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RESEARCH ARTICLE

Ethnicity, Strategy, and Moral Order: Game Theory in Biblical Intergroup Relations

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Abstract

John von Neuman (von Neumann, J., & Morgenstern, O. (1944) (Figure 1) and John Forbes Nash (Nash, J (1950), Nash J. (2001)) may be called the "*Fathers of the Theory of Games*" have formalized human behavior. To emphasize the importance of the Neuman's work on comprehending human behavior, which might improve human behaviorism by reducing future conflicts. The Henry Kissinger quotation "*The Balance of Threat*" (Schelling, T. C. (1960)) in the context of the nuclear arms race, maybe formulized using the *Game Theory* (Osborne, M. J. & Rubinstein, A. (1994)) tools.

Competition is not in general negative for human it has also positive sides which may lead to upgrading the human standard of life. Let's hope that the understanding of the *Theory of Games* (Miller J. (2003)) will increase the chances of development and decrease the possibilities of destruction.

The article describes the Biblical Sum-Zero Games in the context of conflicts versus Non-Sum-Zero Games enabling a collaboration - *Win-Win Game* (Axelrod, R. (1984)) and a tolerant relationship among the nations mention in the Bible.

Keywords: Two Person Game, Sum-Zero Game, Win-Win Game, Avoidance Conflict Goal Conflict, Power Struggle, Tolerance-Violence.

Figure 1. *Visionary thinker John von Neumann (right) received the Medal of Freedom from President Dwight Eisenhower in 1956.*

1. Introduction

The biblical solutions of the Bible's heroes will be a model making contemporary readers the conclusions what is better to do and what should be avoided. The Theory of Games will enable more precise understanding of this procedure.

Game theory is a branch of mathematics that analyzes situations of confrontation (conflicts) or cooperation between decision makers with different desires when the goal is to win the game. The biblical stories are fertile ground for a variety of conflicts with Israeli-Jewish aspects and universal-human aspects.

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With the modern tools of game theory, I will analyze the classic conflicts of the biblical stories, the dilemmas and strategies of the characters we know from there.

The relationships shown are analyzed first on the individuum for and then may be deduced by the reader and analyzed on the ethnic groups. For example, displaying the figure of the Ger (Sojourner) in Biblical Law (e.g., Exodus 22; Leviticus 19)

In this journey between mathematical models and biblical stories. I will try to shed light on patterned behavior patterns, on psychology and decision-making and to stimulate thought about the future and managing risks versus chances (Ophir D. (2007), Ophir D. (2010), Ophir D. (2015).

2. Game Theory Principles

The introduced games template is a simple two-person game showing (Miller J. (2003)) its methodology. Let's call players A and B. A is a row-player and B player is a column-player. The players are playing simultaneously. It is assumed that the players are rational. Each player has two options: choosing one of two rows or choosing one of two columns respectively to the player's name. The options are "No" or "Yes". The players will receive the score according to their choice. The scoring points are in the square of the intersection of the row and the column of the players' choices: namely, row-player has chosen a row, and the column player has chosen a column. In each intersected square there are two values: the lower value is destined to the row-player, and the upper value is destined to the column-player.

The two-players game are classified according to their properties such as: "Sum Zero Game", "Win-Win", "a game with a saddle point", "a game with dominated row or dominated column", "a game with an equilibrium point" (Nash, J. (1950) and Nash J. (2001)), etc. The game strategy depends on the game category.

Some of these possibilities will be demonstrated and analyzed showing the Bible conflicts, which are treated as a game.

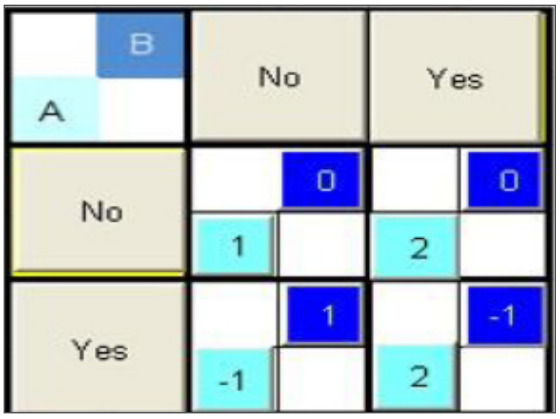

Figure 2. *Two Person Game Template*

3. Torah Heros Conflicts

3.1 Adam and Eve

The conflict between Adam and Eve (Genesis 2:16–17; 3:1–24) describes the prohibition against eating from the Tree of Knowledge it creates a genuine choice framework. It is described according to the Game Theory rules in a table (Figure 3). The rows designate Adam's decisions, and the columns show the Eve options the intersection of the row and column shows a square of the situation which is a result of the players' decision. For example, the intersections of the row show that Adam was tempted with the column that Eve tempts Adam causes that both players-heroes are expelled from the paradise also changing their minds.

