons, one of whom is named Ephraim, meaning "he has made me fruitful"; at his death, he joins his father and mother in their tomb; and he paves the way for his wise descendant Solomon "whose people, Judah and Israel, were as many as the sands of the sea."¹³

Genesis establishes literary coherence among narrative units with genealogies that catalogue the succession of seed through numerous generations, binding its many discrete stories into the history of a single genetic strain. Later uses of the text call attention to the importance of this genetic continuity. The first edition of the King James Bible begins with thirty-four folio pages of genealogical charts tracing lineage from Adam to Christ, while the succession of deaths and births of relatives is still recorded on pages inserted in family Bibles.

The operation of the principle of evolution is determined by the "algorithm" of Natural Selection formulated by Darwin in *Origin of Species*:

Through the preservation of favoured individuals and races, during the constantly-recurrent Struggle for Existence, we see the most powerful and ever-acting means of selection. The struggle for existence inevitably follows from the high geometrical ratio of increase which is common to all organic beings. ...

These laws, taken in the largest sense, being Growth with Reproduction; inheritance which is almost implied by reproduction; Variability from the indirect and direct action of the external conditions of life, and from use and disuse; a Ratio of Increase so high as to lead to a Struggle for Life, and as a consequence to Natural Selection, entailing Divergence of Character and the Extinction of less-improved forms.¹⁴

Genesis begins at “Growth with Reproduction; inheritance” and proceeds to the more complex and turbulent aspects of natural selection: “the struggle for Life,” “Variability,” “Extinction of less improved forms,” and consequent adaptation.

Natural selection arises from three conditions: 1) individuals compete for the resources to stay alive and procreate, 2) they compete for reproductive success through sexual selection--finding mates and raising offspring that preserve and proliferate their genes, and 3) over long periods of time, species adapt, that is, they change in ways that increase their likelihood of survival and reproduction. Such adaptive changes are carried out through improved design of the physical organism and through the adoption of adaptive behaviors.

Adaptive behaviors are patterns of response to recurrent environmental challenges. The brain circuits, or programs that enable adaptive behaviors, become “incorporated into a species’ neural design.”¹⁵ Assemblages of such software circuits evolved as “cognitive domains,” just as the eye and ear, for example, evolved as hardware. Their blueprints were replicated and transmitted by genes in “the seed,” just as were the blueprints for organs.¹⁶

Adaptive behaviors produced by natural selection include tool use, kinship selection, status competition, territoriality, coalition building, reciprocity, indirect reciprocity and in-group/outgroup discrimination. These adaptations are observed in primates as well as in remnants of hunter-gatherer societies. This essay argues that evolutionary psychology’s account of the development of cognitive and behavioral adaptations offers a key to decode many of Genesis’ particular incidents as well as its overall design.

The Primeval Narrative

Creation

Genesis’ opening account of creation (1.1-2.2) has a formalistic perfected structure. It traces a progression from chaos to coherence, fluidity to stability, simplicity to complexity. Vegetable, animal and human life are defined by fertility and replication and are ordered by genetic inheritance: “Let the earth grow grass, plants yielding seed of each kind and trees bearing fruit of each kind, that has its seed within it.”(1.11) All animals

including people are sustained by vegetable life. To the first humans, simultaneously created male and female, God says, “I have given you...every tree that has fruit bearing seed, yours they will be for food.”(1.29) The execution of an apparently premeditated plan is judged by the Creator at every stage as “good” and celebrated at its completion as “very good.”(1.31)

The alternate account of creation which follows introduces the instability, conflict and mortality that natural selection adds to “Growth with Reproduction.” Here the first human is a male molded out of soil before the appearance of vegetation and animal life. God places him in a garden planted for his sustenance but this time adds a caveat. Rather than being invited to eat from “every tree,” the human is warned about the difference between fruit that is good and that which appears good but actually does harm: “from every fruit of the garden you may surely eat, but from the tree of knowledge of good and evil, you shall not eat, for on the day you eat from it, you are doomed to die.”(2.16-17)

Whether or not the fruit is actually poisonous, the prohibition initiates the creature into learning what he must to survive: that some options are safe and others are dangerous.¹⁷ This command specifies that humans are created with the ability to choose between alternatives that either promote or reduce their chances of survival. The totality of such individual choices underlies the operation of natural selection as well as the patterns of behavior discovered by experimental studies.

The command introduces a theme whose relevance to survival and adaptation will become more evident once a larger population of human beings has emerged. It takes the form of an implied contract of reciprocal benefits and costs that might read: “I’ve provided you with the benefit of immortality and easy subsistence in a congenial environment in return for your refraining from eating one fruit and challenging my authority.”

