Virtual Pepulator, a Model for Teaching Negotiation

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ABSTRACT

In order to explain the negotiation process, an outline will be drawn from the conceptual and theoretical point of view, using the basic definition, the importance of negotiation as a current daily process in every aspect, as much for the people themselves as the organizations. Moreover, already existing models such as the 'Nash Equilibrium', the Boston Group Consulter will be outlined to finally explain the development of the 'Negotiation Pepulator Game', its foundations and the obtained results when put in practice, as well as the respective analysis to complement the game and catalogue it as an adequate model for the teaching of negotiation.

INTRODUCTION

Cooperation and competition are reactions of people facing daily negotiation situations. Sometimes it is important to compete and act outside the framework of competition. However, negotiation theory puts forward the idea of cooperating in order to achieve a shared goal and reach a mutual benefit between all parties involved, which sometimes leads to a better result than when one wins alone.

Social interactions are permanent and negotiating is a daily human activity. The results of a good negotiation lead to multiple transactions and not only one. If in one of them there is a winner, it is probable there will be a loser. Due to this, everyone is out for themselves, looking for their own benefits, even though there is the possibility of carrying out various transactions where everyone benefits through cooperating.

The 'Pepulator Game' sets out the possibility of the players cooperating or competing and, while this develops, the strategies used by the contestants are noted, in other words, every one of the strategies and tactics implemented by the participants is traced and monitored. The results of the game are presented in the conclusions in the current work.

THEORICAL FRAMEWORK

Game theory has been applied in themes of management such as negotiation, communication, team work, management itself, among others. This owes itself to the fact that it involves conflict scenarios, it supposes interactions between two or more individuals or players, where the final result depends on the decisions taken by all parties. The main objective is to find the optimum strategy for every player, be it a strategy, a rule or a plan; the optimum for a player is that which allows the maximization of a desired benefit (Pindyck, 2001).

Organizations can cooperate or not. In a cooperative game the players can adopt practices together, maximizing the interests of every individual achieving shared goal. Whereas in a non-cooperative game one cannot have strategies and tactics in common, for want of better words, what's better for one depends on the decisions taken by the other players, and these, in turn, will depend on what they believe the first player will do (Carvajal, 2009).

Bearing this in mind, it's necessary to know the optimum strategy in a game as well as the adjacent result. The success of some strategies depends on the decisions the competition take, others are optimum independent of the actions of their adversary, this concept is known as the dominant strategy.

THE PRISONER DILEMMA

To illustrate the dominance strategy Merrill Flood and Melvin Dresher expose the situation of two people detained for committing a crime, both are imprisoned in different places, where they can't see or communicate with each other, and are thus interrogated separately.

Two options are given to each prisoner: Confessing the crime or not. If one confesses and the other not, the first will be set free while the other will be sentenced for 5 years. If both confess, they will both be imprisoned for 3 years, and if the two both deny the crime, in other words they cooperate they will only be imprisoned for one year (Soto & Valente, 2005).

Exhibit 1 shows that every prisoner has a dominant strategy. In the case of prisoner A who doesn't know the decision taken by B and knowing that he prefers to receive a lesser punishment and supposing that B will betray him, the best alternative for A will be to betray so he is granted freedom. However, if B decides to betray, the best option for prisoner A will be to betray as well, as he will receive a sentence of 3 years instead of 5 if he decides to cooperate. In accordance with this, the strategy that provides the best results for prisoner A, regardless of the decisions of B, is to betray.

For prisoner B, in the case that A denies everything, his best option is to betray prisoner A as he will be granted freedom instead of receiving a year of imprisonment if he decides to cooperate. If A decides to betray, the most convenient for B is to do the same. Both will receive 3 years of prison.

The dominant strategy is to betray, since it is the best response regardless of the decision taken by the other. Both will wonder what option will be used by the other and they will choose that which gives them the better advantage.

NASH EQUILIBRIUM

The previous scene describes the case of the player's dominant strategies, but this is not the case in all the games, one can present the case that one or more of the players do not have these strategies. As a consequence, Nash sets out the equilibrium hypothesis, explaining how in a situation where both parties confront each other, every player does the best for himself while bearing in mind what their counterpart does (Pindyck, 2001), to put it another way, "none of the two knows what the other will do when they have to choose their own strategy. However, there are some expectations about what the other will choose. The Nash equilibrium is interpreted like a pair of expectations about the choices made by every player in a way that when the other reveals their choice, none of the two wants to change their conduct (Varian 1996).

