Does empathy make us less maximizers? Empirical proof against rational choice*

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Abstract

We analyzed how empathy affects rational decision-making during a conflict situation. The study collected empirical evidence from eighty volunteers who participated in a laboratory experiment where Palacio et al.'s (2015) 2x2 Conflict Game, as well as Davis's Interpersonal Reactivity Index (IRI) were used to measure empathy and rational choice. Volunteers were divided into four groups, two of which played with the same person, while the other two played with a random partner. The study found that dimensions of empathy can both increase and decrease rational

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choice, with no single effect. Interestingly, the study also found that proximity to empathic situations promotes altruistic behavior. The results were correlated using a Generalized Linear Model. Overall, this study provides important insights into how empathy can influence decision-making during conflict, which has implications for fields such as psychology and economics.

¿La empatía nos hace menos maximizadores? Pruebas empíricas contra la elección racional

Resumen

Este artículo analiza cómo afecta la empatía la toma de decisiones racionales durante un escenario de conflicto. El estudio recogió pruebas empíricas de ochenta voluntarios que participaron en un experimento de laboratorio en el que se utilizó el Juego del Conflicto 2x2 de Palacio et al. (2015), así como el Índice de Reactividad Interpersonal (IRI) de Davis para medir la empatía y la elección racional. Los voluntarios se dividieron en cuatro grupos, dos de los cuales jugaron con la misma persona, mientras que los otros dos lo hicieron con un compañero aleatorio. El estudio descubrió que las dimensiones de la empatía pueden tanto aumentar como disminuir la elección racional, sin un efecto único. Curiosamente, el estudio también descubrió que la cercanía a situaciones empáticas fomenta el comportamiento altruista. Los resultados se correlacionaron mediante un Modelo Lineal Generalizado. En general, este estudio aporta importantes conocimientos sobre cómo la empatía puede influir en la toma de decisiones durante un conflicto, lo que tiene implicaciones en campos como la psicología y la economía.

Introduction

Throughout history, economists have been trying to uncover how economic agents make decisions. In this task, the classical Rational Theory (RT) establishes utility maximization decision-making as underpinning human behavior, without taking human emotion into account. Certainly, orthodox economic thought, specifically neoclassical theory, considers that economic agents act according to perfect rationality. It is assumed that economic agents have a *homo economicus*

behavior, whose decision-making processes are fully governed by the strictest utility maximization parameters. However, empirical evidence has proved that people's behavior is not always guided by pure rationality. There are psychological, social, and cultural variables that influence the decision-making process, which sometimes ends up in unforeseeable situations from the strict rationality point of view.

At this point, it is important to remember how the field of economics has forgotten Adam Smith's statement on the relevance of psychological variables in choosing behavior. According to Smith (2004), sympathy is comparable to the reasoning process established in the Rational Theory (RT). In this vein, Grohn et. al. (2014), and Güth et. al. (1982), analyze the concept of empathy in the economic field, indicating the relevance of social concerns to economic theory. Grohn et. al. (2014) inspired a new wave of investigation focused on inequality aversion, fairness and reciprocity, efficiency concerns, and impure altruism.

In this context, the assumption that people are capable of inferring others' actions is the basis of Nash equilibrium and Game Theory, despite human reason alone being insufficient for the task. This considerable gap in the theory has been filled by neuroscience and psychology.

Taking the above into account, some scenarios analyzed from the neoclassical theory, particularly from the game theory, show how in a conflict situation, the maximization of individual incentives does not lead to the Nash equilibrium point. Nash equilibrium would be one of the worst possible scenarios since the economic agent does not maximize his/her utilities.

At this point, some questions can be raised to understand, in a better way, the making decision process in a conflict situation: Why does not always rigorous rationality guarantee suitability in actions? Why does not the economic agent guide his/her decisions to the best scenarios? Are human actions strictly rational or are they influenced by emotional and psychological factors, especially when there are two parts in confrontation?

To address those vital questions, this article will focus on how *empathy* affects rational decision-making in a conflict context. It can be mentioned that rational choice and empathy are two concepts that are frequently described as being in opposition to each other. However, some research indicates that people without psychological and social emotions, such as empathy, are rational and objective decision-makers (Castro, et. al, 2020).

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In consequence, this article will show the significant impact of empathy in decision-making, notably in a conflict situation. Based on an experiment, the present investigation will analyze how empathy can increase or decrease rational choice, and how empathy encourages altruistic behavior. For that purpose, this research presents empirical evidence from an economic experiment and Item Response Theory, strategies that allow us to measure these two latent variables for later being correlated. Therefore, this research contributes to the research undertaken by Grohn et al. (2014), Güth et al. (1982), Smith (2004), Kirman & Teschl (2010), and Singer et al. (2005), and builds upon the model proposed by Palacio et al. (2015) to provide evidence for the implications of empathy and decisions under conflict contexts.

The relevance of the present article consists of contributing to the understanding of the conflict. This topic became the genesis of the present investigation. Developing an experiment, it will show to what extent individuals behave rationally in a conflict situation. For this, it is necessary to determine if each person is influenced by strict rationality (precise consistency between desires and action), or by broad rationality (inclusion of social, ethical, and emotional factors in the decision-making). The authors of this article consider the importance of broadening the perspective from which human decisions are analyzed. A more dynamic and integral approach can be made toward understanding decision-making from different types of rationality.

The article is divided into four sections. Firstly, it is presented a literature review related to the history and evolution of the theory of election, the theoretical relationship between economics and empathy, and the notion of empathy and its components. Secondly, we present the methodological issues. Thirdly, the authors explain the statistical results of the investigation. Finally, it is presented the main conclusions.

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Literature review

From the theory of election, through rational choice theory to the broad theory of rationality

The starting point of studying rationality in the economic field was established by classical and neoclassical authors. Adam Smith, the moralist philosopher, and father of classical economics established the *Homo Economicus* as the rational economic agent model, who pursued his/her own defined ends through the maximization of his/her subjective benefits (Smith, 1984). From this perspective, classical and neoclassical thinkers established economic rationality as the *modus operandi* of the rational behavior of every individual.

However, several objections arose against the *Homo Economicus* concept over time. Different authors criticized decision-making based on the search for his/her interest or benefit (an issue that some authors called a "selfish" behavior). The evidence of cooperative and altruistic actions that human beings carry out blurs the behavioral principle of orthodox economic rationality.