Reciprocity requires altruistic behavior from individuals—a sacrifice of short-term interests in exchange for long-term returns. Evolutionary psychologists regard such reciprocity based on the restraint of individual interests as an adaptation that evolved to temper competition for resources and enable social cooperation. A multitude of experiments have demonstrated that individuals choose altruistic behavior through cost-benefit calculations. The continuation of altruistic behavior depends upon upholding the assumption that one’s own sacrifice will be compensated by the sacrifice of others.¹⁸ Failure to reciprocate is labeled as “defection,” “free-riding” or “cheating.”¹⁹ The more individuals who cheat, the greater the cost to those who remain altruistic. If cheating can’t be controlled, altruism and reciprocity disappear and the community breaks down. Natural selection has evolved specialized “cheating detection” modules in the brain and social mechanisms of punishment to deter it.²⁰

In another telling contrast between accounts of creation, the first version’s depiction of reproduction as identical in animals and humans is succeeded by the second version’s delineation of gender and sex as problematic from the start. God revises his earlier assessment of the creation on the sixth day, saying “It is not good for the human to be alone.”(2.18) Here he proceeds by trial-and-error rather than by design, employing

surgery to craft a partner as the remedy for a deficiency in his original creature. After pain, the solution will afford pleasure: “the two of them were naked, the man and the woman and they were not ashamed.”(2.25)

Adam celebrates his new companion’s birth day: “...bone of my bones/ and flesh of my flesh/This one shall be called woman/for from man was this one taken. Therefore does a man leave his father and mother and cling to his wife and they become one flesh.”(2.23) But his words foreshadow the first couple’s imminent departure from the parent and introduce the conflicts of sexual selection.

The Fall

The serpent, not yet associated with threat, encourages Eve to disobey the prohibition, thereby violating reciprocity. As punishment, God imposes the real rigors of natural selection: 1) individual life is bounded by mortality but carried forward through genetic inheritance of offspring and 2) environmental resources fall short of the expanding requirements of offspring, leading to a struggle for existence and survival of the fittest.

Eve and her partner are condemned to eventual death and exiled from the easy fruit-gathering regime of the garden to a setting where they will have to deal with life-threatening animals, snakes in particular.²¹ There they will have to endure the rigors of tilling the soil to produce the seeds and fruit that nourish them. Rough weather will require clothing. Their love-life will be fraught with the tensions of domination and desire, and childbirth will be painful and risky.(3:16)²²

In their state of prelapsarian ignorance, they would be unfit to survive in this environment. However, eating the forbidden fruit of “knowledge of good and evil” allows for positive adaptations brought about by natural selection: the development of intelligence and a moral code.²³ The association between these adaptations and post-lapsarian reproduction, with its demand for handling emotional challenges and parental responsibility, is underscored by the Biblical word for sexual intercourse, “to know.”²⁴ The pains of human childbearing are partly attributable to the oversized head of the fetus required to house the enlarged human brain.²⁵

Evolutionary psychologists postulate that adaptive cognitive development proceeds by the evolution of distinct “domain-specific” capacities--cognitive modules housed in different sections of brain tissue--just as different organs of the body evolved to carry out distinct physical functions.²⁶ One kind of knowledge—tool knowledge or an “object mechanics system”—allows the first humans to adapt to demands of survival in a harsh environment with the inventions of clothing, shelter and agriculture.²⁷

The other kind of knowledge cultivated through adaptation is categorized as “social intelligence” or “Machiavellian intelligence.”²⁸ The serpent’s “cunning” consists of its ability to imagine what is in the woman’s mind and thereby to convince her that it knows what’s in God’s mind: “For God knows that on the day you eat of it your eyes will be opened and you will become as Gods, knowing good and evil.”(3:5-6)²⁹

This capacity depends upon a “mind reading system” or “Theory of Mind” cognitive module evolved to anticipate the behavior of predators, prey, competitors and allies by imagining their mental states.³⁰ Such empathic ability also enables the deception of others by facilitating the fabrication of false clues inducing mistaken inferences about the deceiver’s mental state.

Eating the fruit and attaining the “knowledge of good and evil” leads Adam and Eve to try to deceive God—first by hiding when he calls them, and after being discovered, by covering themselves with the excuse that they needed to hide their nakedness. God detects the ruse and exposes it with accusations disguised as questions: “Who told you that you were naked? From the tree I commanded you not to eat have you eaten?”(3:11-12) In doing so he employs yet another module co-evolved in a “cognitive arms race” with the one for deception: the capacity for “detecting faked and insincere emotional signals.”³¹

Cain and Abel

The adaptations that meet the challenges of their hostile environment allow Adam and Eve to procreate and achieve the reproductive success catalogued with a long genealogy of descendants in a following chapter.(4:16-5:32) But the fact that their the first child murders the second illustrates a primal “recurrent environmental challenge.” Natural selection starts as a zero sum game, with “individual fitness” rewarding the strongest competitor at the expense of others. Cain’s crime is driven by competition for limited resources, here the approval of the Deity. But natural selection has evolved an adaptation responding to this challenge called “kinship selection,” which mitigates intrafamilial competition by selecting for “inclusive fitness.”³² More genes of each of two brothers of the same parents are likely to survive in the next generation if they both live and reproduce than if only one survives. God tests Cain by showing favor to his sibling and instructing him to restrain his jealousy in order to teach this, but Cain defiantly refuses: “am I my brother’s keeper?”(4.10) Like Adam and Eve’s, Cain’s fitness-reducing choice is punished with exile. The failure of the adaptation to work frustrates God, as becomes evident in the next story. The ultimate resolution of sibling rivalry by kinship selection becomes the burden of the later narratives of Jacob and Joseph.

