

Game Theory and Criminal Proceedings

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Abstract

The expression “game theory” is essentially a scientific metaphor where two or more individuals with opposing or mixed motivations take actions, employing strategies that are both interdependent and also build upon each other.

The game-theory method makes possible the study on how individuals on opposing sides make decisions in a given situation. It also applies to those life situations where a decision made by an individual has no power over other decisions that affect him. The decision maker can be an individual, a group, or an organization. Game theory can analyze situations where participants must take decisions that pose risks. In these situations, at least two players try to maximize their own so-called “utility function. Game theory can be used to model criminal proceedings, as each decision carries a risk with respect to the end result.

If the accused and their attorneys adequately apply game theory to their strategies, then they will achieve the result that is most optimal for themselves. Game theory also makes it easier to understand the actions of the participants in criminal proceedings and therefore to understand certain testimony, especially betrayal; game theory helps us properly assess the creditworthiness of incriminating statements that one defendant makes about another.

Keywords: game theory, criminal procedure, decision, prisoner’s dilemma.

I. Introduction

The expression “game theory” is essentially a scientific metaphor where two or more individuals who have opposing or mixed motivations take actions, employing strategies that are both interdependent and also build upon each other¹.

The game-theory method makes it possible to study how individuals on opposing sides make decisions in a given situation. It also applies to those life situations where a decision made by an individual has no power over other decisions that affect him. The decision maker can be an individual, a group, or an organization².

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¹ G. Iván, *Játékelmélet – a racionális döntések elmélete* [Game Theory – The Theory of Rational Decisions], V. Vajdasági Magyar Tudományos diákköri Konferencia [Fifth Conference of the Vojvodina Hungarian Scientific Student Body], 2006, pp. 1-17. <http://vmtdk.edu.rs/a2392a4a-feb3-8217-c098-67fe2159f959> (accessed on March 1st, 2019).

² The foundations of the decision theory, which examines logical choices in situations with uncertain outcomes, were laid out by mathematician János Neumann. His work transformed our

The essence of the “game” is that it is played by decision makers who have diverse objectives and whose destinies are intertwined. It is a situation where several outcomes are possible, and each outcome has a different value depending on what decisions the individuals make. Each individual may have some influence on the final result, but no single person has complete control over the process as a whole. The player must consider how to maximize his outcome while keeping in mind that there are others whose goals are different from his own and whose actions will affect everyone else. The player not only needs to adjust his plans to his own desires or capabilities, but to those of others as well. The outcome of the game depends on the strategies that the various players employ. It also depends on factors that none of the players can control, such as luck³.

We call a game “totally informed” when all participants are familiar with all the data that concerns them; they have a transparent view of their position and the steps that they or their opponents might take. In such cases, one can achieve victory through a so-called “clean strategy”. The players keep their decisions secret, disguising them as random or as possibilities. They mix strategies to target the optimal ratio, try to deduce the others’ decisions, and do their best to confound them. All players are aware of all this, so they remain vigilant against the others’ efforts to wrongfoot them⁴.

Game theory can analyze situations where participants must take decisions that pose risks. In these situations, at least two players try to maximize their own so-called “utility function”. Each participant’s utility function depends on at least one other participant’s utility function. It is generally understood that the player who wins the most is the one who eschews conventional answers to questions and dares to step out of the equilibrium. However, this player might also end up losing the most.

Starting out as a set of mathematical models, game theory has evolved into a system that can be used to analyze many-sided conflict situations.

The theory generally treats players as rational. Naturally, the players are the ones who have to formulate diverse answers to particular challenges in numerous areas of life. The concept of rationality can be perceived in that the players, as decision makers, endeavor to maximize their own advantage – that is, they choose the action that is most optimal for themselves⁵.

Game theory is very good for modeling various economic processes, customs policy, perhaps an election, and criminal proceedings as well. It facilitates the examination of criminological processes – for example, how the law influences prospective criminals and how it impacts societal welfare as a whole⁶.

For example, researchers have used game theory to analyze how intensified police action in a crime-infested area affects the behavior of possible victims in potential target groups and, consequently, the development of criminal activity. Professional criminological

approach on the nature of rational behavior. Neumann and economist Oskar Morgenstern published their book “Theory of Games and Economic Behavior”, in which they tried to develop principles of rational behavior for situations in economic, political and social life. (John von Neumann and Oskar Morgenstern, *Theory of Games and Economic Behavior* (Princeton, NJ: Princeton University Press, 1944).

³ R.L. Birmingham, *Model of Criminal Process: Game Theory and Law*, Cornell Law Review no. 56/1970-71, pp. 57-69.