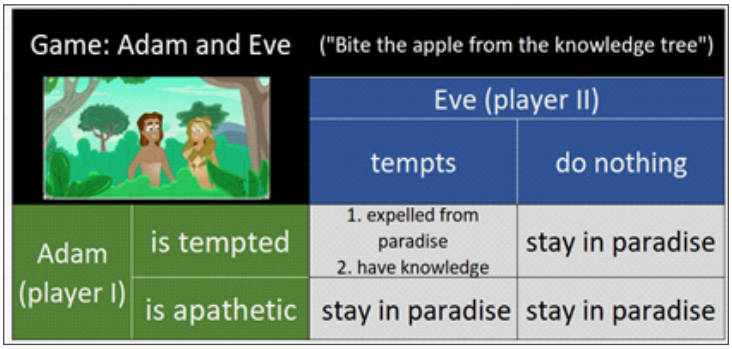

Figure 3. *Visualization of various options of scenarios in a paradise according eating or not eating the apple.*

3.2 Cain and Abel

Cain and Abel are figures from the Bible, specifically from the Book of Genesis (Genesis 4:3–8). They are the first two sons of Adam and Eve. The story highlight's themes of jealousy, sin, and the consequences of actions. Feeling rejected and angry, Cain lured Abel into the fields and killed him, committing the first murder.

The Game Theory interpretation is shown below. (see Figure 4).

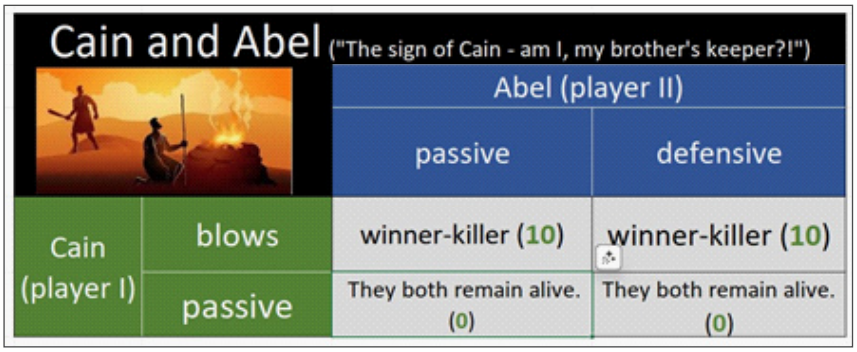

Figure 4. *Formalization of various options in the relations of the brothers and their consequences in the squares on the intersections of the rows and the columns representing the behaviour of the brothers. Two options for each brother.*

3.3 Jacob and Eysau

The conflict between Jacob and Esau is a significant narrative found in the Book of Genesis in the Bible (Genesis 25:29–34; 27:1–29). It canters around two brothers who are the sons of Isaac and Rebekah. Here are the key points of their conflict.

Birthright and Blessing: Esau, the elder brother, was entitled to the birthright, which included the rights to leadership and a double portion of the inheritance. However, Jacob, the younger brother, with the encouragement of their mother Rebekah, deceives Esau into selling his birthright for a bowl of stew when Esau is hungry (see Figure 5). The the sibling's status is established according to the rows and column's intersections which expresses the brothers' options choices.