Another element of this story also recapitulates Adam and Eve’s defection. Cain is provided the benefit of the power to resist temptation: “At the tent flap sin crouches/and for you is its longing/but you will rule over it.”(4:7) But he fails pay the cost of restraint. He employs deception when luring Abel to his death and when trying to hide his crime. God again foils deception with interrogative tactics that bring on self-disclosure.³³

Noah and the Flood

In the next story the specific crimes aren’t specified, but it is asserted that all people had done evil in the Lord’s sight except for Noah and his family.(6:5-6) From the perspective of evolutionary psychology, one can infer that this evil consists of failures of kinship selection as well as of wider applications of reciprocity that could allow for the existence

of communities. Though later regretted, the cataclysmic scale of the punishment here follows upon the ineffectiveness of earlier efforts to deter defection and cheating. The story teaches that even a small group that practices reciprocity when others defect will be selected for survival and reproduction. In a narrative motif repeated throughout the Bible to emphasize this lesson, spectacular penalties are accompanied by the salvation of a chosen few, who witness the destruction of the many with terror, and with heightened joy at their own deliverance.

Practical adaptation skills, both tool knowledge and social intelligence regarding animals, also enhance the fitness of Noah's family. To provide for the biodiversity in their trust, they are counseled to hoard nutriment: "take you from every food that is eaten and store it by you, to serve for you and for them as food"(6:21) and given precise instructions for constructing a seaworthy lifeboat.³⁴ And Noah exercises survival skills by taming beasts, observing the behaviors of raven and dove, and from them learning the moment to venture out.

This story emphasizes the principle of kin selection. Under the increased pressure of the natural catastrophe, Noah's family alone, along with their animal companions, restart the process of reproduction at the expense of all other competitors. Once the crisis has passed, however, kin selection breaks down into intra-familial competition. Ham, one out of three brothers, appropriates some of his father's reproductive powers by observing him naked when he's drunk and asleep. For that he is punished through his genetic descendants, who are condemned to be enslaved by the descendants of his siblings.(9:21-27)

Babel

The re-creation that stems from the survivors of the flood is tracked with a genealogy of Noah's descendants. "These are clans of the sons of Noah according to their lineage in their nations. And from these the nations branched out after the Flood."(10:32) Their dispersal "out of Africa" follows a Darwinian pattern:

As each species tends by its geometrical ratio of reproduction to increase inordinately in number; and as the modified descendants of each species will be enabled to increase by so much the more as they become more diversified in habits and structure, so as to be enabled to seize on many and widely different places in the economy of nature, there will be a constant tendency in natural selection to preserve the most divergent offspring of any one species.³⁵

The Patriarchal Narrative

Chapter 11's genealogy recording the descent of the founders of the dispersed nations of the world marks a transition into the second large subdivision of Genesis. The narrative structure here changes from a series of short discreet stories in which God is the only character who persists from one incident to the next to a continuous intergenerational saga chronicling the overlapping life histories of Abraham, Isaac and Jacob. Rather than by God's catastrophic interventions, the process of selection is accomplished by the

mechanisms of breeding, conditioning, and teaching through interactions among complex human characters in human history. Rather than stories representing all of humanity, the focus narrows to a single genetic strain. Emphasis falls upon adaptations that will promote successful social living in the chosen group, enabling its members to become founders of a nation that will achieve the reproductive success to out-compete rivals and establish future imperial dominance.

Survival

The biographies of Abraham and his grandson Jacob relate tales of testing for individual fitness. God orders Abram to leave his home in a Babylonian city and take up the rigors of a nomadic life in Canaan.(12) Abraham displays his strength as a fighter by defeating four local kings in battle before rescuing his brother Lot from captivity.(14) Jacob proves his mettle in the desert by walking alone hundreds of miles to his uncle's settlement in Harran, camping out with only a rock for a pillow(28) and by prevailing in an all-night wrestling match with an angel.(32) Their selection through these rites of passages is signified by honorific changes of name: Abram to Abraham, Jacob to Israel.

Sexual selection

The Patriarchal narrative places strong emphasis on the Darwinian theme of sexual selection:

Amongst all animals there is a struggle between the males for the possession of the females...The strongest and most vigorous men—those who can best defend and hunt for their families...would succeed in rearing a greater than average number of offspring.³⁶

Though individual characters are prominent, the unifying element of its stories is the “seed” they receive and transmit, whose future proliferation is mentioned in this section no less than forty times.

Frequent graphic references to the organs of generation--circumcised penises,(17) dried up or moist vulvas,(18) menstruating vaginas,(31) baby's arms reaching out of wombs(25)—and to a lurid variety of sex acts—anal rape,(18) daughter/father incest,(19) pimping a spouse,(12, 20, 26) the bed-trick(29)—contrast fruitless sexuality with the licit mating that yields children of promise. The truest loves produce preferred siblings after an extended trial period that includes matches with less favored wives or concubines whose offspring, like Ishmael, or Abraham's sons by Sarah's successor, Keturah, are disinherited.

The chosen seed is distinguished by extraordinary sex appeal that sometimes leads to trouble: the Pharaoh falls in love with Abraham's 70 year-old wife,(12,20) and so does King Abimelech,(26) who also cannot resist the allure of Isaac's wife, Rebecca. Jacob weeps with the joy of love at first sight of Rachel,(29) but must work fourteen years for her father to earn her hand, seven of them also married to her older sister, while the women vie for his nightly presence in their beds.(30) His reproductive success yields

twelve surviving sons, each of whom will be the genetic source of one of the twelve tribes of the future Israelite nation.