⁴ G. Iván, cited, pp. 1-17.

⁵ F. Forgó, *Mivel foglalkozik a játékelmélet?* [What Does Game Theory Deal With?], Magyar Tudomány no. 5/2009, pp. 515-527, <http://www.matud.iif.hu/2009/09maj/02.htm>, epa.oszk.hu/00600/00691/00065/pdf/515-527.pdf. (accessed on 1 March, 2019).

⁶ R.L. Birmingham, cited, pp. 57-69.

literature regards intensified police activity in particularly dangerous locales as a feasible strategy. By contrast, game-theory processes suggest that the optimal strategy would be random police action in various locales. If statistics indicate a high rate of crime in a given area, or criminal activity is intensely directed at a certain class of victims, then a redistribution of law-enforcement resources is not necessarily justified; it might mean that although fewer crimes are committed against the less vulnerable (for example, homeowners who are able to protect their homes), criminal activity will intensify against victims who are truly vulnerable⁷.

Gál (2007) employs what is essentially game theory in setting up his model for sanctioning economic criminals, starting with theories that describe criminals as profit-maximizing actors. These theories argue that a perpetrator commits a crime when the profit he anticipates from illicit activities exceeds the losses he may suffer should he get caught⁸.

In some cases, criminal proceedings raise questions with respect to decision analysis. In cases adjudicated by multi-judge panels, researchers usually analyze the process through which jurors make decisions. However, the workings of three- and five-judge councils, composed of professional judges, can be examined using similar methods⁹.

In one example of game-theory analysis, jurors must render a verdict on a defendant's guilt or innocence and also decide what kind of punishment he deserves. In this case, 35 percent of the jurors believe the accused is innocent, 20 percent think he is guilty but deserves a relatively light sentence, and 45 percent think he is guilty and should serve a long term in prison. The jury president, who manages the voting, favors a "guilty" verdict with a lighter punishment. When he realizes the jury is deadlocked, he comes up with the following solution: First, he will call a vote on the question of guilt or innocence, which will clearly go 65-35 percent in favor of "guilty". Then, he will call a vote on sentencing. If the decision-making process is rational, then those who consider the defendant innocent will vote alongside jurors who favor a lighter punishment. Thus, the jury president achieves the outcome he wanted, which was originally the least popular of all three alternatives¹⁰.

II. Game theory and criminal proceedings

Game theory originally emerged from the scientific study of well-known games such as chess and poker, where the player has to think ahead and develop a strategy to deal with other players' possible responses. The strategy is a long-term plan. It covers the entire game and extends to all of its details. The strategy is the player's plan for self-conduct; it guides the player on which way to go – and how to go there –

⁷ E. Guttel, B. Medina, *Less Crime, More (Vulnerable) Victims: Game Theory and the Distributional Effects of Criminal Sanctions*, Review of Law and Economics no. 3/2007, pp. 407-433.

⁸ I.L. Gál, *Gazdasági büntetőjog közgazdászoknak* [Economic Crime Law for Economists], Budapest: Akadémiai Kiadó, 2007, p. 57.

⁹ If a vote is not unanimous, a decision shall be taken by majority vote. If there is no unanimity on assessing punishment or applying a provision, the majority of votes shall be established in such a way that the vote for the most severe legal consequence reinforces the one that falls closest to it, and that is to be expected. (Hungarian Law on Criminal Proceedings, Act XC (2017) (Abbreviated in Hungarian as "Be.") §450 (1)(2)).

¹⁰ J. Mészáros, *Játékelmélet* [Game Theory], Budapest, Gondolat Kiadó, 2005, p. 222.

at every future decision-making point, assuming the game proceeds that far. Essentially, it is a method that will help the player to victory, or at least a tie, by taking advantage of his opponent's mistakes. Hence a strategy means the decision that a player considers optimal¹¹; it is a decision alternative, or a series of such alternatives.

In cases where information is not available to a participating player, then no strategy will lead to a clear victory. There is no point in the player trying out different tactics, as his opponent will soon recognize them and make use of them¹². In court, one defendant may find it advantageous to employ a defense that is significantly different from the other defendants' defenses, but the moment that the others begin imitating him, it is hardly certain that his strategy will bear fruit¹³.

A similar strategy is required in numerous business situations. It can also be useful in developing and understanding an investigative plan or a defense strategy¹⁴. In forensic science, criminal strategy and criminal tactics concern rules for planning and organizing investigations, the behavior of the investigators, and the applicable apprehensions and operations¹⁵.