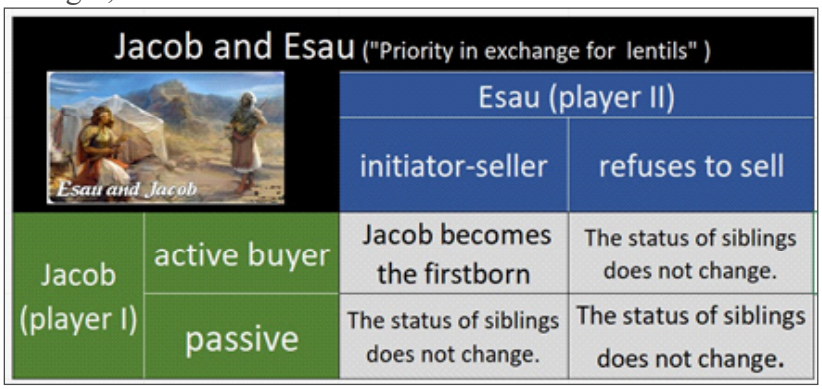

Figure 5. *Game Theory interpretation of the Biblical brothers: Jacob and Esau.*

3.4 Ten Commandments

The Ten Commandments are a foundational set of moral and religious principle in Judaism, Christianity, and Islam. They are presented in the Bible (Exodus 20: 1-17) to Moses on Mount Sinai.One of the given rules was: "You shall not worship other gods …". The following Table - Figure 6 shows schematically, using the Game-Theory notifications, what will happen to the Jewish people, obeying and not obeying the God's Ten Commands.

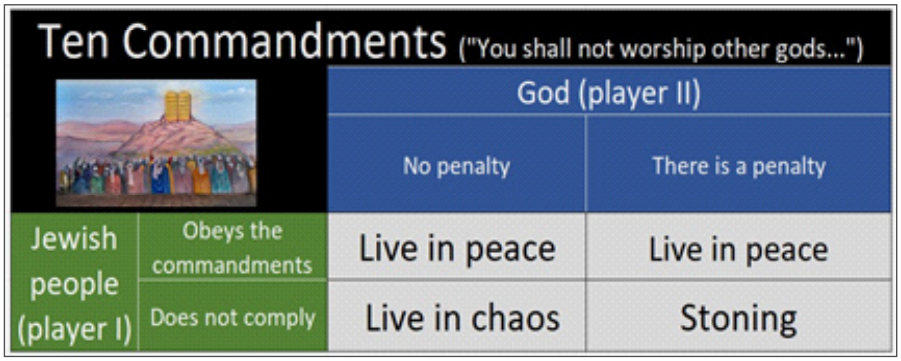

Figure 6. *The combinations of Jewish people behaviour and God's reactions.*

4. Prophetes Conflicts

4.1 Yael and Sisera

Yael (Jael) and Sisera are mentioned in the (Bible Book of Judges 4:18–21)

In the historical narrative: Sisera is the commander of the Canaanite army under King Jabin of Hazor. He is defeated by the Israelite forces led by Barak, inspired by the prophetess Deborah. Jael, the wife of Heber the Kenite, kills Sisera by driving a tent peg through his head while he is sleeping, after being asleep by her. (verses: Judges 4:17–22).

The options of possible behaviour of Yael and Sisera are given in the Figure 7, according the introduced previously convention intersecting rows and columns. From the Game theory point of view, this is a "Sum Zero Game", one player can score the same amount which may be lost by the opponent. The values in the parenthesis in each combination of the intersection are related to the score of the row player, the column-player should receive just the negative of this value.

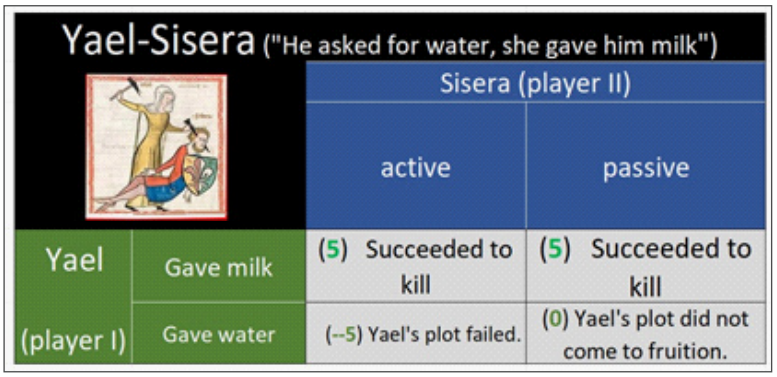

Figure 7. *The confrontation of Yael and Sisera – "Sum Zero Game". The score is represented by the given values, according to the rules explained in the text.*

4.2 Samson and Delilah

In this conflict the player is Samson opposite Philistines who treat to kill Samson. Samson betrays the Philistines and collapses the pillars of the building, killing the Philistines along with himself.