Jacob performs the kind of artificial selection that inspired Darwin's theory of natural selection by breeding goats, which, over generations, he chooses for the traits of dark and spotted coats.(30:35-43)³⁷ His success in that endeavor generates enough wealth to free him from indenture to his father in law.(30) Like the clever herdsman, Genesis' God prefers inbreeding over endogamy, observing the priorities of kin selection over numerousness of partners.³⁸ The chosen seed springs from Sarah, Abraham's half-sister, and not from Hagar, her unrelated slave girl. Abraham requires that Isaac's wife be found in the house of his brother in law.(25) Rebekah rejects Esau for marrying a Hittite woman and provides her favorite, Jacob, with the opportunity to find a spouse from among her own family, whose members are overjoyed with the match of first cousins.(27, 29)

God distinguishes his preferred line of descent with a badge that comes as close as possible to a genetic marker of adaptation: "You shall keep my commandment, you and your seed after you through their generations...You shall circumcise the flesh of your foreskin, and it shall be the sign of the covenant between me and you."(17:11) When the Canaanite Schechem and his brothers and father agree to endure such circumcision in order to intermarry with the Israelites, Jacob's sons butcher them all for dishonoring their sister, Dinah, while they're incapacitated from the surgery.(34)

Reciprocity: Abraham

Abraham's selection by God as the vehicle of his chosen seed depends largely on his character traits of altruism and reciprocity, as opposed to the self-seeking behaviors of Adam and Eve and Cain and the contemporaries of Noah. When his and his brother Lot's men fight because "the land could not support their dwelling together," Abraham says "let there be no contention between you and me...for we are kinsmen,"(13) and gives his brother first choice of territory, exemplifying the adaptation of kin selection. He shows extraordinary care for strangers who turn out to be emissaries of God, demonstrating the hospitality that serves as a universal example of faithful reciprocity.(18)

God cultivates those adaptive behaviors in Abraham with promises and rewards and strengthens them with the kind of tests failed by earlier candidates for selection. As exchange for future progeny and wealth, He demands the fleshly sacrifice of the foreskin and the psychological sacrifices of extraordinary patience and unquestioning obedience.

Abraham is taught patience by having to defer gratification of the promise of offspring with his wife Sarah until he is 90 years old. The challenge is intensified by her impatience and the family discord that results from her insistence he mate with her slave-girl Hagar. Abraham demonstrates the ultimate obedience during the cruel test that's posed by the demand to sacrifice his only son with Sarah.(22) Though such traits of heroic patience and obedience are necessary in a subordinate, they are also required of leaders, who must model the self-control, commitment, and personal sacrifice they demand from followers and who must persist in pursuit of their goals in the face of doubt and reversal.³⁹

In some incidents, Abraham's exceptional self-restraint and subordination is mixed with a portion of the self-assertion also required of leaders. He protests to God about the ejection of his unselected son, Ishmael(21:11-12) and he bargains with God to spare the innocent when He condemns the city of Sodom.(18:21-33)

Isaac

By contrast, the drawbacks of unqualified obedience are shown in the biography of Abraham's son, Isaac. Isaac learns obedience as a child in the same incident that tested his father. But his obedience offered no occasion for choice; the loving father bound him and took a knife to his throat without explanation, leaving the boy permanently traumatized, passive and ineffectual. He remains in an infantilized state his whole life, ruled by others, even during the process of reproduction. His father selects his mate,(24:3) her elaborate courtship is carried out by a servant,(24:9-63) and his choice of an heir is circumvented by trickery.(27:6-48)

Jacob

Isaac's offspring, Jacob, develops the optimum adaptive blend of self-seeking and altruism through painful experience, rather than by God's instruction. Jacob's life begins in the womb as a competitive struggle for precedence with his elder twin, Esau. Supported by his mother, he deceives his father and brother to gain dominance and control of the family patrimony. He uses technical intelligence in cooking and dressing and social intelligence to maintain coalitions and escape detection.(27:6-48)

Jacob's excessive competitiveness is punished by a trial, which develops the self-restraint required for reciprocity. To secure his preferred mate and earn his own fortune in livestock, he endures exile and the free-riding of his uncle Laban for fourteen years.(29-30) After paying more than his dues, he achieves wary reconciliations with the uncle who cheated him(31:25-54) and the brother and father whom he cheated.(32-33) This success qualifies his seed to found the future nation of Israel, which is given the Darwinian name conferred upon him by the angel, "he has struggled with God and man and prevailed."(32:23-33)

The Joseph Narrative

The last third of Genesis takes up the story of Joseph and his brothers, the sons of Jacob, the seed of Abraham. It reiterates the earlier stories' themes of adaptation but presents them in a more sophisticated structure and style. The whole section is comprised of a single plot with multiple layers of action rather than sequentially linked episodes. The characters are individualized and realistic, their words and deeds providing one another and the reader with evidence of inner consciousness different from what they outwardly project. The most striking change is that the world of the story no longer includes supernatural beings. God disappears as speaker and actor and is present only insofar as he's invoked by the narrator or by Joseph, who eventually seems to take upon himself God's directive role.