This concept also makes it possible to understand a defense plan, where the defense counsel makes assumptions about future events and decides what he will do in response to them. The more surefooted his assumptions, the better decisions he will make. Here, game-theory modelling is an excellent tool as it can establish the optimal decision in light of the other competitors' anticipated behavior. Thus, the game theory can be used to model criminal proceedings, as each decision carries a risk with respect to the end result.

Participants in criminal proceedings have many decisions to make. The "players" are the accused, the defense attorneys, the investigators and the prosecutors. Game theory precisely shapes procedures in which cooperation and competition are simultaneously present. It deals with situations where at least two decision makers try to maximize their own so-called "utility function". Every participant's utility function depends on at least one other participant's utility function.

The accused must take risks when deciding whether to testify, whether to confess to the charges against him, perhaps whether to concoct a cover-up story, or whether to expose the role his partners may have played in the crime. Likewise, every decision the investigator takes carries a risk that directly affects the behavior of the accused and his attorneys.

In game-theory terminology, an "interaction" occurs when the decisions of at least one player directly affect the conduct of another player. Their effectiveness also

¹¹ F. Forgó, cited, pp. 515-527.

¹² G. Iván, cited, pp. 1-17.

¹³ For example, a criminal proceeding where one defendant's attorney argued that his client wanted to smuggle cigarettes, but they ran out before he arrived. The case against him was dropped because the wiretap evidence proved nothing more than this, and the act of planning fraud against the state budget is not punishable. The other defendants tried in vain to copy this defense during the trial phase; it could no longer bring results.

¹⁴ Fenyvesi raises the applicability in criminal proceedings of the Bayesian analysis, which provides an objective model for dealing with uncertainty, stressing that it is employed effectively in game-theory in the field of economics. The present study takes a slightly different approach to analyzing the applicability of game-theory to modeling criminal proceedings. See C. Fenyvesi, *A kriminalisztika tendenciái: A bűnügyi nyomozás múltja, jelene, jövője* [The Tendencies of Forensics: The Past, Present and Future of Criminal Investigations], Budapest: Dialóg Campus Kiadó, 2014, p. 243.

¹⁵ G. Bíró, *Kriminalisztika* [Forensics], Debrecen: Debrecen University Faculty of Law, Lícium Art Könyvkiadó Kft, 2015, p. 9.

depends on the decisions of the other participants. When individuals or groups decide how to behave toward others, then their conduct influences the others' decisions as well as their behavior, according to the basic premise of game theory¹⁶.

We call an interaction a "strategic game" when the participants are aware of this effect, and even take it into account when formulating their behavior; that is, each player is aware that the other player is also aware that he is also aware etc.

A strategic game can be pictured as an interaction between actors, where the actors develop their behavior by paying attention to the opposing side's conduct; they already know these actions, or at least consider to be within the realm of possibility. For example, a good chess player thinks several steps ahead, trying to foresee his opponent's possible moves. He decides on his current move only after having thought through the entire process to the very end. Similarly, a military commander in the heat of battle tries to think with the enemy leader's mind. Criminal proceedings typically represent a similar kind of strategic game. There is a conflict of interests between opposing parties. Persons involved in criminal proceedings have knowledge and assumptions about the others' objectives and possible alternatives, but this information is hardly symmetrical. The basic theorem remains valid: Every player tries to optimize his position in accordance with his individual goals¹⁷.

In criminal proceedings, every actor – regardless of whether he is an investigator, a defense attorney, or a defendant – is aware that each of his moves affects the others' decisions and conduct. Each player, whether defendant or investigator, builds into his decisions what he considers to be the opposing party's behavior, or possible behavior. It is essential for more than one decision maker to take part: Obviously, if there is only one player, then we are talking about a decision problem (someone who has a problem making decisions), not a game.

If any suspect (perhaps a witness) provides incriminating testimony about himself or his co-defendants, that will clearly influence the game's final outcome.

The key characteristic of the games is interdependence. In investigations, this interdependence can be interpreted as defendant-investigator, defendant-prosecutor, defendant-other defendants, or even defendant-defense attorney. If we look at the simple game-theory questions, we can see that the same questions apply to criminal proceedings as well.

In some games, the players know their situation precisely. This is hardly the case in criminal proceedings, although certain "players" might know their situation. For example, an investigator is someone who knows what certain accused persons and witnesses have said and what they know. However, he has only indirect information on how the past event occurred. The typical card player acts in a similar way: he knows his own cards, still can only deduce what cards the other players are holding. At the same time, he tries to deceive other players about what cards he is holding.