In organizations this implies that the competition and the strategic decisions depend on the information that is received from the opponent and from the context in which the game is based (Soto & Valente, 2005).

This equilibrium exhibits some problems (Garcia & Perez, 2001):

1. A game can show several Nash equilibriums.
2. There are games where the Nash equilibrium does not feature, when this happens a strategy based on probabilities must be chosen.
3. Nash equilibrium does not lead to optimum solutions in the sense of Pareto. This is led by the study of the prisoner dilemma.

On the other hand, on occasions the competitors can find out the strategy of the others and they can influence the decisions between them due to the repetitions that happen in the games. This type of behavior is known as "eye for an eye", noted by Axelrod in 1984 upon carrying out an experiment in which the individuals behave as others did in a previous period (García & Pérez, 2001).

Exhibit 1
Matrix of Payments, Prisoner's Dilemma

		Inmate B	
		Cooperates	**Betrays**
	Cooperates	1 - 1	5 – 0
Inmate A	**Betrays**	0 - 5	3 – 3

Exhibit 2
Recommendations according to the type of Negotiation

TYPE OF NEGOTIATION	RECOMMENDATIONS
Distributive (WIN -LOSE)	• Determine the resistance point • Set an aspire goal better to the point of resistance • Plan own opening[1] • Avoid making unilateral concessions.
Integrative (WIN-WIN)	• Analyze the interest of the parties • Prioritize the interests • Built tenders that contain both the interest and the differences of the other negotiating parties. • Be gentle with people and hard with problems.

(Rojas, 2002)

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[1]The opening itself must be high if you are selling and low if you are buying

NEGOTIATION

Negotiating is the action that two or more parties do when, in spite of other interests, they must interact to resolve their differences (Escandón, 2000); it is synonymous of agreement, concur or debate (Marcano, 2000). Negotiation is a process between two parts in which third parties do not intervene, it does not necessarily mean a previous dispute, and on the contrary, it is a mechanism of conflict solution that has a voluntary character, is predominantly informal, is not structured, where all these elements are utilized in order to come to a mutually acceptable agreement (Pirela, 2006).
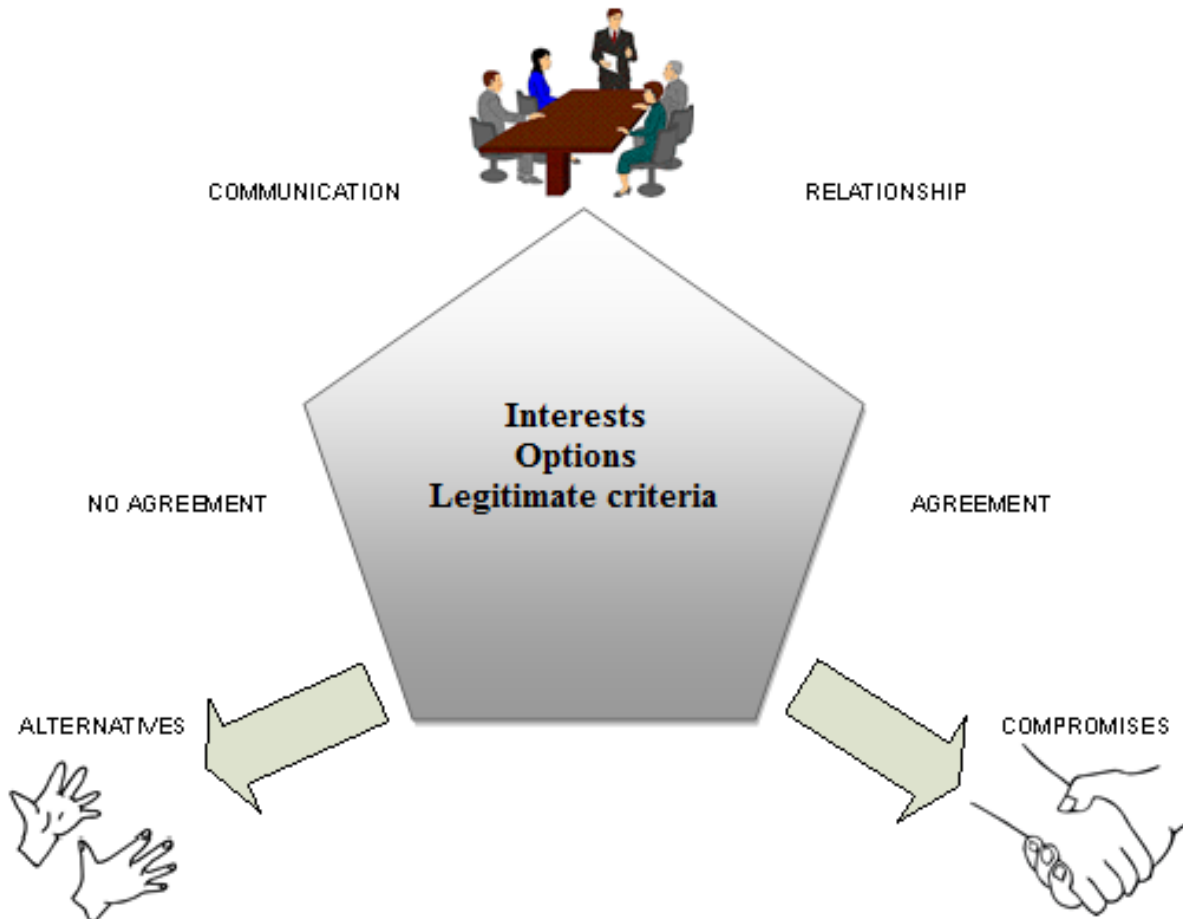
Añez (2002) Says that negotiation links two or more independent actors that do not evade the problems between them and they look for an agreement, solution, or bilateral arrangement. This result can inhabit four forms:

- Simple agreement: this is the minimum solution. Nobody obtains total satisfaction of their objectives.

- Mutual concessions: this is a more ideal solution to the compromise. A search for balance in the majority of the points during the negotiation.

- Allocation of returns: the initial objective of the negotiation is amplified.

- The creation of new alternatives: The initial problem changes into an opportunity to find a solution to the said initial problem.

Negotiation can be presented through diverse models, to respond to different priorities and to combine and interact in agreement with the different elements of which they consist. Among the types of negotiation one finds distributive negotiation, being apparent when upon concluding there is a winner and a loser, in other words, there is not equilibrium between the parties, rewarding the benefit to the winning group; integrative negotiation, which sees the final result the product of an agreement between the parties involved, is characterized by the fact that the interests of the parties are similar, thus all look for the maximization of the benefits together, generally negotiation lends itself to long term periods and centers upon the

Exhibit 3
Elements of Negotiation

COMMUNICATION   RELATIONSHIP

NO AGREEMENT   **Interests** **Options** **Legitimate criteria**   AGREEMENT

ALTERNATIVES   COMPROMISES

(Rojas, 2002)

parties involved and not upon the problems, this is also known as 'Win-Win'. In exhibit 2 there are listed some strategic recommendations to be applied in accordance with the class of negotiation that comes up. (Rojas, 2002).

The "Harvard Approach" to negotiation, developed in 1980 by the professors Roger Fisher, Bruce Patton, and William Ury established seven elements of negotiation: Communication, relationship, interests, options, legitimacy, alternatives, and commitment; these create a guide in order to proceed in a decided moment, as well as achieving a 'Win-Win' agreement, which is the goal of this method.

In exhibit 3 there is a diagram of the 7 elements of negotiation.

Communication makes a critical impact on the negotiation development. The benefit is always better for both parties when the process is face to face, as it is possible to know and share information that via other communication methods is not possible, for instance, the facial expressions and body language. Communication is the opportunity that a person has to try and understand the point of view from the other side and to understand that the other parties involved tend to have differing points of view of situation (Rojas, 2002).