In the middle of the 20th century, modern economic authors based on empirical evidence, carried out a process of redefining the concept of *Homo Economicus* and the neoclassical postulates of the Theory of Election. Authors such as John Von Neuman and Oskar Morgenstern (2004), with their academic contribution to the Theory of Games; Anthony Downs (1957), with his Theory of Economic Behavior; and James Buchanan and Gordon Tullock (1980), with the introduction of methodological individualism in the field of collective decision-making, created a new explanatory paradigm of rational action, known as the "Theory of Rational Choice" (TRC). This academic movement affirms that people behave differently in their normal lives as it is postulated by traditional economic rationality. For those authors, social, cultural, and psychological variables influence human decisions. In the same way, George Caspar Homans (1961), the founder of behavioral sociology, postulated Rational Choice Theory concerning social exchange. He indicates that a rational calculation of an exchange between benefits and costs guides social behavior.

Even though, the Rational Choice Theory became the contemporary explanatory model of individual and social behavior in the field of social sciences. Different authors, like Jon Elster (1977; 1983), began to underline its limits and

gaps, such as imperfection, indeterminacy, and irrationality of preferences. The constraint of orthodox rationality leads Elster to configure a broader theory of rationality based on the flexibilization of the normative parameters of the Rational Choice Theory. Elster's "Broad Theory of Rationality" indicates that reason is not the sole basis for decision-making. Decision-making includes emotions as a highly variable that influences human motivations and actions. This motivational factor not only liberates human behavior from hyper-rationalism, but also configures an explanatory model of action that is more consistent with human nature since it includes emotions and feelings. According to Elster, the rational making decision process includes "non-rational" elements, which configure not only an integral approach to human behavior, but also a more dynamic approach to rationality.

Empathy and Economics

It is noteworthy how ethics has permeated economic theory and practice since the field's creation. It is useful to remember how economics was perceived as part of modern philosophy, insofar as philosophers were those who debated concepts of economics such as utility, merchandise, value, and wealth. Likewise, philosophical conceptions of justice, sympathy, reciprocity, well-being, etc., were included in the economic language. As can be concluded, in the history of economic thought, ethics, and economics are intimately related.

In this context, it is important to remember how Adam Smith, in *The Theory of Moral Sentiments*, proposed sympathy as the fundamental basis of value judgments. This philosophical book of morality introduces the epistemological legacy that understands the interaction between humans as a process guided not only by selfish rationality, but also by reason and sympathy. This theory was also postulated by Smith in *An Inquiry into the Nature and Causes of the Wealth of Nations*. This idea pervades the exchange of goods among people because it is essential to appeal to a special sense or attribute allowing for the understanding of others' preferences (what the other is looking for), and to know how they might react (Fontaine, 1997). According to Smith, sympathy is the innate capacity to be interested in the well-being of others, putting ourselves in their place through imagination, due to the impossibility of being the other (Smith, 2004). In other words, for Smith sympathy is "our fellow feeling with any passion whatsoever" (Smith, 2004, p. 13); a definition comparable to what we describe as "empathy".

Thanks to Adam Smith, the concept of sympathy became part of economics. According to classic thought, the economic agent is motivated by other's affections that guide the person to take options and define preferences, based on sympathy with others, not only on his feelings.

Remarkably, the ability to sympathize has been hidden within economic thought, taking away from the analysis of behavioral economics, for example. Instead, the influence of the impact of sympathy on rational choice has been studied by psychology. However, Güth et al. (1982) pointed out the need to incorporate social concerns into behavioral theory. Thus, in the last forty years, several studies have been carried out analyzing the relationship between economic variables, empathy and emotions (Calvet Christian & Alm, 2014; Hoffman et al., 1999; Lerner et al., 2015; Salehi-Abari et al., 2019).

In economics, the notion of empathy has been considered in different ways that range from a basic knowledge of emotions to feeling and experiencing the emotions of others. This kind of research has been conceptualized in different terms, such as "mind-reading", "mimesis" or "mirroring", which have been analyzed in two ways: First, "Imagine-self", where the viewer imagines what he/she would feel if finding themselves in the other person's situation. Second, "Image-others" is when the viewer feels or imagines the emotions of the other person by putting himself/herself in his/her shoes (Grohn et al., 2014); the former would be associated with selfish behavior, and the latter with an altruistic one.

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This new economic theory explains human behavior in a multidimensional way (reason and passion), consolidating the genesis of a new branch of economics known as "Neuroeconomics"; a field that seeks to understand how the brain operates when making decisions and interacting with others. Neuroeconomics has demonstrated the existence of a prefrontal medial lobe area associated with the perception of the emotional state of others, meaning empathic behavior, and found that this reaction is innate and cannot be inhibited (Singer

et al., 2005). Just to mention how some experiments have proved the effect of emotional distance with the empathic object and its effect on the intensity of empathy. In this context, empirical research has been done in which the perception of the viewer was affected through positive and/or negative messages given by a particular agent, to measure the grade of empathy or altruism with that person (Batson et al., 1999; Kirman & Teschl, 2010; Singer et al., 2004). The evidence showed that in the case of close people (family, partners, etc.), the level of empathy is perceived in one's brain in a similar way as one's own emotions, illuminating the same brain areas. This effect changes when the observer interacts with a person who is unjust, criminal, or emotionally distant from the viewer. In this case, his/her pain does not cause brain reactions in the same areas as in the previous case.

However, empathy is not only associated with others' emotions. It has also been related to a cognitive process that manages to put oneself in the place of another to predict his or her behavior. Individuals can observe and analyze the intentionality of others, based on previous experiences. The brain can predict possible actions that other people would perform (Batson et al., 1999; Kirman & Teschl, 2010; Salehi-Abari et al., 2019; Singer et al., 2004). One of the points in which the authors agree consists of indicating that each person has a certain level of empathy with which the individual determines the inclination in his/her making decision process. Likewise, the literature indicates that it is not possible to predict what kind of decision the person would take (selfish or altruistic). The distinctive selfish identity of the market system affects the empathic feeling and the effect on our preferences. Decisions can lean towards a personal interest or a social interest, depending on how the agent perceives others and the level or type of empathy that he or she develops. People's motivation would change, from partial to complete empathy, depending on the rational process that the individual makes when taking decisions.

The study of empathy from game theory, behavioral, and experimental economics

Empathy was a longstanding issue in economics, especially in welfare economics, but it faded from the scene for a long time. This may be due to a shift in focus towards more individualistic and rationalistic models of economic behavior, which downplay the role of emotions and social context. In particular, the rise of

neoclassical economics in the mid-twentieth century emphasized the importance of self-interest and rationality in economic decision-making, and this perspective dominated the field for several decades (Kirman & Teschl, 2010).

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The development of game theory made the study of empathy important in economics. Game theory is a branch of mathematics that studies strategic decision-making in situations where the outcome of one person's decision depends on the decisions of others. In game theory, individuals interact directly and consciously with each other, and the basis of the theory is that this interaction is strategic.