As the geographic background shifts from Canaan to Egypt, the setting changes from a world of tents and herds to scenes of civilized life: domestic intrigues in the house of the chamberlain, the dynamics of prison management, and politics in the court of the Pharaoh, where Joseph controls the fates of the population of the empire and its neighbors.⁴⁰ The expanded setting also expands the arenas of natural selection from family and tribe to the state. The adaptations of *direct* reciprocity, which make for the inclusive fitness of kinship groups and small bands, here lead to the adaptations of *indirect* reciprocity that group selection requires for the survival of a larger community. Indirect reciprocity is a system of exchange of benefits that involves third parties and depends upon reputation. Natural selection favors the person who develops a reputation for altruism on the basis of previous acts performed for others, and it confers benefits from fellow community members, like elevation of status, opportunities for partnership and material rewards.⁴¹

Joseph advances in Egypt through indirect reciprocity by building his reputation for self-restraint, obedience and loyalty, qualities that God cultivated in Abraham. Here they are displayed for the young immigrant's superiors--the chamberlain, the head jailer, and Pharaoh--in Joseph's resistance to Potiphar's wife's attempted seduction, in his advancement from prisoner to jail steward, and in his crediting all his political successes as the power behind the throne to the Pharaoh.(39-41) As in all hierarchical societies, animal or human, establishing alliances through reciprocity with friends in high places is essential to acquiring status.⁴²

Joseph's trustworthiness is accompanied by adaptive traits of technical and social intelligence, advanced beyond those that enabled Jacob to succeed in Haran by the measure of increased complexity and sophistication of the Egyptian setting. These traits are mobilized in administrative tasks, which motivate his superiors to let him do their jobs to their credit. His ability to interpret dreams, which he prudently ascribes to God, can be credited to talent for recognizing patterns and decoding symbols and to a canny assessment of the dreamer's situation.(41) His successful economic policy of cornering the futures market in grain is attributable to observations of climate and productivity trends and to awareness of the tendency to spend when times are good without providing for the lean years.

Joseph's policy converts the population of Egypt from independent farmers to vassals of the central government while providing sustenance to those who otherwise would starve.(47) His power to cultivate direct and indirect reciprocity strengthens the whole society, creating community fitness in a time of famine that draws his long-estranged brothers all the way from Canaan to buy food.

Their encounter foregrounds a tale about kin selection and direct reciprocity that begins with deadly sibling rivalry and ends with prosperous family reunification. The initial disturbance arises from Joseph's arrogance and his father's preferential treatment, which induce fierce envy in his brothers, who sell him into slavery and report him as dead.(37)⁴³ The final success is facilitated by Joseph's hiding his identity in order to test, punish and educate his brothers about their crimes and by their willingness to offer restitution, admit their guilt and at last affirm their common genetic bond.(45:1-15)

His interaction with them highlights the operation of social intelligence, the ability to deceive, decode nonverbal clues, and persuade.⁴⁴ These traits belong to a cognitive domain that evolved through the “arms race” between cheaters and those engaged in their detection.⁴⁵ That race shaped earlier interactions between God and Adam and Eve and Cain, Jacob and Esau and Jacob and Laban, but here it’s greatly amplified. Through extended dramatic scenes between the brothers, the reader discovers discrepancies between what characters say and what they think. While hiding their own feelings, they try to penetrate one another’s.

The young naïve Joseph learned the way cheaters work by listening to the plotting of his brothers while waiting for slave traders to pull him out of the pit and by being subjected to the false accusations of Potiphar’s wife. That experience equips him to employ crafty interrogation methods on his brothers, who come into his presence without recognizing him or knowing that he understands their language. Spying himself, he falsely accuses them of spying and places them under arrest. He subjects them to techniques used by police and by psychologists who simulate the Prisoner’s Dilemma to study the dynamics of competition, cooperation and punishment.(42)⁴⁶ To his relief he discovers that they’ve left his father and his younger brother Benjamin alive. He overhears their admission of having sold him into slavery. Their horror at his insistence that they bring Benjamin as a hostage reveals the guilt they feel for the suffering they caused Jacob many years ago by depriving him of a favorite son.

When the famine forces the brothers to return for more food with Benjamin, Joseph’s false accusation of the youngest brother elicits Judah’s willingness to suffer punishment for a crime he did not commit in order to spare both Benjamin and Jacob.(44:18-34) At this moment of restored reciprocity,

Joseph could no longer hold himself in check before all who stood attendance upon him, and he cried, “Clear out everyone around me!” And no man stood with him when Joseph made himself known to his brothers. And he wept aloud and the Egyptians heard and the house of Pharaoh heard. And Joseph said to his brothers, “I am Joseph. Is my father still alive?” And his brothers could not answer him for they were dismayed before him.(45:1-4)

Shedding his disguise and standing alone, he bares his soul by exposing his deepest feelings.⁴⁷ But those who witness his tears, though sharing the same seed, have little understanding of that inner self.