This conflict is visualized in a table (Figure 8) in which the intersections between the rows and the columns represent the actions done by the heroes and the results of these actions. These results are represented verbally and with their numerical values. The left value belongs to the row-player, and the right value belongs to the column-player.

For example: the intersection of the row – "destroying the columns" with the column "do nothing" give the score (-1000, -1000), meaning that both Samson (row player) and the Philistines (column-player) are losing their lives. In the Game-Theory terms such situation is called "lose-lose" case.

Figure 8. *Table formalization of the game, which represents the Bible conflict between Samson (row player) and the Philistines (column-player).*

4.3 David and Goliath

In the background of the historical narrative ([1] Samuel 1: 17) The Israelites and the Philistines are at war. The Philistines champion is Goliath of Gath, described as a giant warrior, heavily armed and terrifying. For 40 days, Goliath challenges the Israelites to send a single fighter to face him in combat. No one dares—including King Saul.

David is a young shepherd, not a soldier. He comes to the battlefield to deliver food to his older brothers. Hearing Goliath's taunts, David is outraged that the giant defies "the armies of the living God."

This is a "Sum Zero Game" presented in Figure 9. The numerical values represent the score of the row-player which is in this case David. The column-player namely Goliath receives just the opposite – its negative value., thus symbolically: instead of (+5) points (-5) points, and instead of (-5) points (+5) points The numerical values are given to emphasize the different significance for each player, when one wins the second loses, namely, when one played lives the opponent loses his live, These are the possible combinations.

Figure 9. *The duel between David and Goliath – "Sum Zero Game" – it's interpretation is given in the text.*

4.4 Salomon Trial

The original story (Bible: 1 Kings (Melakhim I) 3:16–28) is as follows: Shortly after Solomon becomes king, two women both prostitutes living in the same house come before him with a dispute: Each woman had given birth to a baby. One infant died during the night.

Each woman claims the living child is hers and accuses the other of switching the babies while the mother slept. There are no witnesses, no evidence, and equal claims—a classic unsolvable legal case.

The Judge – King Salomon commands to divide the baby by cutting into two equal parts and give to each woman a half of the body.The players of the game are two women, one the biological mother of the living baby (row-player) and a woman pretending to be a mother (column-player).

This is a Sum-Zero Game presented in Figure 10. The confrontation between the women, values of combinations of their movement in the game is shown in the squares of the intersections of the rows and the columns respectfully.

According to the game the row-player giving up opposed to the woman – the column-player, accepting the king's decision has won the game. This woman -receives the whole Baby. The Game Theory represents the maternity instincts and the wisdom and the creativity of King Solomon who has found a test differentiating between the women choosing the correct one, from both.

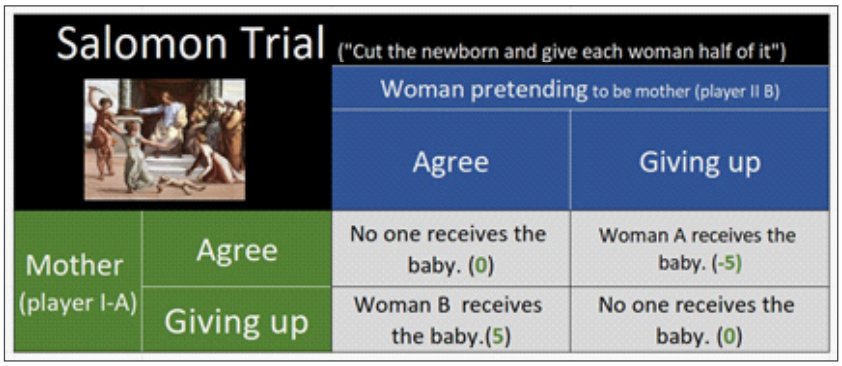

Figure 10. *King Salomon – Trial is a Sum-Zero Game – See the details in the text above.*

4.5 Wolf and Sheep

The wolf–sheep relationship (Isaiah 65:25 "The wolf and the lamb shall feed together…") as a powerful metaphor usually for danger vs. vulnerability, oppressors vs. the righteous, or false leaders vs. God's people. The symbiotic relationship is a utopian symbolising living in peace analogically to somehow imaginal and unnatural life of wolf with sheep. These is one hypothetical combination in the game analysed by the Game Theory (Figure 11). This case corresponds to the received square by the intersection of the first row (wolf decision) positive interaction, namely not attacking the lamb, with the first column (sheep decision) positive interaction, namely, not run away from the wolf. This idyllic scenario is one of the four other possible behaviour combinations. This situation is expressed numerically by showing the same positive score for the both players: the wolf and the lamb-sheep.