Unlike the standard economic model, game theory assumes that individuals reflect on the actions of others with whom they interact and know that others do the same. This is usually referred to as the "common knowledge" assumption (Aumann 1976; Binmore 1990). In this framework, empathy is important because it allows individuals to better understand the position of others and anticipate their actions. Empathy is important for mentalizing, which is the ability to attribute mental states to oneself and others. Mentalizing is crucial for successful coordination and cooperation in economic contexts, as well as empathy helps individuals to put themselves in the shoes of others and to understand their perspectives.

In that way, Binmore's idea is that "Homo economicus must be empathetic to some degree" (Binmore 1994, p. 14). This means that contrary to the traditional view of economic agents as purely self-interested and rational, individuals in economic contexts must possess some level of empathy to anticipate and coordinate with others. Binmore argues that empathy is necessary for individuals to understand the position of others and to better anticipate their actions. This mentalizing sense of empathy allows individuals to contemplate the reactions of others, and to be aware of their utilities or payoffs. In other words, empathy helps individuals to put themselves in the shoes of others and to understand their perspectives, which is crucial for successful coordination and cooperation in economic contexts.

In this way, Binmore's concept of empathetic identification is similar to this idea. Empathetic identification refers to the ability to identify with the preferences of others and to take them into account when making decisions. This concept is based on the idea that individuals in economic contexts are not isolated maximizers, but rather interact consciously with others, and must be aware of their preferences and payoffs to coordinate effectively.

On the other hand, recent developments in behavioral and experimental economics have led to a renewed interest in empathy in economics. Behavioral economics is a subfield of economics that studies the effects of psychological, social, and

emotional factors on economic decision-making. Experimental economics, instead, uses controlled experiments to test economic theories and hypotheses. In both of these fields, empathy is seen as an important factor in economic decision-making. Empathy helps individuals to better understand the position of others and to anticipate their actions, which is crucial for successful coordination and cooperation in economic contexts.

Furthermore, recent research in behavioral and experimental economics has shown that other-regarding preferences, such as empathy, can lead to non-selfish behavior. This challenges the traditional assumption of neoclassical economics according to which individuals are purely self-interested and rational (Bowles & Gintis, 2003).

Likewise, Grohn et al. (2014) conclude that empathy plays an important role in strategic decision-making, as well as can have significant implications for social behavior and utility. The authors introduce two mechanisms, imagine-self, and imagine-other, that define empathy as a process of belief formation, and explore the possibility that agents who are more sophisticated when it comes to evaluating the preferences of others are also more prone to have "other-regarding" preferences. They also discuss the potential impact of empathy on trust, cooperation, and moral behavior, and highlight the need for further research in this area.

According to what has been shown, the study of empathy is of special importance in economic science. Specifically, there have been multiple researches on how empathy can lead to cooperation and coordination among strategically interacting agents. However, our approach is novel in the literature, because it breaks with the dual paradigm of rational and irrational decisions; also brings Elster's Broad Theory of Rationality to the discussion as a new perspective to take into consideration. In this sense, it is important to study what is the role of empathy in strategic decision-making under conflict contexts in non-cooperative games, and whether this influence could lead to broad rational results.

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Empathy meanings and its components

Empathy is considered a fundamental aspect of the social functioning of people, being part of the processes that motivate prosocial behavior and inhibit aggressive behavior (Bandura, 1991; Eisenberg et al., 2000; Mestre & Paula, 2002). According to Eisenberg (2000), it can be defined as the ability of individuals to put themselves in the other's place, an effective response resulting from the perception and understanding of others' situations. In addition, Davis (1983) defines empathy as the "reactions of one individual to the observed experiences of another" (p. 113). In this context, many authors have emphasized the significant relationship between empathy and social competence, which means that a socially competent individual would be sensitive and empathic with their peers (Cecconello & Koller, 2000; Gilar et al., 2008; Howes et al., 1994; Junttila et al., 2006).

There are multiple approaches to the measurement of empathy. However, there is a certain consensus in favor of empathy as a multidimensional construct where cognitive and emotional phenomena are related (Kerem et al., 2001; Rodrigues et al., 2015). In this perspective, Davis (1980) establishes his concept of empathy and his conception of the Interpersonal Reactivity Index (IRI). According to this author, people can have two types of reactions to what another person is experiencing: the cognitive reaction (the ability to understand the other's perspective), and the visceral or emotional one.

In his effort to measure empathy, Davis developed the Interpersonal Reactivity Index (IRI) in order to provide a multidimensional perspective. The IRI contains 28 items (see Appendix) measured with a Likert scale of five values ranging from 1 to 5, where 1 indicates that the item "does not define me very well", and 5 indicates that the item "defines me very well". The items are distributed across four dimensions (fantasy, perspective-taking, empathic concern, and personal distress), measuring aspects of empathy. Each of these subscales contains seven different items.

According to Davis (1980), the first two scales measure the cognitive dimension of empathy. That is, they evaluate cognitive processes.

- Fantasy (FS): This subscale evaluates the tendency of the person to identify him/herself with film and literature characters, i.e., the subject's imaginative capacity to place him/herself in fictitious situations. It comprises items 1,5,7,12,16,23 and 26.
- Perspective-taking (PT): This subscale indicates the subject's spontaneous attempts to adopt the other person's perspective in real and daily life situa-

tions, i.e. the ability to understand the other person's point of view. It contains items 3, 8, 11, 15, 21, 25 and 28.

Davis (1980) indicates the existence of an emotional measurement dimension that measures people's emotional reactions to the negative experiences of others. This dimension includes two scales:

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- Empathic concern (EC): Measures feelings of compassion, concern, and affection in the face of other people's discomfort. This dimension contains items 2, 4, 9, 14, 18, 20, and 22.
- Personal distress (PD): Assesses feelings of anxiety and discomfort manifested by the person upon observing the negative experiences of others. Items 6, 10, 13, 17, 19, 24, and 27 are included in this subscale.

Methods

In this section, we introduce the proposed Conflict Game and explain the experiment we conducted.

The game

In the Conflict Game (CG) that we proposed —an extension of Palacio et al. (2015) Conflict Game— two players interact in the same stage. In this stage, each player decides simultaneously which of the two available strategies to choose. For the Blue Player and the Green Player {V1, V2}. Therefore, there are four possible scenarios for this game, where depending on the payoffs {A1, A2}, the dominant strategies will lead to the equilibrium, being at the best possible outcome for all (Peace) or at the worst (Conflict). The payoffs of this game can be expressed in the following payoff matrices: The dominant strategies will lead to the equilibrium being at the best possible outcome for all (Peace) or at the worst (Conflict). The payoffs of this game can be expressed in payoff matrices (see figure 1).

