

CluEvo - Solving a crime with the help of evolutionary psychology

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Introduction

In our project we are dealing with a fictional case which took place at the Summer School of Science in 2009. According to the available information, Nikolas, a participant of Summer School, was found dead in the woods near Požega. Because there were no apparent signs of violation on the corpse, the first investigator closed the case quickly. He did not see any reason for further investigations and therefore assumed a tragic death without any remarkably interaction between the victim and others.

Some years later Nikolas' mother assigned further investigations of this case she personally considered to be a murder. From this point on a new investigation team of Summer School participants had a closer look at the case again.

In order to solve the case, a very different approach was used. The idea of this approach is to apply evolutionary psychology on all the information, statements and alibis of this case. evolutionary psychology is a field in psychology that uses Darwin's evolution theory on animal and human behaviors. It is focused on why the instinctive actions are as they are.

Material and methods

This part of the report shall give further descriptions of the tools and resources used to solve the case. There were two main sources used for solving this case. On the one hand, we used theoretical information by reading and discussing scientific papers to understand important concepts in order to assess if the witnesses were telling the truth in their testimonies. On the other hand side we designed our own experiment in order to investigate how people behave in a given situation and how they interact with each other.

Prisoner's Dilemma Experiment

In this study, it has been designed a two-games test based on Nicky Case version. This prisoner's dilemma experiment was a two-player game in which each subject participated in a two and a eight-round game. The objective of this test was to check the behaviour of people in certain situations in order to see how an accomplice in our case would have behaved.

The 28 subjects were assigned a number randomly and a different opponent in the 2 different games. At the beginning of every game, the rules of the game were stated similarly. These included that none of the subjects did know who the other player in their game was and they were asked to keep quiet to accomplish it. They were also told if they were

performing the 2-round or the 8-round game and that their personal goal was to maximise the number of candies they had at the end of both games.

In each round, the players had one decision to make. They could either show this signal 👍 (for the further report named: “cooperate”) or this signal 👎 (for the further report named: “cheat”). If both of them cooperated, they both got two additional candies. In the case they both cheated, none of them got any extra candy. If one of them cheated and the other one cooperated, the one who cooperated lost two candies and the one who cheated won four of them.

Before doing the experiment we came up with some predictions. Firstly we assumed that people would cheat more in the 2-rounds-game than in the 8-rounds-game. This simply because for them, there would be no reason to evolve trust strategy with the other person during the 2-rounds-game. It would be much safer for them to cheat because they would, no matter what the other one did, not lose any of their candy. Whereas in the 8-round-game it would be helpful to trust the other player in order to evolve trust and cooperation strategy, in order to maximise the number of candies.

We also assumed that project leaders and organizers would cheat less than other participants. This for the simple reason that project leaders and organizers would perhaps want to play more like a role model (a function they fulfilled already during the camp).

Furthermore, we were quite sure that the percentage of people cheating in the last round of game 2 would be much higher than in the rest of the game. This could be explained by the fact that they wouldn't see the other player in the game again and the interaction with the other player would end afterwards so it would not matter if they cheated in the last round.

A more advanced prediction we had is that a strategy called “Tit for tat” or “Copycat”, that consists in cooperating in the first round and from then on copy what the opponent did in the previous round, would be the best strategy to maximise the number of candies participants get in the end because it had the best performance in the different studies we looked at.

Results

Statistical results from the Prisoner's dilemma experiment were extracted after extensive data treatment. Many of the results we obtained were not initially predicted, potentially because of the flaws of our “homemade” and ecological experimental procedure. Some games were excluded of the statistics due to the failure to follow the conditions of the experiment.

The prediction about the 2-rounds-game that subjects would cheat more did not stand true, as in the 8-rounds game the percentage of cheating was a 10% higher than in Game 1 (see in Table 1). Therefore, in the 8-rounds game there was more cheating than expected.

	<i>GAME 1</i>	<i>GAME 2</i>
Total number of events:	56	224
Number of cooperations:	30	97
Number of cheating:	26	127
% of cooperation:	53.6	43.3
% of cheating:	46.4	56.7

Table 1. Percentage of cooperation in Game 1 and Game 2

About the prediction that group leaders and organizers would be more cooperative came to be true, although there were few subjects in this category, they cheated a 13.5% less than S3++ students. Otherwise, there was not any prediction on gender and it was not designed to search about it but the difference of cheating and cooperating between the two genders it is 18.3% (males cheating more than females).

	<i>FEMALES</i>	<i>MALES</i>	<i>STUDENTS</i>	<i>P. LEADERS</i>
Total number of events:	160	120	200	80
Total number of cooperations:	60	67	83	44
Total number of cheating:	100	53	117	36
% of cooperating:	37.5	55.8	41.5	55
% of cheating:	62.5	44.2	58.5	45

Table 2. Percentage of cheating by gender and status

In the 8-rounds game, we predicted that in the last round, the percentage of cheating would increase. For this reason we compared the three first rounds and the last three. After data treatment, a $p\text{-value}=0.01717$ was obtained, which can mean that mostly cheating in the first three rounds and in the last three is 98% not independent.

The strategy prediction did not stand true in our experiment. There were five subjects who followed the Copycat strategy but none of them won any of their matches. Other strategies were found like the "Improved Copycat" that followed the same strategy but cheated in the last 2 rounds to get a probability to win, as copycats had no possibility to win in any case.

Discussion

The general understanding of evolutionary psychology helped us to solve the case in many ways. It was useful, for example, to determine the reliability of a statement made by a suspect or witness. By understanding how evolutionary processes influence our behaviour today, it was possible for us to make a statement on whether a given situation could be at least partly explainable. We also used the results we got from our own experiment.

Our main goal in our experiment was to see what would be the behavior of an accomplice in a criminal case. The clearer index to show this kind of behavior is the % of cheating in Game 2 because in these games the participants started planning a strategy and they had a long-term situation in which to play. The results showed that 56.7% actions in Game 2 were cheating and we related this to the Nash Equilibrium that is found in Game Theory. This

theory states that people tend to choose the safest option in a 2-options decision situation, in our experiment this option was cheating because in any case, it would maximise the gain and minimize the loss. With this majority of participants tending to the Nash Equilibrium in our experiment, we applied this to our case within the Selfish gene theory. This is due to our accomplices, who were the siblings of our main suspect and thus genetically related to him. They did not confess in the first trial because doing so would have hurt a relative carrying their genes and later they could have been retaliated by their older brother.

What concerns our experiment, we are also aware of some weaknesses. On the one hand side, we had to face some outliers for different reasons. One participant did not totally understand the goal of the experiment and his results were not taken into account. In one case one of the participants found out who the other player was. Because he could have been biased from this moment on, his results were not considered in our research. Obviously the human psychology is much more complex than what we considered. It is hard to apply this science directly to real life cases: the individual behaviours can differ from the general predictions that we can draw from the knowledge of this field. Finally, those are only theories and not the absolute truth though they are considered for now as the most parsimonious explanations for many phenomenon.

Conclusion

All the information and literature about evolutionary psychology used to solve the fake criminal case is stated in this paper and its bibliography. Although this is not a common approach to criminology, from our point of view, it would be interesting to take into account the tools that this emerging field gives to detectives, lawyers and judges as it could be useful for them when dealing with biased humans.

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