In game-theory terms, an actor has a "clean strategy" when his strategy is final and does not change in later stages. Correlated to all this is the so-called "total memory", which means that the player does not forget his own previous moves¹⁸. When an accused person forgets details about his earlier testimony, offers up too much information, or changes counsel, he complicates his own strategy for winning, but his responses to the others' already-known moves can also alter the strategy he has employed thus far.

¹⁶ G. Iván, cited, pp. 1-17.

¹⁷ J. Mészáros, cited, p. 1.

¹⁸ J. Mészáros, cited., p. 4.

“Individual” and “common” knowledge is the usual method of classification to express the state of possible information in game theory. Information that is available to all players is called “common knowledge”. It is a situation where each player is aware that the other players also have complete information; each player also knows that his opponents know the same thing about him. This common knowledge is much more than the sum total of each player’s individual knowledge.

A well-known example of game theory concerns the customs surrounding adultery in an island society. When a woman discovers that her husband has been unfaithful, it is compulsory for her to publicly shame him in the village square the next day until midnight. Let’s suppose there are two couples, e.g. two women and two men. A stranger shows up and declares that one member of the group has been unfaithful; in fact, each woman is engaging in an illicit relationship with the other’s husband. The first woman knows she has been unfaithful with the other’s husband, so she expects that his wife will take him out to the main square at midnight and shame him. However, this does not occur because the other woman is thinking the same thing. The next day, when it becomes clear that nobody had gone to the main square, the common knowledge emerges: everyone has been unfaithful¹⁹. In criminal proceedings, the dilemma over common knowledge emerges in a similar fashion when parties with opposing interests try to determine who will talk and who will stay silent.

If an investigator states that one of the accused has confessed and therefore can leave detention, no one knows for sure what will happen. Sometimes it is not clear who – if anyone – made the incriminating statement or confession until the court proceedings take place. Common knowledge will emerge, at the very latest, when the documents accompanying the indictment are disclosed.

III. Trap Situation

In game theory, a “trap situation” is when an apparently simple solution runs into difficulties or cannot be completed. Such trap situations include the so-called Prisoner’s Dilemma, the Battle of the Sexes, and Leader.

IV. The Battle of the Sexes

A wife and husband both want to spend the evening together, but both of them know the husband would prefer to go to a football match and the woman wants to go to the theater. The person who cooperates is the one who is inclined to give in to the other. As during the weekdays, the party that fares best is the one who refuses to give in because the spouse is compliant. The party that gives in fares somewhat worse because they do not get to spend the evening as they wish, but at least they get to spend the evening with their spouse²⁰. In criminal proceedings, it is often clear that the person who defies the rules may win the most – but he is also the one who stands to lose the most. The defendant who does not give in, but rather consistently denies his guilt or comes up with a new and unusual defense, wins big if the judge dismisses

¹⁹ *Idem*, pp. 1-6.

²⁰ Z. Zsigó, *Van-e megoldás a csapdahelyzetekre?* [Is There a Solution to Entrapment?], Sulinet, 28th March 2014, <https://hirmagazin.sulinet.hu/tudomany> (accessed on 31 March 2019).

the charges against him or halts the criminal proceedings. However, he also misses out numerous legal possibilities where a confession might have led to a more favorable judgment or agreement. Should the trial end in a conviction, the defendant might also miss out on the lighter sentence that a confession would have afforded him.

V. The Leader

The moral of an old Japanese tale is that the more polite of two people is, in fact, the one who is less polite – because by being impolite, he allows the other person to be more polite. Two gentlemen are trying to get through a narrow doorway. The collaborator is now actually the leader; he is the one who takes on the “less polite” role and starts through the doorway first. He gets the biggest reward accruing to the selfless Japanese. However, the leader’s action is also advantageous for his colleague, because if the leader crosses through the doorway first, then the colleague can pass himself off as the more polite man. If both parties do the same thing, then the above-described “equilibrium” is upset. If both people want to be the leader, then each will block the other while walking through the doorway; if neither is polite, then they both will stand in front of the door making gestures of courtesy to one another.

In criminal proceedings, the accused wants to be the leader – the one who tries to direct the events with his testimony. Certainly, the defendants hinder each other when they testify against each other; they upset the equilibrium. The defendant who declines to testify will not be believable, but with his silence, he is actually calling attention to himself²¹.

VI. Prisoner’s Dilemma

In this classic example of game theory, police apprehend two criminals who were accomplices in a crime; authorities have been trying to catch these men for a long time. They lock the prisoners up in separate rooms. In an effort to uncover the facts, the prosecutor makes the following offer to each prisoner: “If you confess and your partner does not, then you go free and he gets 10 years behind bars. Your partner gets the same offer: If he confesses and you do not, he goes free and you get 10 years. If neither of you confesses, then each of you get one year behind bars on a lesser charge. If both of you confess, then each gets five years in prison”. This is not a zero-sum game; no matter what his partner does, the prisoner gets the best deal if he confesses.