Exhibit 4.
Matrix of Payments

		CONSOLIDATED			
		US$40	US$30	US$20	US$10
PULSAR	US$*40*	US$*140* / **US$140**	US$*10* / **US$210**	US$*10* / **US$180**	US$*10* / **US$150**
	US$*30*	US$*210* / **US$10**	US$*110* / **US$110**	US$*20* / **US$180**	US$*20* / **US$150**
	US$*20*	US$*180* / **US$10**	US$*180* / **US$20**	US$*80* / **US$80**	US$*30* / **US$150**
	US$*10*	US$*150* / **US$10**	US$*150* / **US$20**	US$*150* / **US$30**	US$*50* / **US$50**

Universidad de los Andes, improved it by the authors

Exhibit 5
Interface of the Administrator

In order to achieve as much respect as security and confidence among the parties, the idea of relationship is a vital communication element for preventing as much as resolving conflicts that come up during the course of a negotiation (Rojas, 2002). The objective of negotiating is to satisfy certain interests. These are intangible motivations that drive the realization of the negotiation; they cannot be interchanged among different actors despite the fact in some cases they can coincide. Three classes of interests can be identified (Rojas, 2002):

- Complementary and compatible interests
- Shared interests
- Different interests.

When a 'Win-Win' process of negotiation is developing, initially the interest of all parties concerned is satisfied; being that the definition of their own interests and their respective levels of importance is as vital as the identification of the other's interests.

To fulfill the goal (satisfying the interests) of the negotiation creative options are developed, as agreements, in order to achieve the goal. In the moment when the options are generated, it is important to create some possibilities, in order to avoid taking a bad decision so as to choose the most adequate (Rojas, 2002).

The criteria must be clear, so that the agreement, to which they will arrive, is fair and prudent with respect to the parties involved so, in this way, both parties compromise over what is fair. To guarantee the success of this element the use of external norms are recommended, and whether these be based on scientific criteria, historical dates, or others, these are needed in order to generate the tranquility of impartiality among the parties involved.

"The alternatives are the possibilities that every party has to take themselves away from the negotiating table in case an agreement is not reached"(Rojas, 2002, page. 135). The alternatives lie outside of the negotiation and it is recommended that they be identified before the start of any negotiation instead of making the mistake of considering them only once things go bad.

Compromises could be verbal or not, on which the parties commit to come to an agreement, they are conceived as a sketch of the formal contract, where the terms and conditions under which the negotiation is concluded are specified; "the difference between an offer and an option is the commitment: An offer is a possible deal that one is prepared to accept" (Rojas, 2002, page. 137).

TRUST

Tschannen & Hoy (1998), say that trust is when a person assumes a vulnerable behavior with someone who is benevolent, reliable, and honest. Also is the a measure for good intentions and reliability of the others' words and actions (Cook & Wall, 1980) and the expectation for an