What follows is a joyous playing out of the reconciliation scenario that leads to strengthening of the family’s inclusive fitness. Jacob is reunified with all his sons and their children in Egypt, Pharaoh honors and rewards them with the most productive land in the kingdom, and Joseph fathers two sons. The ability to offer and accept reconciliation after conflict, restoring cooperation after bouts of murderous competition, demonstrates one more tool of adaptation devised by natural selection.⁴⁸

Joseph ascribes this happy ending to the providence of God: "And now do not be pained and do not be incensed with yourselves that you sold me down here, because for

sustenance God has sent me before you to make you a remnant on earth and to preserve life, for you to be a great surviving group,”(45:5-8) in a passage echoed by Darwin’s celebration of natural selection:

Thus, from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved.⁴⁹

However, that reconciliation among brothers subsequently turns out to be fragile and provisional, contingent upon the circumstances of a changing environment:

And Joseph’s brothers saw that their father was dead, and they said, “If Joseph bears resentment against us, he will surely pay us back for all the evil we caused him.” And they charged Joseph saying, “Your father left a charge before his death, saying ‘Thus shall you say to Joseph, We beseech you, forgive, pray the crime and the offense of your brothers, for evil they have caused you....’ (50:15-17)

Despite the earlier tearful scenes of love and forgiveness, they fear that Joseph has only been waiting until their father’s death to exact his revenge. Their continuing distrust is likely to result from their own continuing disguised defections. It may be that Joseph senses this new danger and counters it with his appeal to higher authority:

And Joseph said, “Fear not, for am I instead of God? While you meant evil toward me, God meant it for good, so as to bring about at this very time keeping many people alive. And so fear not. I will sustain you and your little ones.” (50:15-21)

As he himself plays the role of surrogate deity, Joseph’s attribution of his success to an unseen God activates another adaptation. Evolutionary psychology accounts for the origin of supernatural beings as support for the indirect reciprocity required in communities too large to assure face-to-face punishment of cheaters.⁵⁰

...natural selection favoured [attributions of life events to supernatural agency] because, in a cognitively sophisticated social environment, a fear of supernatural punishment steered individuals away from costly social transgressions resulting from unrestrained, evolutionarily ancestral, selfish interest.⁵¹

In his pious yet pragmatic references to a God whose existence is a product of the words of humans, here at the end of Genesis Joseph suggests a possible interpretation of the book’s beginning, where the existence of humans was a product of the words of God.

He also points forward to the book of Exodus that follows. There, God reemerges as the

dominant character, and in collaboration with Moses, his surrogate-in-training, embarks on the creation of a new religion and a new state, natural selection's next evolutionary project.⁵²

¹ Geoffrey Keynes, editor, *The Complete Writings of William Blake* (London: OUP, 1966), 775.

² (New York: Harcourt Brace Jovanovitch, 1982).

³ "Genes are the means by which functional design features replicate themselves from parent to offspring. They can be thought of as particles of design. ...[they cause the organism to develop some design features and not others. Genes ...propagate themselves by increasing the probability that offspring will be produced by the organism in which they are situated or others who...carry the same genes." John Tooby and Leda Cosmides, "Conceptual Foundations of Evolutionary Psychology," in *The Handbook of Evolutionary Psychology*, ed. David M. Buss (Hoboken New Jersey: John Wiley and Sons, 2005), 21.

⁴ "Genesis," in *The Literary Guide to the Bible*, ed. Robert Alter and Frank Kermode (Cambridge MA: Harvard University Press, 1987), 41.

⁵ Two new scholarly books have opened the door to this rich area of study. John Teehan's *In the Name of God: The Evolutionary Origins of Religious Ethics and Violence*, (Chichester UK: Wiley-Blackwell, 2010) provides an extensive survey of research in evolutionary psychology that offers insights into the Bible's moral codes and its representations of God. His approach differs from this paper's in that he devotes only a few pages to Genesis and his interests are primarily ethical and philosophical rather than literary. Two essays in Rick Goldberg's collection, *Judaism in Biological Perspective: Biblical Lore and Judaic practices* (Boulder and London: Paradigm, 2009) explore topics in Genesis: Laura Betzig's study of sexual selection, "The Fertility of Prominent Men in the Bible and Biological Theory," (42-61) and David Barash's study of kinship selection, "Intrafamily Conflict in the Bible and Biological Theory" (62-83).

My own interest in this topic dates to 1996, when I discovered that evolutionary principles provided a coherent reading of the convergent plot structures of Genesis and Shakespeare's *The Tempest*. See "Progeny: Prospero's Books, Genesis and The Tempest," *Renaissance Forum* volume 1, number 2 (<http://www.hull.ac.uk/renforum/v1no2/marx.htm>) and *Shakespeare and the Bible*, (Oxford: Oxford University Press, 2000).

⁶ Robert Alter, *The World of Biblical Literature*, (New York: Basic Books, 1992), 40-45.

⁷ Evolutionary Psychology is defined as "the application of the principles and knowledge of evolutionary biology to psychological theory and research. Its central assumption is that the human brain is comprised of a large number of specialized mechanisms that were shaped by natural selection over vast periods of time to solve the recurrent information-processing problems faced by our ancestors." Evolutionary psychology is an interdisciplinary science that includes research in cognitive psychology, neuroscience, game theory, and ethology. R. Durrant, R. & B.J. Ellis, "Evolutionary Psychology," in M. Gallagher & R.J. Nelson, ed., *Comprehensive Handbook of Psychology, Volume Three: Biological Psychology*, (New York: Wiley & Sons, 2003), 1. A loose sense of "Midrashic" is intended, to signify interpreting a story by retelling it with a particular emphasis or slant.