²¹ In the practice of the European Court of Human Rights (ECHR), the right to remain silent is contravened if an accused person is convicted based solely or predominantly on his silence, his refusal to testify or his own confession. However, the right to remain silent does not mean that the accused’s silence cannot be taken into account amid circumstances that clearly require his explanation during an examination of the merits of the evidence cited in the indictment. A similar conclusion can be drawn in cases where a defendant is late in providing his evidence: As the ECHR ruled in *Murray v. United Kingdom* (1996): “The courts in a considerable number of countries where evidence is freely assessed may have regard to all relevant circumstances, including the manner in which the accused has behaved or has conducted his defense, when evaluating the evidence in the case”. (*John Murray v. The United Kingdom* 18731/91, *Averill v. The United Kingdom* 36408/97, Budapest Court of Appeals 8.Bf.392/2016/113).

The primary goal for both prisoners is to be set free, or at least to get the shortest possible sentence at trial. The question to be answered is, what is the most logical way to accomplish this?

The perpetrator approaches the question logically. "If my partner confesses, then two outcomes are possible: If I also confess, I will get five years, but if I don't confess, I will get 10". It follows that the perpetrator will make out best if he confesses when his partner does likewise.

If a perpetrator does not confess, then the possible outcomes are different: Either one perpetrator will go free while his partner gets 10 years, or if neither confesses, then each gets one year. It is clear that the perpetrator will fare better if he confesses while his partner remains silent. The logical model therefore suggests that both prisoners will do better if they both confess and serve five years. However, if neither of them had confessed, they could have gotten away with one year each²².

It is in neither prisoner's interest to do differently than he is advised, as long as his partner also takes the prosecutor's advice. This situation might be an equilibrium, since it is in no one's interest to diverge from the path so long as the other does not. We call this situation the point of equilibrium, or "Nash equilibrium" after John Nash, the American mathematician and Nobel laureate in economics who discovered equilibrium theory. At the Nash equilibrium point, any player's equilibrium action (maximizing his own utility or advantage) is the best response to the other players' action profiles²³.

A Nash equilibrium comes about if one person's decision is optimal in relation to another person's choice, and vice-versa. When making strategic decisions, no one knows what the other will decide. However, each player can envisage the others' decisions. The Nash equilibrium can also be interpreted as mutual expectations toward the other player²⁴.

According to the conclusions of game theory, the betrayal of a partner (called "defection") is always the dominant strategy. This is because in most cases, it comes with a higher payout at the individual level. But all in all, the best course of action for players is mutual cooperation.

Naturally, researchers have scrutinized the decisions people make in prisoner's dilemma situations²⁵. Two economists from the University of Hamburg studied real-life prisoners and found that the majority were highly cooperative – indeed, they cooperated at a much higher rate than the students who served as the control group²⁶.

Psychologists also like to examine prisoner's dilemma situations. However, they focus more on real-life situations and use their experiences to build up a model that describes the regularity of the situation. In psychological experiments related to prisoner's dilemma, it is clear that the game's outcome is influenced by the concrete values of the payout matrix – not just the values' relation to each other, permission to communicate, the players' gender, the relationship between the two players' gender, the gender of the person managing the experiment (!) whether the game is one-round or

²² G. Iván, cited, pp. 1-17.

²³ F. Forgó, cited, pp. 515-527.

²⁴ G. Iván, cited, pp. 1-17. John Nash and János Harsányi shared the 1994 Nobel Prize in Economics for their pioneering analysis of equilibria in the theory of non-cooperative games. Nash and Harsányi jointly developed a method for the general resolution of non-cooperative games.

²⁵ M.M. Flood, *Some Experimental Games*, Management Science no. 5, vol. 1, October 1958, pp. 5-26.

²⁶ M. Khadjavi, Andreas L., Prisoners and their Dilemma, *Journal of Economic Behavior & Organisation* no. 92, August 2013, pp. 163-175.

multi-round²⁷. Kuba also points out that over the course of many games, psychological factors can have a major influencing effect. These include trust, sympathy, assumptions, learning, prior knowledge, worldview, and personality traits²⁸.

Research on the regularities of games in real-life situations has evolved into “behavioral game theory”²⁹. However, the experiments often concluded that in some situations, the decisions people make are hardly rational. The thesis of behavioral game theory posits that people are basically rational decision makers even when they are limited by various conditions.