Exhibit 6
Interface of the Player
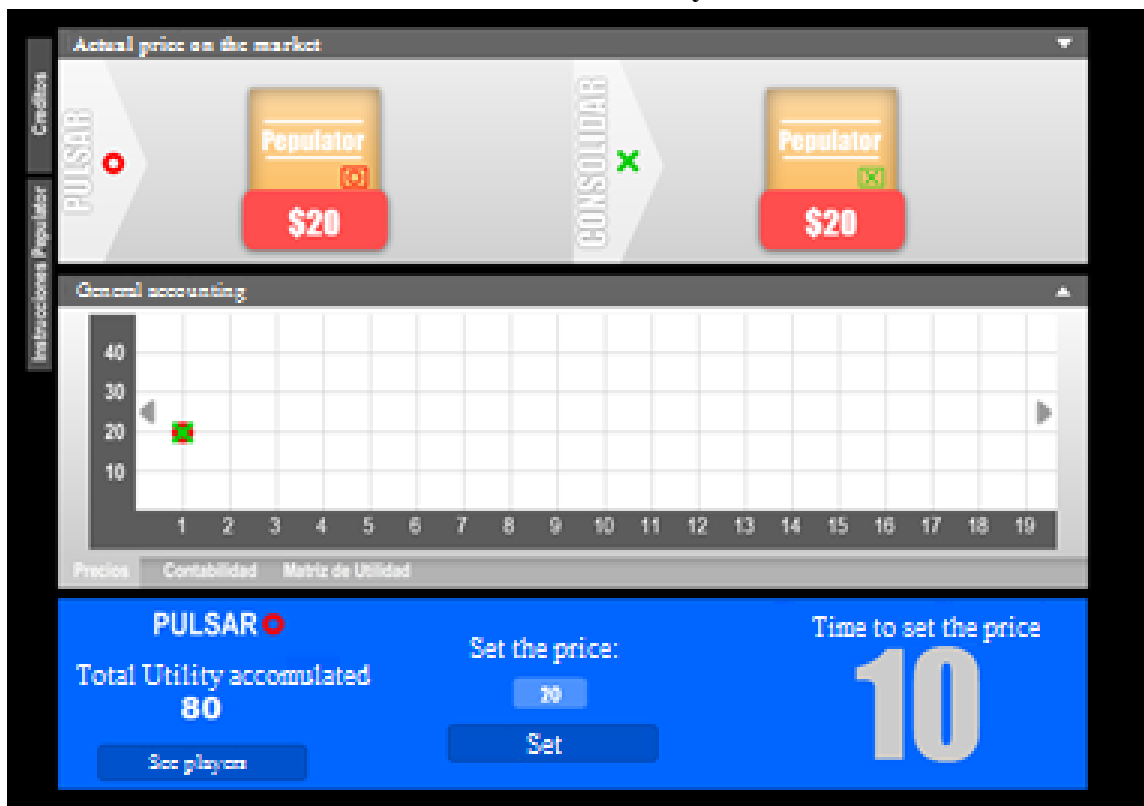
individual or group of people in the commitments acquired by another individual or group of verbal or written agreement (Rotter, 1967).

Trust is a complex concept that is the core of social relations, which are important for organizations in order to achieve strategic objectives (Tschannen & Hoy, 1998). Nowadays, trust is related to relationships among people (Msanjila & Afsarmanesh, 2007).

PEPULATOR PRICE EXERCISE

"Pepulator is a game of two teams based on the prisoner dilemma which was developed in Harvard; the negotiation is conducted between two representatives of two different companies that offer the same product. The competition is represented by the monthly price of the 'pepulator' product" (Grookes & Gordan, 1985).

In order to define the scenario where this exercise takes place, the 'pepulator market' is controlled by multinationals: 'Pulsar' and 'Consolidate'. The monthly profits of both companies are uniquely determined by the price fixed by these same companies and latter mutually compared by these same parties. The participants must decide the price they wish to sell the pepulator from month to month, while having the opportunity to cooperate with the competition in certain periods.

Exhibit four shows the matrix of the player's returns with values of every business increased by ten. The Italics corresponds to the returns of Pulsar and the returns in bold refer to those of Consolidated. The online game uses two interfaces: the first is the administrator interface that is in charge of the flow of the game, as seen in exhibit 5. In other words, the administrator is who is in charge of sending messages to the players every period so, having a notion, they make price decisions. Moreover, he can observe the results of every pair and see which participant does or does not respect the price agreement.

Exhibit 6 shows the interface for every player. Every month, after having the statement and assigning a price to the product, it continues and the results regarding the competition are obtained. The player will be able to observe their utilities and those of their competitors. This will allow him to take a decision in terms of the price. Furthermore, the administrator will have access to the matrix of returns that is presented in exhibit 4, to know the consequence of a decision in terms of their utility.

In the long term the maximization requires mutual trust. However, in the short term, it is possible to break this trust. In the majority of rounds, the communication must be implicit, which is ambiguous and subject to mistaken interpretations, due to the fact the businesses must suppose the tactics of their competitor. At certain points, the parties are given the opportunity to communicate between themselves explicitly, and can opt to come to a price agreement.

The game allows the making of imprecise assumptions, which suggests the importance of maintaining the price agreements carried out in the negotiation phase and making both parties revise them periodically.

Exhibit 7 shows the returns obtained in a pilot test of the game carried out on a theory of management course at Facultad de Minas in Universidad Nacional de Colombia; followed by exhibit 8 where the median, average, and geometric average as much for PULSAR as for CONSOLIDATE are shown.