Interaction ("A wolf lives with a lamb")		Lamb (player II)	
		Positive interaction	Natural behavior - running away
Wolf (player I)	Positive interaction	They both live in harmony. (5,5)	They both live in peace. (0,0)
	Natural behavior - predator	The wolf devours the lamb. (-5,5)	The wolf devours the lamb. (-5,5)

Figure 11. *Wolf and Sheep relationships – possible options. The details are given in the text above.*

5. Writings – Conflicts

5.1 Job and his friends

The discussion between Job and his friends (Bible Book of Job chapters 3–31, 3841). It is one of the Bibles most sophisticated explorations of suffering, justice, and the limits of human understanding.

The central question is: Why do the righteous suffer? The friends assume a simple moral order: "God is just the suffering is punishment; therefore, Job must have sinned."

From the other side Job insists: "I am innocent → suffering is not always deserved → God's justice is mysterious.".

The presented Game Theory's approach much simplifies (see Figure 12). The intersection of one of the two rows with one of the two columns shows in the square the consequences of the made decisions by the row-player – Job, and the column-player – Friends. Each such square contains two adjectives: the first is related the row-player and the second description is related to the column-player choosing the respective column, representing the column-player choice.

For example, the intersection of the first row (Job obeys rules) and the second column (Friends are provocative) represent proud Job and angry Friends.

Job - friends ("The righteous and it is bad for him, the wicked and it is good for him")		Friends (player II)	
		Partners in grief	Provocative
Job (player I)	Obeys commandments	Comforted, Comforted	Proud, Angry
	Abandons commandments	Suffering, Suffering	Suffering, Happy

Figure 12. *Job and his friends - a simplified polemics in a schematical way, using the Game Theory notifications, explained in the text above.*

5.2 Ecclesiastes

Ecclesiastes (Hebrew: קֹהֶלֶת – Qohelet) is one of the most distinctive and intellectually challenging books of the Bible. Ecclesiastes asks controversial questions that are rare in biblical literature for example: What is the profit of human labour? The presented conclusion is that everything is null.The Game Theory formalization of the above nothingness-scepticism is filling the table squares of rows and columns intersections with NULL-s values, or in its numerical counterpart as "0" s. Such game is a Sum Zero Game, because each player receives par definition the negative values of his opponent – the negative value of "0" is "0".

6. The Conclusions

The conflicts mentioned and in general may be qualified in the following special interest categories. Thus, division is done according to the type of players taking part in the game. There are players confrontations classified in more than one class.

6.1 Human versus Human

This kind of confrontation a is the most popular confrontation mentioned in the Bible. We have met this type of confrontation in the following cases such as

Adam and Eve, Cain and Abel, Jacob and Eysau, Yael and Sisera, Samson and Delilah - Philistines, David and Goliath, Salomon Trial and Job and his friends.

6.2 Animal versus Animal

This class is given here for comparison between the human-to-human relationship with some relationships among other species.

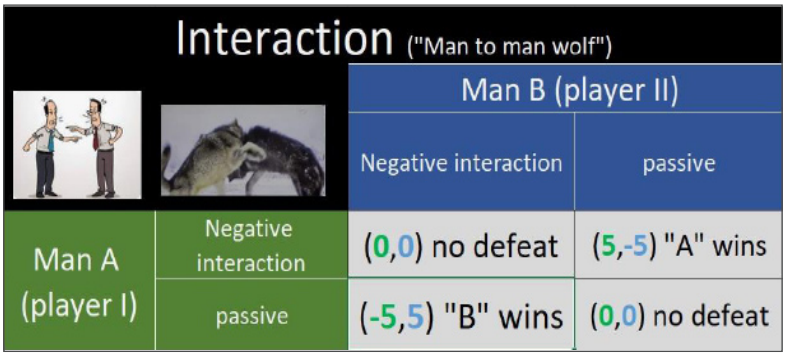

Figure 13. **"***Man to Man – Wolf" – The Sum Zero Game - interpreting the human relationship. The more detailed description in the text.*

Additional approach is given by a philosopher John Lock in his statement: "Man to man – wolf …" (Lock J. (1685)). The corresponding idea is represented in the Game Theory – Figure 13. This is a Sum-Zero Game, in which the total score of both players is in each case zero. This might be a message to the humanity, also regarding the Henry Kessinger term in the context of the nuclear power (mentioned in the introduction): "The Balance of Threat".