VII. New rules for criminal proceedings

The beginning of a game determines its end. Or, if the rules of the game change, then the player must completely rethink his own strategy. Hungary’s new Law on Criminal Proceedings, which entered into force in July 2018, significantly changes the nature of the strategies that participants in criminal proceedings must develop.

VIII. Cooperation or conflict

Games can be categorized in different ways. We draw a distinction between cooperative and non-cooperative games. In non-cooperative games, players compete against each other, but tacit cooperation is permitted. In cooperative games, players work together toward a common goal and are allowed to make agreements with each other. The players jointly maximize their benefits, allowing them to reach a result that is more propitious than what could be achieved without cooperation³⁰.

Players know their exact position in games such as chess, which is a “complete information” game. However, such a situation is exceptional; in most games, some players have information that others do not. A clear example of this is the investigator, who knows the prior testimony of certain defendants and witnesses or perhaps an expert witness’ opinion, while the other participants do not. To make another comparison to real-life games: In most card games, each player knows his own cards and tries to deduce what cards his opponents are holding, or, at least, tries to deceive the others as to what cards he holds. All the players are aware of this; everybody tries to take account of the others’ deceptive intentions.

The players’ strategic interaction is a mix of mutual interests and mutual conflict. It is often worthwhile for the players to enter into agreements on cooperation; however, in many cases it is beneficial for certain players to unilaterally break these agreements, hoping that the others will not do likewise. The other players may make various assumptions about their behavior after the agreements and develop their

²⁷ L. Mérő, *Mindenki másképp egyforma. A játékelmélet és a racionalitás pszichológiája* [Everybody is the Same in a Different Way: The Psychology of Game Theory and Rationality], Budapest: Tercium, 2007, pp. 1-388.

²⁸ P. Kuba, *A magatartás játékelmélet eredményeinek általánosíthatósága és korlátai* [Generalizability and Limitations of the Results of Behavioral Game Theory], pp. 280-285, www.eco.u-szeged.hu/download.php?docID=40109 (accessed on 30 March 2019).

²⁹ Kuba uses this expression; see P. Kuba, cited, p. 279.

³⁰ F. Forgó, cited, pp. 515-527.

strategies accordingly. For example, defendants may cooperate by firmly denying the charges against them. However, the rules of game theory suggest that this kind of cooperation generally will not last unless the agreement is somehow enforceable³¹.

The basic premise of game theory argues that it is often worthwhile for players to make agreements. Cooperation can be beneficial, but in numerous cases it is more advantageous for an individual player to break the agreement, hoping that the others will not do likewise. The players devise their strategies accordingly. Defendants might cooperate by agreeing that nobody will talk, which could mean staying silent or denying all charges. However, a basic rule of game theory suggests that cooperation will not succeed in the long run unless it is somehow enforceable³². This is true for cooperation between defendants as well.

The new Law on Criminal Proceedings raises another possibility: cooperation between the defendant and the investigator or the prosecutor. The legislators who drafted the law attempted to make the terms of such cooperation enforceable.

The law introduces a procedure called “prospective prosecutorial measure or decision”, as well as two legal institutions under the title “procedure toward agreement”. These can be employed right at the beginning of an investigation. By positing a prospective prosecutorial measure or decision, it becomes clear which legal institution should be applied, even as early as the interrogation of the suspect. Such institutions might include a mediation procedure, a conditional suspension by the prosecutor, or other method of facilitating the procedure³³.

The undisguised aim of the Law on Criminal Proceedings is to facilitate the defendants’ cooperation and obtain a confession. In cases where the defendant receives precise information on the possible outcome of a criminal proceeding, or about the concrete possibilities that would open up should he decide to cooperate, he might become interested in the opportunity to confess.

The new rules necessarily gave rise to new forms of conduct in the multi-player “game”, since the prosecutor’s interest is to prove his criminal case in the simplest but most reliable manner. The law’s authors sought to accomplish this by strengthening cooperation for the sake of opportunity, by increasing the role of the victim and by codifying enforceable agreements.

IX. Trust and the value system

In the sphere of formal and informal agreements, one factor of uncertainty is that the defendants’ value systems may not concur with one another, while those of the investigator, the prosecutor and the defense counsel may also be entirely different. This can seriously affect the outcome of the game. According to game theory’s premises, every player is only consistent with respect to his own value system³⁴. Players often have different value systems and they do not know about each other’s values. From this point, the game is a function of informality rather than rationality³⁵.

³¹ J. Mészáros, cited, pp. 1-6.