Figure 1. Conflict Game payoff matrices with modifications

| | Green Player | | | | Green Player | |
	V1	V2			V1	V2
A1	1000, 1000	500, 500		**A1**	1000, 1000	0,1500
A2	500, 500	250, 250		**A2**	1500,0	250, 250
	Peace				Conflict	

Source: Own elaboration.

The above payoff matrices in Figure 1 show the optimal scenarios in a green circle and the equilibrium scenarios in a red circle. Then, in the Peace design, the Nash equilibrium is equal to the Pareto optimum {A1, V1}. In contrast, in the Conflict design the Pareto optimum is still {A1, V1} but the Nash equilibrium is now at {A2, V2}. Therefore, the only change between the Peace and Conflict designs is that it changes the dominant strategy from a cooperative (Peace) to a non-cooperative (Conflict) game.

Experimental procedures

We conducted a laboratory experiment between September 30th and October 1st, 2019. Undergraduate students from various degrees at the Universidad Santo Tomás participated, including a sample of economics, law, and architecture. A total of eighty people participated in the experimental sessions, with twenty players in each treatment. Each of the groups participated in twenty rounds of the game with a within-subject treatment design, with ages ranging from fifteen to 36 years. Instructions were given aloud in the room to all participants to avoid asymmetries of information and to send a signal that the information was the same for everyone. Z-Tree software (Fischbacher, 2007) was used. At the end of each of the sessions, participants were paid in Colombian pesos the total sum of the points obtained during the twenty periods played. The range of payoffs ranged from COP 11,750 to COP 22,500.

Recruitment was carried out through the researchers' social networks, the location of an information table on the campus of the Universidad Santo Tomás, and the on-site call-in cases in which the previously registered persons did not

attend the session. The ethical principles of the Belmont Report National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research (1979) were incorporated in the terms of the call: respect for persons, beneficence-non-maleficence, and justice. In addition, as an institutional protocol, this research was authorized by the Research Ethics Committee of the Universidad Santo Tomás. In order to guarantee compliance with the protocols described above, each of the experimental subjects read and accepted an informed consent in which it was explained what the activity consisted of, the potential risks, the benefits to be received, the voluntariness to participate, and the protection of personal data following the Colombian Law of Habeas Data.

Experimental design

Before starting the experiment, each player completed the "Interpersonal Reactivity Index" test Davis (1980), with 28 items translated into Spanish and a short survey with personal information. The validation of the translation and cultural relevance was made by the researchers and collaborators of the project. Once a question bank was created, the relevant questions used in the application of the construct were selected and drafted according to the format.

The first version of the questionnaire was tested under a pilot test with 35 student volunteers from different faculties. The pilot test was not done for statistical purposes, but to gather feedback from the students. As a result, the wording of the questions and typographical errors were corrected. The final Spanish version of the questionnaire is presented in Appendix A.

We designed the laboratory experiment in three stages described below.

- Stage 1: The subjects were randomly paired (for the Strangers treatment this was done in each round, for the Partners treatment only in the first round). Then randomly assigned roles (Blue Player or Green Player). Participants played one treatment in the first ten periods and the alternate treatment in the last ten periods.
- Stage 2. Decisions: Participants simultaneously had to decide between strategy A1 or A2 for Blue Player and between V1 or V2 if Green Player. Each of them had two options to decide according to the payoffs presented in the matrix, which led to four possible scenarios.

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- Stage 3. Payoffs: The calculation of payoffs was a function of the coordination of the player's decisions and the treatment they were in. Figure 1 shows that if, in the Peace treatment, both players chose options A1 and V1 (cooperative decision) each of them earned 1000 points. On the other hand, if both players chose A2 and V2 the gains would be 250 for each player. The "Level of Rationality" variable was measured as the number of times the participant played a strategy that led to the Nash equilibrium.

Treatments

We selected a 2x2 factorial within-subjects treatment called Peace and Conflict on one axis and Partners and Strangers on the other, made up in turn of groups of two people. In each of the groups, there were two roles: Green Player and Blue Player. Each group looked at a 2x2 matrix of the Conflict Game and had a choice of strategies (one cooperative A1 or V1 and the other non-cooperative A2 or V2).

On the first axis, the treatment variable was defined as the level of existing conflict which was modeled as the incentive to deviate towards the non-cooperative strategy (A2 or V2 as appropriate). In the second axis, the type of matching (Partners or Strangers) was determined as the treatment variable, i.e., in the Partners treatment, participants always interacted with the same person over the twenty periods; in contrast, in the Strangers treatment, in each round, the other player was randomly matched, so the probability of playing twice with the same participant was low.

Table 1. Treatment design matrix

		Matching	
		Strangers	Partners
Type	Peace-Conflict	Group 1	Group 3
	Conflict-Peace	Group 2	Group 4

Source: Own elaboration.

In sum, the treatments for the four groups were:
- (Peace – Conflict) – Strangers. Group 1.
- (Conflict – Peace) – Strangers. Group 2.
- (Peace – Conflict) – Partners. Group 3.
- (Conflict – Peace) – Partners. Group 4.

Results

## Validation of the IRI construct through the CFA

The statistical validation of the Interpersonal Reactivity construct (IRI), was performed through Confirmatory Factor Analysis (CFA) and the Lavaan package of the R software. The Diagonalized Weighted Least Squares estimation method was used to estimate the model parameters, a methodology appropriate for categorical variables (Li, 2016a, 2016b). The results obtained showed that items 12, 13, 14, 15, 18, and 19 contributed little to the explanation of the common factor to which they theoretically belonged (Fantasy, Perspective Taking, Empathic Concern, or Personal Distress). For this reason, these items were excluded from the calculation of the latent variables. The final test analyzed had 22 questions presenting favorable indicators for the validation of the model: RMSEA of 0.107, CFI of 0.946, and TLI of 0.938. These results are consistent with the results found by Garcia-Barrera et al. (2017) and Arenas et al. (2021).

Empathy Variable Conformation

To calculate the empathy variable, Cronbach's alpha and Macdonald's Omega reliability coefficients were performed for each of the four factors that make up the IRI construct. The results were favorable in favor of the one-dimensionality of each factor: Fantasy ($\alpha = 0.81$, $\omega = 0.89$), Perspective Taking ($\alpha = 0.77$, $\omega = 0.85$), Empathic Concern ($\alpha = 0.75$, $\omega = 0.82$), Personal Distress ($\alpha = 0.78$, $\omega = 0.8$); the MacDonald's coefficient has an advantage over Cronbach's alpha for categorical variables and with small sample sizes. In this case, all the omega values are greater than 0.8, which supports the hypothesis of unidimensionality.