⁸ Richard Elliot Friedman, *Who wrote the Bible* (New York, Harper Collins, 1997).

⁹ Lead Cosmides and John Tooby, “Evolutionary Psychology, A Primer,” (Santa Barbara CA: Center for Evolutionary Psychology, 1997), <http://www.psych.ucsb.edu/research/cep/primer.html>.

¹⁰ “The Tree of Knowledge and Darwinian Literary Study,” *Philosophy and Literature* 27.2 (2003) 255-268.

¹¹ Robert Alter, *Genesis: Translation and Commentary*, (New York and London: Norton, 1996), xiii-xiv. All citations of Genesis are to this translation.

¹² “To your seed I have given this land from river of Egypt to the great river, the river Euphrates...” (15:18)

¹³ I Kings 4.20

¹⁴ *On The Origin of Species by Means of Natural Selection*, (New York: Appleton, 1861)406.

¹⁵ Adaptive behavior: “behavior that tended to promote the net lifetime reproduction of the individual or that individual’s genetic relatives. By promoting the replication of the genes that built them, circuits—systematically and over many generations—cause adaptive behavior to become incorporated into a species’ neural design.” Tooby and Cosmides, “Conceptual Foundations of Evolutionary Psychology,” 21.

¹⁶ “the human mind comes factory equipped with an astonishing array of dedicated psychological mechanisms, designed over deep time by natural and sexual selection to solve the hundreds of statistically recurring adaptive problems that our ancestors confronted.” David M. Buss, *The Handbook of Evolutionary Psychology* (Hoboken New Jersey: John Wiley and Sons, 2005), xxiv.

¹⁷ Adam already seems to have at least some knowledge of good and evil by virtue of the choice here offered, a conundrum that’s stymied readers of this story. Evolutionary psychology may provide one solution: the difference between the unlearned, evolved capacity for learning programmed into the brain by natural selection and the activation of that capacity, which allows the organism to learn by experience. See Tooby and Cosmides, “Conceptual Foundations of Evolutionary Psychology,”31

¹⁸ Dennis Krebs, “The Evolution of Morality,” in *The Handbook of Evolutionary Psychology*, ed. David M. Buss (Hoboken New Jersey: John Wiley and Sons, 2005), 747-771.

¹⁹ Leda Cosmides and John Tooby, “Cognitive Adaptations for Social Exchange,” in *The Adapted Mind: Evolutionary Psychology and the Generation of Culture*, ed. J. H. Barkow, L. Cosmides and J. Tooby (New York: Oxford University Press, 1992), 163–228.

²⁰ R. Trivers, “The Evolution of Reciprocal Altruism,” *Quarterly Review of biology*, 46 (1971):39.

²¹ A. Ohman, and S. Mineka, “The malicious serpent: Snakes as a prototypical stimulus for an evolved module of fear,” *Current Directions in Psychological Science* 12(2003): 5-9.

²³ The story also can be interpreted as representing the sequence of individual developmental stages, also a pattern evolved as adaptation: the movement from the innocent garden of the parental protection to adolescent rebellion, sexuality, departure from home and facing the challenge of independent survival in a cruel world. See David F. Bjorklund and Carlos Hernandez Blasi, “Evolutionary Developmental Psychology,” in *The Handbook of Evolutionary Psychology*, ed. David M. Buss (Hoboken New Jersey: John Wiley and Sons, 2005): 828-850

²⁴ Alter (1996), introduction, xxx-xxxii.

²⁵ H.S.Kaplan, et. al., A Theory of Human Life History Evolution: Diet, Intelligence and Longevity,” *Evolutionary Anthropology*, 9(2000), 156-185.

²⁶ Pascal Boyer and H. Clark Barrett, “Domain specificity and intuitive ontology,” in *The Handbook of Evolutionary Psychology*, ed. David M. Buss (Hoboken New Jersey: John Wiley and Sons, 2005), 96-118.

²⁷ Pascal Boyer and H. Clark Barrett, 102-4.

²⁸ Richard Byrne and Andrew Whiten, editors, *Machiavellian Intelligence: Social Expertise and the Evolution of Intellect in Monkeys, Apes and Humans* (Oxford: Clarendon Press, 1988).

²⁹ “Out of the early features of human attention, especially the capacity for *shared* attention, we develop a full theory of mind, a capacity that by the fifth year allows children to appreciate what others can infer from their situation, and blooms into an ability to understand multiple-order intentionality, to conceive what A thinks of B’s thoughts of C’s thoughts of D’s, and so allows for the rich comprehension of social situations and the rich production and comprehension of story.” Brian Boyd, “Literature and Evolution: A Bio-Cultural Approach,” *Philosophy and Literature* 29(2005): 9.

³⁰ Simon Baron-Cohen, *Mindblindness: An Essay on Autism and Theory of Mind* (Cambridge MA: MIT Press, 1997).

³¹ R. Trivers, 39.

³² W.D. Hamilton, “The Genetical Evolution of Social Behavior I and II,” *Journal of Theoretical Biology* 7, (1964): 1-54.