³² *Idem*, p. 5.

³³ Law on Criminal Procedures, §404-416.

³⁴ J. Mészáros, cited, p. 7.

³⁵ *Ibidem*.

The sensitive point of every agreement made in criminal proceedings is the extent to which the participants trust each other.

In a review of his game-theory results, Camerer arrived at the opinion that the various fields of social science might find a common denominator when it comes to defining terms such as “trust”. The disciplines of psychology and sociology had been trying to find an acceptable way to define the concept of “trust”.

According to Camerer’s theory, the concept of trust can easily be grasped in a game where someone gives out a cash loan with the understanding that the debtor will not receive any punishment if he does not pay it back. In this kind of game, the creditor trusts the debtor if he loans him money; if he does give out the loan, then there is no trust. Camerer argues that it is possible to measure the level of trust by changing the amount of the loan³⁶. Naturally, measuring trust takes an entirely different shape in criminal proceedings, since giving money would mean engaging in corruption. However, the issue of trust is by no means negligible, as it will be a precondition for agreements. In criminal proceedings, trust may be relevant to the material weight of the case, but also to the personal acquaintance of the people involved and their previous experiences with each other³⁷. A related game-theory rule is that players will not forget their previous moves, assuming that their behavior is rational.

X. Prospective prosecutorial measure or decision and settlements

The Hungarian Law on Criminal Proceedings, which went into effect in July 2018, introduced new opportunities for actors to cooperate during the investigation phase.

A conditional suspension of a prosecution creates a dependent legal situation that will end with either the termination of the proceedings or an order to continue the proceedings. The application of a conditional suspension is not yet an alternative to prosecution. The law on criminal proceedings deliberately moved to the beginning of the investigation those prosecutorial legal institutions that, when applied, would have to carry out fewer procedural acts and could carry out acts of proof more quickly and cost-effectively.

The prosecutor can employ these institutions at any time during the investigation. Likewise, prosecutor may tell the suspect that if he confesses, it is possible that he will not face prosecution; rather, the prosecutor will drop the charges.

In addition, the prosecutor may also raise the possibility of using a simplified method of prosecution³⁸.

The accused must decide between two courses of action: deny the charges and cooperate with the other defendants (perpetrators) or confess and cooperate with the authorities. The risk in denying the charges is that another defendant might seize the opportunity to cooperate with the authorities, as in the classic Prisoner’s Dilemma situation.

When accepting a prospective prosecutorial measure or decision, the accused takes a risk by renouncing other defense strategies (keeping silent or denying the charges, for example.) In order to avoid a situation arising from the prosecutor’s initiative in which

³⁶ C.F. Camerer, *Behavioral Game Theory: Experiments in Strategic Interaction*, Princeton, NJ: Princeton University Press, 2003, pp. 43-62.

³⁷ C.F. Camerer, cited, pp. 43-62.

³⁸ Law on Criminal Procedures, §382(1), §399(1).

the prosecutor unfairly denies the terms of the agreement at a later time, the Law on Criminal Proceedings excludes the use of the suspect's statement and the means of proof obtained on this basis³⁹.

In this rule, the Anglo-Saxon legal doctrine known as “the fruit of the poisonous tree” enters into the new codex, because the law prohibits using means of proof that were originally – at least on the surface – legally obtained personal evidence⁴⁰. If the accused testifies under the influence of prosecutorial deception or an unfulfilled promise from the prosecutor, then – in order to exclude evidence obtained under improper influence – the Law on Criminal Prosecutions excludes his confession and the evidence obtained from it.

The “fruit of the poisonous tree” doctrine means that all illegal evidence, evidence stemming from illegal sources, and evidence obtained in relation to illegal sources is excluded from the scope of evidence.

Therefore, in implementing the prospective prosecutorial decision or measure, the legislators' starting point was the game-theory rule that says cooperation can only be enforceable if there are consequences. The prosecutor will pay a high price if he diverges from the terms of the agreement, which must set in writing. If he fails to uphold the terms, then he will not be able to use any confessions or evidence stemming from the offer. This demands a totally new game strategy from the participants in the proceedings.

On the other hand, the prosecutor's office is under no obligation to act upon a measure set in writing and approved by the suspect, or to issue an order, if the suspect fails to fulfill the conditions to which he agreed or provides false testimony. In this case, the suspect's testimony, made in light of the offer from the prosecutor, is usable as a tool of evidence. Although the Law on Criminal Prosecutions encourages the accused to confess, there is no tolerance for false testimony or a false confession. The sanction for a suspect who provides false testimony is the same as if the defendant does not fulfill the conditions he has agreed to undertake.