For this reason, a unidimensional graduated response model of Item Response Theory (IRT) was performed, supported by the Mirt package of R programming language. The application of the model made it possible to estimate the latent trace for each individual to each factor that makes up empathy according to the IRI. Figure 2 shows the distribution of the calculated latent traits discriminated by the bond among players.

**Figure 2.** Distribution of calculated latent traits.
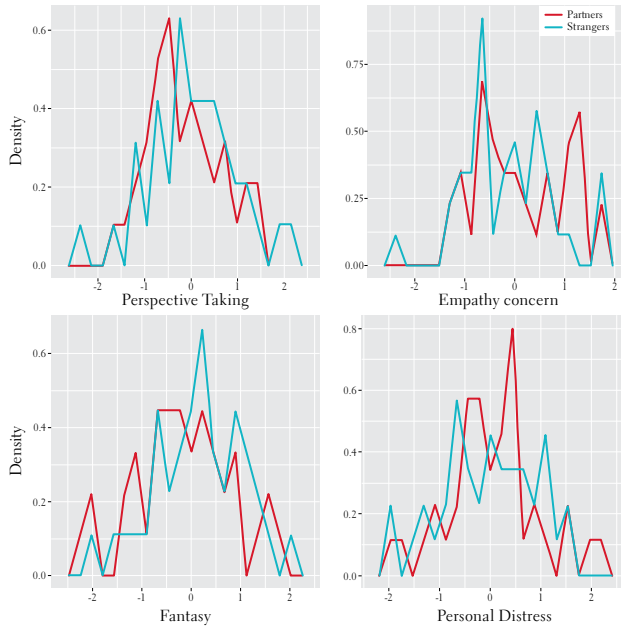
Source: Own elaboration.

Figure 2 shows that there are no differences in the latent trait density functions concerning the type of bonding before the test, suggesting that both groups start from similar characteristics in terms of empathic ability. This is important in order to verify that the differences between the groups after the experiment are attributed to the treatments and not to pre-game characteristics.

Afterward, a Principal Component Analysis (PCA) was performed for the four newly created variables. The process was implemented with the R language package FactorMiner. This technique allows the reduction of dimensions and is favorable for constructing indicators when the variables are continuous, unlike IRT. Figure 3 indicates that the fantasy component has low representativeness in the empathy index compared to the other components. This means that the final empathy index will have a lower weight assigned to the fantasy variable than the other dimensions. We find that the first two components account for approximately 78% of the variability of the data.

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Figure 3. Principal Component Analysis.
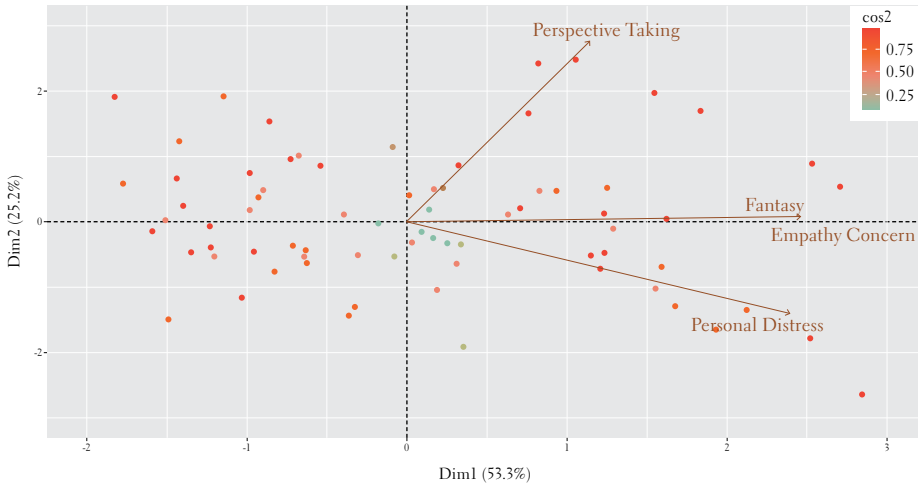
Source: Own elaboration.

Therefore, it was decided to calculate the projection of each examinee in the first component, which contained 53% of the data's inertia, it should be noted that cosine squares greater than 0.3 reflect a correct representation of the individuals in the two factorial planes, which validates one of the projections in the first factorial plane. This projection was named Empathy by ACP (empathy index) and it was used in the final model. The density function of this new variable is presented in Figure 4.

The density function of the empathy index has a distribution similar to the normal distribution and there are no differences between partners and strangers' groups.

Figure 4. Density Function of Empathy Variable.
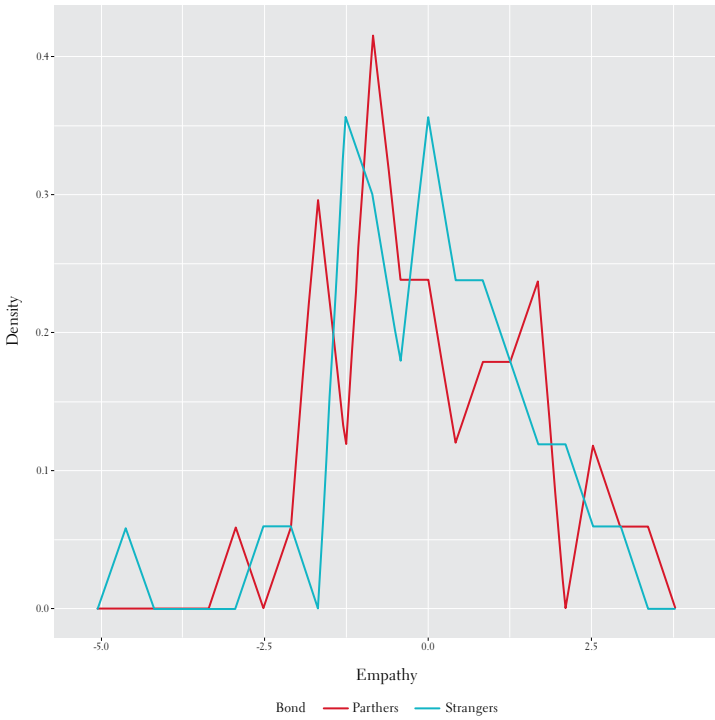
Source: Own elaboration.

Rationality and conflict level

The rationality variable was calculated from the number of times that each partic-
ipant played a Nash equilibrium decision in the game. This variable is understood
as a proxy of rational choice in the economic sense and is related to the search for
maximum profit and selfish behavior. In the payoff matrix of the Peace treatment,
the Nash equilibrium coincides with the social optimum. This treatment serves
as a control group since all players were expected to decide to cooperate in the
game regardless of their empathy levels, or the fact that they were always playing
with the same person or with a stranger, moving the empathic object closer or
further away.