³³ In addition to finding food and avoiding predators, early humans needed to learn to protect themselves from their fellows. When Cain says “Let us go out in the field,” Abel fails to employ the primary “adaptive homicide avoidance strategy,” which consists of “avoiding contexts where homicide is likely.” Joshua D. Duntley, “Adaptations to Dangers from Humans.” *The Handbook of Evolutionary Psychology*, ed. David M. Buss (Hoboken New Jersey: John Wiley and Sons, 2005), 234.

³⁴ Such adaptive accumulation of resources preceding a catastrophe is later practiced by Joseph before a famine in Egypt. (41:33-37)

³⁵ Darwin, 1861, 555. An alternative accounting for this dispersion is offered in the story of the Tower of Babel that follows. This is one tale in which God does not act the role of natural selection, for his motive seems to be to limit the prosperity and fertility of humans simply because by their own efforts they challenge the primacy of his rule. A Darwinian explanation of the story could hypothesize the violation of reciprocity for an unstated exchange or perhaps an expectation that the development of a technically accomplished cooperative human society would exceed the environmental carrying capacity of a single location and lead to collapse.

³⁶ Charles Darwin, *On the Descent of Man and Selection in Relation to Sex*, (London and New York: Penguin Classics, 2004): 246-7.

³⁷ “As has always been my practice, let us seek light on this head from our domestic productions. We shall here find something analogous. . . . Here, then, we see in man's productions the action of what may be called the principle of divergence, causing differences, at first barely appreciable, steadily to increase, and the breeds to diverge in character both from each other and from their common parent.” Darwin 1861, 112.

³⁸ See Laura Betzig, “The Fertility of Prominent Men in the Bible and Ancient Near East,” in Rick Goldberg, editor, *Judaism in Biological Perspective: Biblical Lore and Judaic Practices* (Boulder and London: Paradigm, 2009), 42-61. Betzig documents the correlation between numbers of wives and concubines and the reproductive success of kings and gods throughout Ancient Near East texts. Sexual selection in the Bible is not simply quantitative however, since selection continues for the offspring chosen among many. King Solomon, the most powerful and successful of Biblical leaders, has 700 wives and 300 concubines, but his seed suffers from his pursuit of non-Israelite mates.

³⁹ Mark Van Vugt and Robert Hogan, “Leadership, Followership, and Evolution: Some Lessons From the Past,” *American Psychologist* Vol. 63, No. 3 (April 2008): 182–196.

⁴⁰ This movement presages fulfillment of the promise God made to his grandfather that 400 years in the future the Israelites would move back to Canaan as nomadic conquerors and develop into an imperial power themselves.

⁴¹ Richard Alexander, *The Biology of Moral Systems: Foundations of Human Behavior*, (New York: Aldine de Gruyter, 1987), 94. See also, Robert Axelrod, *The Evolution of cooperation*, revised ed. (New York: Basic Books, 2006).

⁴² Frans de Waal, *Chimpanzee Politics*, (Baltimore: Johns-Hopkins University Press, Revised edition 1998).

⁴³ Joseph’s behavior fits the profile of “tall poppy” dominance that leads to stronger opposition coalitions. Denise Cummins, “Dominance, Status and Social Hierarchies,” in *The Handbook of Evolutionary Psychology*, ed. David M. Buss (Hoboken New Jersey: John Wiley and Sons, 2005), 692

⁴⁴ C.F. Keating and K.R Heltman, “Dominance and Deception in Children and Adults: Are Leaders the Best Misleaders? *Personal and Social Psychology Bulletin*, 54 (1994): 312-321.

⁴⁵ Simon Baron-Cohen, “The biology of the imagination: how the brain can both play with truth and survive a predator,” in Robin Headlam Wells and Johnjoe McFadden, editors, *Human Nature: Fact and Fiction Literature, Science and Human Nature* (London: Continuum, 2006),109.

⁴⁶ Robert Axelrod, and W.D. Hamilton, “The Evolution of Cooperation,” *Science* 211(1981): 1390-1396.

⁴⁷ “... understanding of other minds marches in surprisingly close step with understanding one’s own. Self-consciousness and consciousness of others develop at the same time and in conjunction. It is no accident that Shakespeare’s Hamlet ratchets up our sense of human intelligence by his intense scrutiny of his own mind as well as his strategic resistance to being read by others and his intense probing of Claudius’s mind.” Boyd, 17.

⁴⁸ Frans de Waal, *Peacemaking Among Primates* (Cambridge MA and London: Harvard University Press, 1989).

⁴⁹ Darwin 1861, 525. Darwin’s mention of “the Creator” in this passage from the 1859 and 1860 editions, disappears in all later editions of the *Origin*. See <http://darwin-online.org.uk/Variorum/1861/1861-524-dns.html>.

⁵⁰ Pascal Boyer, *Religion Explained: The Evolutionary Origins of Religious Thought* (New York: Basic Books, 2001).

⁵¹ Dominic Johnson and Jesse Bering, “Hand of God, Mind of Man: Punishment and Cognition in the Evolution of Cooperation,” *Evolutionary Psychology* 4(2006): 219.

⁵² See Teehan 72-103 for a clear and persuasive Darwinian account of this development. For treatments of a pre-Darwinian adaptationist interpretation of Exodus, see Steven Marx, "Moses and Machiavellism," *J Am Acad Relig* 65:3(1997): 551-572.