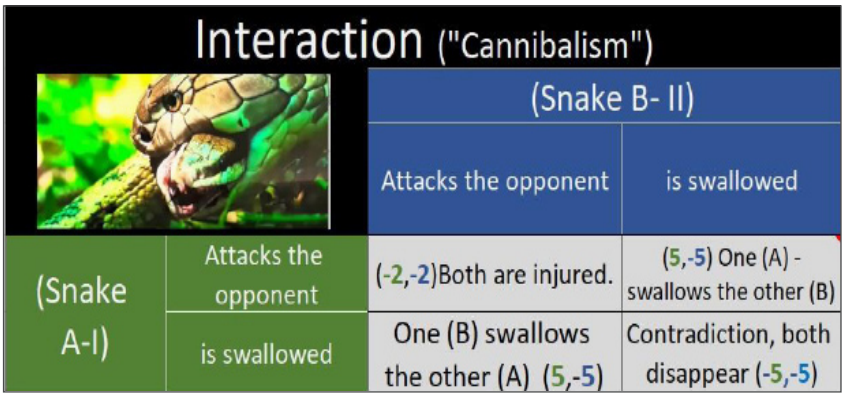

Figure 14. *Snakes-Cannibalism – additional version of animals' interaction, represented in the Game-Theory form – Sum Zero Game.*

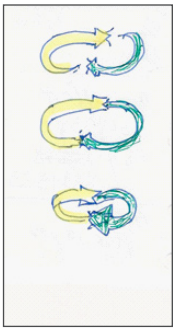

Figure 15. *Schematical snakes cannibalism description with an allusion to the possible future.*

The similar relationship is possible to find among the snakes – Figure 14 and Figure 15 with allusions of disappearing snakes in the context of Henry Kissenger sentence.

The above human behaviors comparison to animal relationship differ to the prediction found in the Bible about the future relations between wolf and sheep – this is a drastic contradiction to their current relations in the natural world.

6.3 Power versus Brain

In the naturel world according to Darvin's Evolution Theory, the combination of power and wisdom belongs to the winning player. In the Bible's confrontations the brain has had the dominant role (David versus Goliath, Yael versus Sisera etc.). The wisdom-knowledge is an dominant factor in other Biblical stories (Adam and Eve, Salomon Trial, etc.). See this idea symbolically expressed in the painting showing a brain and a man scared by it. (Figure 16).

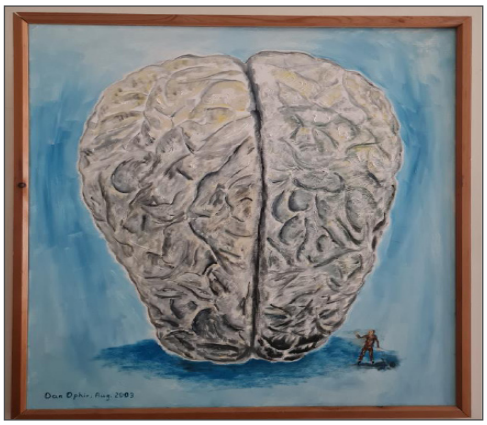

Figure 16. *Brain versus Power – a scared man.*

7. Epilogue

The article has reviewed the Bible relationships. A spectrum of various relationships was presented using the Game-Theory notation. Starting with extreme conflicts threating death such as: Cain-Abel, Samson-Phlistines, Yael-Sisera, David-Goliath, heroes representing the rivalry between their nations- and ending with idyllic relations (Wolf-Sheep) representing the cooperating nations. Thees Relationships symbolise and represent the nations' relationship which prevailed among the nations of the Biblical time.

This collection of the relevant relations may be extended and the following cases: Ruth the Moabite (Book of Ruth); Jonah and Nineveh (Book Jonah and Nineveh); Rahab the Harlot (Joshua 2); Uriah the Hittite (2 Samuel 11) etc.

This spectrum of relationship may be analysed with the presented Game-Theory tools: starting with the Sun-Zero Game and ending with Win-Win Game.

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