Now, it was found the opposite tendency, because the Nash equilibrium decisions led to equilibrium with lower payoffs than the social optimum. At this point, Nash equilibrium decisions were expected to be affected by both the empathy level of each individual and the closeness of the empathic object (partners or strangers). Figure 5 shows how the participants who played all rounds with the same partner had lower equilibrium decisions than their counterparts who played with a different person each round. Based on some literature references, it is possible to indicate that the distance of the empathic object can potentiate or subtract the ability to empathize with others. This finding indicates that people who played with fixed partners made altruistic decisions.

Figure 5. Rationality Violin Plot.
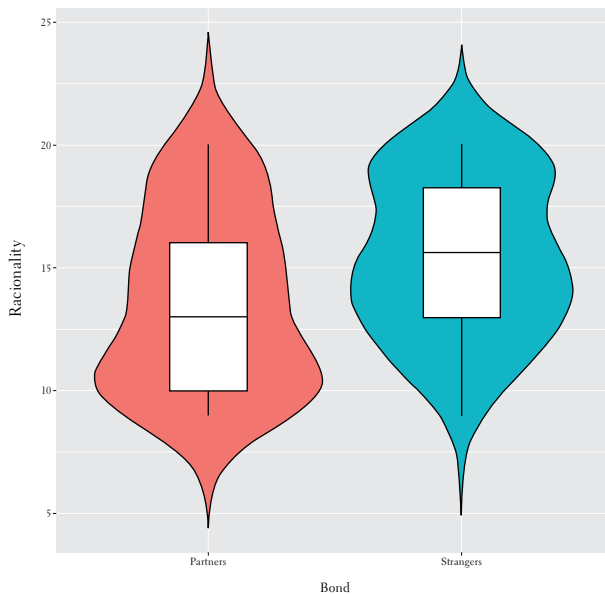
Source: Own elaboration.

Figure 6 indicates that cooperation decisions are higher at the Conflict treatment level. As may be observed, the median box plot for partners is lower than the stranger median. Additionally, the density of the partners' group is higher in the lowest scores, while the density of the strangers is located in the highest scores.

**Figure 6.** Rationality Violin Plot by Conflict Level.
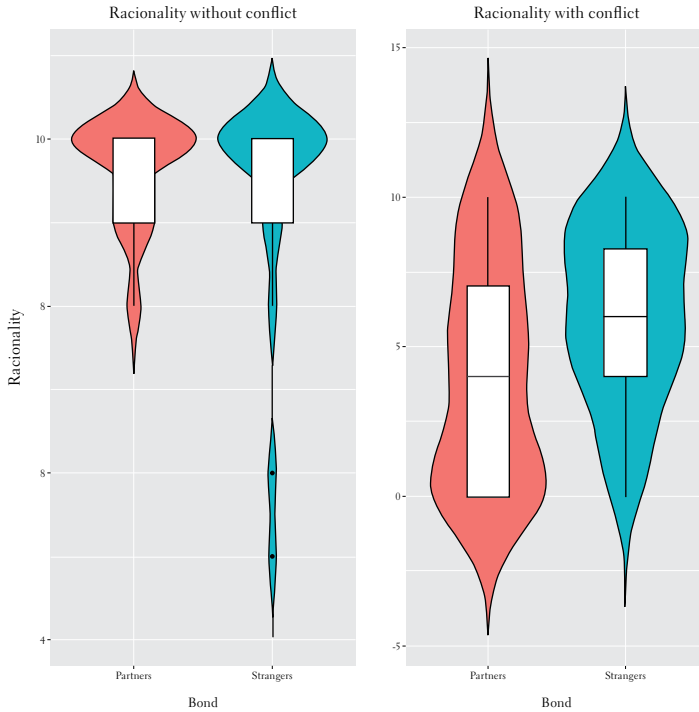
Source: Own elaboration.

Rationality, empathy, and its components

Rational decisions taken during the game may also be motivated (before the game) by the empathic abilities of the players, which means that they were not generated by the closeness of the empathic object. In this context, the present study examines possible relationships between the number of times a player took a decision that led to a Nash equilibrium and the IRI scores obtained before starting the experiment. In this context, the present study aimed to verify the relationship between the empathy score, calculated with the projection of the players in the first component of the PCA, and the count of Nash equilibrium decisions under the Conflict payoffs matrix.

Figure 7. Scatter Plot of Rationality and Empathy Index.
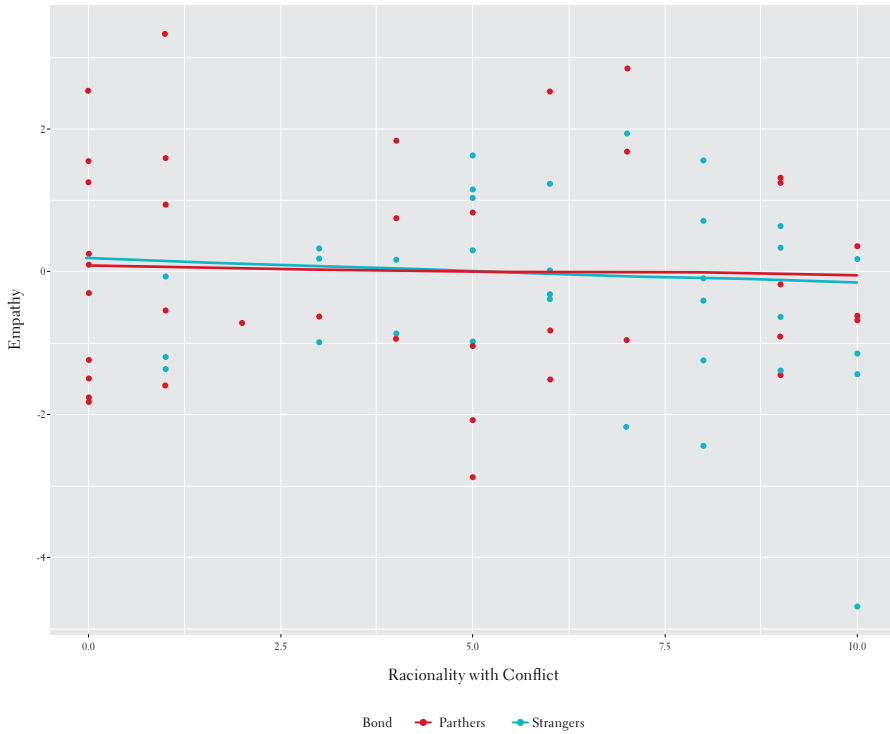
Source: Own elaboration.