The negotiation strategy is win-win, in other words, integral, the maximum utility that businesses can obtain

Exhibit 7
Results

Couple	CUMULATIVE TOTAL UNIT	
	PULSAR	CONSOLIDATED
1	5510	3830
2	2050	850
3	5060	3770
4	5090	3800
5	2195	1780
6	1690	1950
7	1535	1710
8	1091	3010
9	1560	1790
10	1051	2950
11	1830	1420
12	2140	700
13	4490	4770
14	1830	1285

after 12 rounds is 1960, the value used to look for the true relationship and application of the type of negotiation between players.

- Median: median coincides with the 50 percentile, 50 per cent of the data obtained during 14 rounds is below 1940 units of total value in the case of pulsar and the remaining 50 per cent is above said value. In the case of Consolidate 50 per cent of the data is below 1870 units of value while the rest is above.

- The average or mean: mean is 2651.5 (pulsar), indicating the average during 14 rounds carried out by the players, the units of value accumulated by Pulsar are 2651. This statistical measurement in the case of Consolidated is 2401.1 units of value or utility accumulated during the game.

CONCLUSIONS

The pepulator game allows the dynamic of negotiation, the making decisions and the trust between the participants to be observed, analyzed and evaluated. In addition, it permits the loyalty of the players to be observed.

Two emotions are featured in the players, those which are exclusive: cooperation and competition. The first consist of a group of people working towards a shared goal; whereas competition looks to generate individual benefit. During the execution of the game there should be an evolution from competition to cooperation as favored by social interactions. This behavior was not seen in the pilot game; possibly due to the fact that the participants thought about obtaining a particular benefit without realizing that by means of cooperation they could have benefited mutually. This game implies knowing the principals of negotiation, understanding it as an evolution from competition to cooperating through trust.

As far as the virtual implementation of the game, the players were allowed to have control and constant information about their own tactics and those of their competitor, demonstrating the fulfillment of the negotiations.

REFERENCES

Añez, Manfredo. (2002). "Los Elementos de la Negociación". Santa Cruz. Bolivia.

Carvaja, B. C. (2009). Teoría de los juegos e inteligencias múltiples. Cómo cambiar el juego organizacional para una gestión del conocimiento sostenible. *Tempo – Revista cultural, tecnológica y patrimonio.*

Cook, J & Wall, T. (1980) New work attitude measures of trust, organizational commitment and personal need non-fulfillment. Journal of Occupational Psychology, 53, 39-52.

Escandón, R. (2000). "Negociación" Caracas. Venezuela

Grookes, M. & Gordon, M. (1985). Harvard Negotiation Project

García, J. & Pérez, C. (2001). Equilibrios de Nash y Cournot: el caso de la provisión privada de un bien público. *Acciones e investigaciones sociales,* 75-85.

Marcano, E. (2000). "Factores que retardan el Proceso de la Negociación Colectiva". URBE, Facultad de Ciencias Jurídicas y Políticas. Escuela de Derecho. Maracaibo. Venezuela.

Msanjila, S. Afsarmanesh, H. (2007) Trust analysis and assessment in virtual organization breeding environments .International Journal of Production Research, 465, 1253-1295.

Pindyck, R. & Rubinfeld, D. (2001). Microeconomía. Madrid: Prentice Hall.

Pirela, A. (2006). "Los elementos de la negociación efectiva para la pequeña y mediana empresa". Centro de investigación de ciencias administrativas y gerenciales. Universidad Rafael Belloso Chacín

Rojas, M. (2002). Administración para Ingenieros. Bogotá D.C.: ECOE Ediciones.

Rotter, J. (1967) Interpersonal trust, trustworthiness, and gullibility. American Psychologist, 35, 1-7.

Soto, A. & Valente, M. R. (2005). Teoría de los juegos: vigencia y limitaciones. Revista de ciencias sociales, 497-506.

Tschannen, M. & Hoy, W. (1998) Trust in schools: a conceptual and empirical analysis. Journal of Educational Administration, 4(36), 334-352.

Varian, H. (1996). Microeconomíaintermedia: un enfoque actual. España: Antoni Bosch.

Exhibit 8
Statistical Results

	MEDIAN	ARITHMETIC MEAN	GEOMETRIC MEAN
PULSAR	1940	2651,5	2268,1
CONSOLIDATED	1870	2401,1	2071,6