XI. The settlement

Under the Law on Criminal Proceedings, the state can create an opportunity during the settlement with the defendant for the person who is the subject of the criminal proceedings to exercise his right to choose the format of the proceedings. Before the indictment is filed, the prosecutor's office and the accused can enter into a settlement on an admission of guilt and the consequences thereof. If the prosecutor's office and the accused do not reach a settlement, the initiative and the documents drawn up in connection with it may not be used as evidence or as a means of proof. In this case, the prosecutor's office cannot inform the court about the initiative that led to the agreement or submit documents related to it⁴¹.

A “change in approach” means that the process of admitting guilt is included in the rules of general procedure. It follows that settlements have a place in any case and in any instance of crime. An exception to this is criminal proceedings against defendants who cannot be punished due to abnormal state of mind; obviously, such defendants cannot admit their guilt.

³⁹ Law on Criminal Procedures §406(2).

⁴⁰ The “doctrine of the fruit of the poisonous tree” in the legal practice of Hungary and Strasbourg. *Magyar Jog*, February 2018, pp. 94-104.

⁴¹ The Law on Criminal Procedures, §407 409.

In relation to the settlement, the law expressly makes it possible to bargain over the punishment to be meted out. All of this results in new, previously unknown (or hardly known) forms of behavior in criminal proceedings. The success or failure of the indictment and the evidentiary procedure, as well as the subjective factors in determining punishment all point in the direction of an agreement.

Camerer ascribed the term “ultimatum game” to those models that are developed after a bargaining process has taken place. He offers the following example: If a photographer is selling pictures of attendees at a social gathering for \$10, and nobody buys them, then the pictures will be worthless to him. We want the photos, but we also want to take advantage of our negotiating position. Naturally, the photographer will not lower the price for us while others are crowding around to buy photos of themselves; in that case, he would lose a lot of money because it would be obvious to everyone that it is worthwhile to bargain with him. Something similar happens in the last few moments before workers call a strike or prosecutors submit a case to a court⁴². A settlement reached during an investigation may result in a similar bargain, which is likewise an ultimatum game in the sense that failure to accept the settlement would mean continuing with an indictment whose outcome is inscrutable.

Camerer’s final conclusion is that it makes a difference who initiates the offer in the bargaining process, according to his model. The analytical approach to the ultimatum bargaining works as follows: First, let us assume that all players are self-interested – that is, they consider it important to earn the most money for themselves. If this is the case, then the person responding to the offer (Respondent) accepts the smallest sum offered, say \$0.25. If person making the offer (Bidder) counts on this, and he wants the most money for himself, then he will offer \$0.25 and keep \$9.75 for himself. Figuratively speaking, the \$0.25 offer (as well as the acceptance of any positive sum) means the “pricing game’s perfect equilibrium”. If the Bidder starts the game, then his bargaining position is stronger and – theoretically – he can take advantage of the situation because the self-interested Respondent will accept whatever sum he can.

In laboratory experiments, however, Camerer pointed out that Respondents consider a price proposal unfair if it is significantly less than half of what they originally asked. They are inclined to reject a such a small price simply because they want to punish the Bidders who behaved so unjustly toward them⁴³.

XII. Concluding thoughts

If the accused and their attorneys adequately apply game theory to their strategies, then they will achieve the result that is most optimal for themselves. Game theory also makes it easier to understand the actions of the participants in criminal proceedings and therefore to understand certain testimony, especially betrayal; game theory helps us properly assess the creditworthiness of incriminating statements that one defendant makes about another.

Naturally, a question that frequently crops up in relation to game theory is its practical application. A common concern is that it is hard to divine from game-theory models what kinds of decisions people or actors will make in real-life situations. There

⁴² C.F. Camerer, cited, pp. 43-62.

⁴³ *Idem*, pp. 43-62.

is no professional consensus on which game-theory models are desirable or whether they correspond with reality.

In real-life situations, the actors' behavior is influenced by many factors that were not considered in the initial assumptions. These factors, known as distortionary effects, can influence the game's results in real-life situations⁴⁴.

With respect to the relationship between real-life situations and game-theory models, situations that are difficult to fit into a logical model can be deduced; thus "using this approach, an interesting result is that one can create a model in which the phenomenon of bluffing can be grasped in an abstract strategic situation⁴⁵". All this would lead to the analysis of further uncertain situations, such as tactical bluffs during hearings or the tactical influence on obtaining testimonies, which goes beyond the scope of this study.

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⁴⁴ P. Kuba, cited, pp. 275-276.

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