As can be seen in Figure 7, there is not any graphical relationship between the rationality variable and empathy index —the blue and pink lines represent the trend smoothing discriminated by bonds and were fitted from generalized linear models. However, after a graphical review of Figure 8, it was possible to surmise a univariate relationship between rational choice and empathy components. Of course, these relationships are only at a descriptive level, necessitating the performance of a Multivariate Generalized Linear Model to allow us to observe the joint behavior of these variables.

Figure 8. Scatter plots of Empathy dimensions and Rationality.
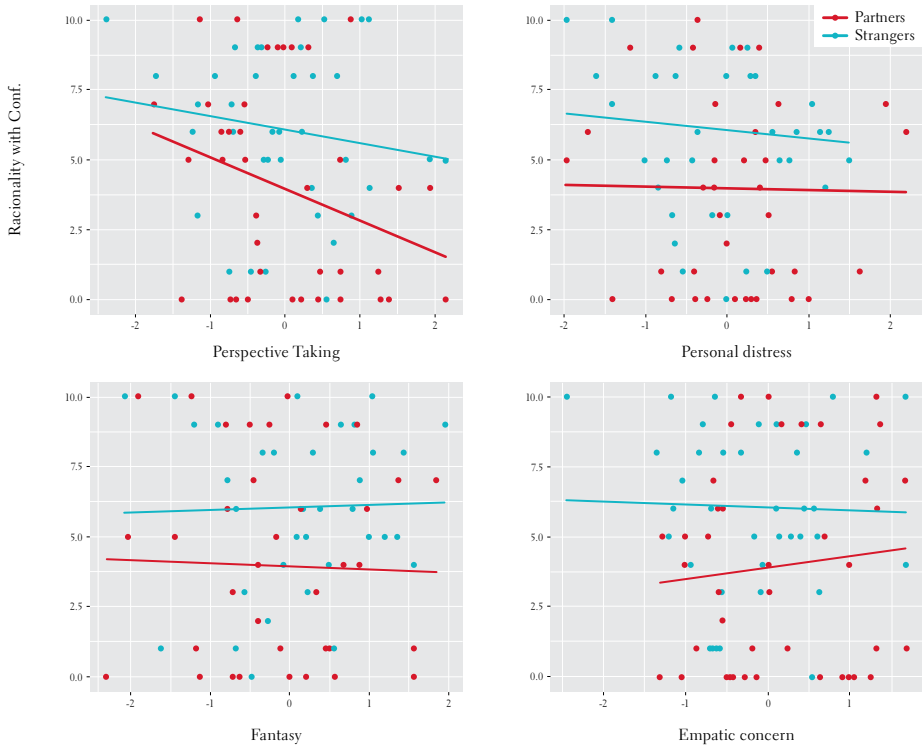
Source: Own elaboration.

Generalized Linear Model

A Generalized Linear Model with Poisson response was used due to the count-type nature of the dependent variable rationality (median:14, min:9, max:20). To ensure the selection of the best model, the routine known as Step AIC implemented in the Mass library of the R language was used. This procedure is an interactive process of inclusion and exclusion of covariates, searching for the best Akaike Information Criterion (AIC). The independent variables in the study were empathy constructed by PCA, empathic concern, perspective-taking, fantasy, personal distress, and bond type (partners or strangers).

Table 2. Summary of Independent Variables

	Mean	Min	Max
Empathy by CPA	0	-4.67	3.32
Empatic Concern	-0.00004	-2.44	1.67
Personal Distress	-0.003	-1.97	2.18
Perspective Taking	-0.00005	-2.38	2.13
Fantasy	-0.00005	-2.3	1.96

Source: Own elaboration.

Furthermore, we considered a pool of control variables that could be related to rational choice as well as prosocial behavior: sex (male: 36, female: 44), only child (yes: 19, not: 61), and spiritual (are you considered spiritual? yes: 56, not: 24). The GLM structure was:

$$\log [E(Y|X)] = \alpha + \beta'X$$

Where α and β are the model parameters and X is the covariate matrix and Y indicates the variable related to rationality. The signs of the coefficients are of special interest because they indicate the multivariate relationship of the factors associated with empathy with rational choice controlled by some characteristics that could affect participants' altruism. To achieve this, we built two different independent variables: the first one, rationality with conflict, corresponding to the count of Nash equilibrium decisions under the Conflict payoffs matrix; and the second one, rationality in Peace, corresponding to the count of Nash equilibrium decisions under the Peace payoffs matrix.

Table 3 presents four different regressions for each independent variable —column 1 has all covariables unless *Empathy by PCA* since it is a linear transformation of Perspective Taking, Personal Distress, Empathic Concern, and Fantasy; to include Empathy by PCA joined to their components would force a multicollinearity problem; column 2 shows the best model with the first pool of variables since the StepAIC routine; column 3 is a saturated model with Empathy by PCA but without their components; and column 4 is the best model with the same pool of variables of column 3.

As can be seen in Table 3, the set of the best predictors of the rational choice score in conflict context is in the second column. This model shows a significant

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relationship at 95% confidence with the distance from the empathic object (partners), Perspective taking, Personal distress, and Empathic concern. The sign of the variable "partners" indicates that when participants play with the same person, their Nash equilibrium decisions are lower than if they play with different people, regardless of the empathy level and the other control variables. This inverse relationship is similar to the ability to put oneself spontaneously in the situation of others (Perspective Taking), and the degree of anxiety and discomfort when observing others in uncomfortable or unpleasant situations (Personal Distress). Additionally, the measure of feelings of compassion for the discomfort of others (Empathic Concern) showed a positive relationship with the number of equilibrium decisions. It should be noted that Empathy by PCA is not significant in models 3 and 4, meaning that a one-dimensional score for empathy does not correlate with rational choice.

Table 3. Outcomes with Conflict and Peace

Variables	Rational Choice in Conflict				Rational Choice in Peace			
	1	2	3	4	1	2	3	4
Intercept	1.797 <2e-16***	1.808 2e-16***	1.807 <2e-16***	1.804 <2e-16***	2.21474 <2e-16***	2.249 <2e-16***	2.20806 <2e-16***	2.249 <2e-16***
Empathy by PCA	x x	x x	-0.010 0.801	x x	x x	x x	-0.01703 0.551	x x
Partners	-0.477 1.1e-5 ***	-0.46767 6.3e-06 ***	-0.427 3.19e-05 ***	-0.424 3.21e-05 ***	0.0258 0.739	x x	0.030215 0.68	x x
Perspective Taking	-0.208 4.42e-04 ***	-0.20827 3.05e-04 ***	x x	x x	0.016795 0.701	x x	x x	x x
Personal Distress	-0.127 0.070	-0.136 0.045*	x x	x x	-0.00797 0.881	x x	x x	x x
Empathic Concern	0.186 0.021*	0.176 0.016*	x x	x x	-0.00735 0.907	x x	x x	x x
Fantasy	0.007 0.918	x x	x x	x x	-0.02512 0.613	x x	x x	x x
Male	0.079 0.459	x x	0.043 0.679	x x	0.003013 0.969	x x	0.007462 0.922	x x
Only Child	0.100 0.392	x x	0.121 0.298	x x	-0.00237 0.979	x x	-0.0068 0.938	x x
Spiritual	-0.067 0.602	x x	-0.075 0.539	x x	0.02801 0.767	x x	0.033354 0.718	x x

	Rational Choice in Conflict				Rational Choice in Peace			
Variables	1	2	3	4	1	2	3	4
AIC	459.59	453.66	463.03	462.38	356	340.9	350.3	340.9
Deviation	205.28	207.36	219.72	222.07	10.29	11.23	10.627	11.23

Source: Own elaboration.

On the other hand, the models constructed to predict rational choice in the treatment Peace do not show any relationship with proposed covariables. It should be noted that in this game the Nash equilibrium point was itself a social optimum, hence we did not expect that the variables associated with empathy would affect decision-making. This hypothesis is corroborated by column 4 of Table 3, since the best model for these data was the one that included only the intercept, indicating that empathy factors are not related to the number of Nash equilibria played.

Conclusions

In this article, we embarked on a comprehensive exploration that serves two fundamental purposes. Firstly, it aimed to offer an in-depth look at the historical context and the invaluable contributions of Rational Choice Theory to the realm of social sciences, establishing it as a cornerstone in the theoretical framework for analyzing human interactions. Secondly, it sought to underscore the transformative contributions of visionary thinkers like Jon Elster, whose work expanded the horizons of economic theory, transcending the confines of the conventional rational choice model. This transition from a "thin theory of rationality" to a more expansive conceptualization marked a significant departure from the normative constraints and shed light on the inherent imperfections, indeterminacies, and the role of emotions in shaping human preferences within the domain of rationality (Elster, 1983; 1977). Elster's work compellingly demonstrated that unadulterated rationality encounters limitations, particularly in contexts marked by incomplete information, giving rise to actions that may not necessarily be conducive to individual well-being. Consequently, the broader conception of rationality not only acknowledges the significance of factors beyond sheer reason in shaping human behavior but also opens the door to considering emotions as integral components of human action, as compellingly

illustrated in our experiment, which unveiled the intricate interplay between empathy and rationality.

Indeed, empathy emerges as a distinct human capacity that exerts a profound influence on individual behavior within society. Its significance transcends multiple academic disciplines, spanning philosophy, ethics, psychology, and economics, where it emerges as a pivotal factor in the realm of behavioral theory. Irrespective of innate virtue, humans are inherently susceptible to the sway of their passions. The mythological character of Ulysses, as depicted in the epic poem *The Odyssey*, stands as a compelling testament to how human rationality, albeit virtuous, can be permeated and swayed by emotions. Ulysses' decision to have himself bound to the ship's mast to resist the enchanting call of the sirens illustrates that his rationality, unaided by emotional considerations, would not have sufficed to resist temptation.

Our present study serves as a testament to how empathy, defined as the capacity to be emotionally affected by the feelings of others, yields diverse effects on rational behavior, particularly from an economic perspective. On one hand, it elucidates how individuals assess their preferences by adopting the perspective of others and gleaning information to exploit the actions of their counterparts, a behavior that leans towards self-interest. On the other hand, empathy can be associated with prosocial and altruistic conduct, illuminating our comprehension of how individuals perceive and respond to the suffering and challenges faced by others in economic interactions. In this light, it becomes imperative to view empathy as a multidimensional construct, mirroring the conceptual framework presented by Davis (1980). In this context, empathy emerges as a multidimensional construct encompassing distinct components such as fantasy, empathic concern, personal distress, and perspective-taking, whose magnitudes, in conjunction with the distance of the empathic object, collectively define an individual's empathy level.

Our experiment, conducted with two groups of students sharing similar levels of empathy components, uncovered how proximity to adversaries induced altruistic decisions in conflict contexts. These decisions, while not maximizing individual utility, engendered greater social benefits, aligning with the findings of Batson et al. (1999), Kirman & Teschl (2010), and Singer et al. (2004). Furthermore, our study ascertained that the overall empathy index exhibited no correlation with equilibrium decisions, given that its internal components pointed in opposing directions, effectively nullifying their collective impact on behavior. Conversely, the components of perspective-taking and personal distress exhibited an inverse relationship with self-serving decisions. These outcomes resonate with Singer et al.'s (2005) findings,

emphasizing that individuals possessing a superior capacity for perspective-taking (cognitive empathy) are better equipped to anticipate their opponents' actions. Consequently, our experiment illustrated that individuals with higher perspective-taking scores exhibited more altruistic behavior, leading to social equilibriums with superior payoffs compared to non-cooperative choices. Additionally, the personal distress component displayed an inverse relationship with non-cooperative choices, signifying that individuals registering elevated scores on this factor —those likely to experience discomfort when witnessing others in distress— tended to cooperate more frequently to avert conflict.

Another noteworthy discovery was the positive correlation between empathic concern and the number of Nash equilibrium choices. While this finding lacks a clear theoretical explanation, it warrants exploration as a potential avenue for future research. Future investigations could delve into the dynamics of outcomes at each stage of the game to gain a deeper understanding of how they evolve over time.

In sum, we have provided empirical evidence of deviations from the Nash equilibrium within the context of conflict, illuminating their relationship with empathy factors. These results shed light on why interpersonal relationships wield influence over business and political realms, where the proximity of the parties involved and the empathic disposition of decision-makers jointly determine the outcomes of social interactions. This observation is reinforced by the acquaintances versus strangers treatment, wherein all statistical analyses indicated that participants who engaged with the same individuals demonstrated a greater inclination towards cooperation compared to those interacting with strangers.

Additionally, we propose a few avenues for further research based on our findings. Firstly, exploring the nuanced relationship between empathic concern and Nash equilibrium choices, which, despite showing a positive correlation, lacks a clear theoretical underpinning. Secondly, conducting longitudinal analyses to scrutinize the evolution of outcomes at each stage of the game could provide valuable insights into the dynamics of rationality and empathy in economic interactions.

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Appendices

Appendix A Interpersonal Reactivity Index used in the laboratory experiment.

1. I daydream and fantasize, with some regularity, about things that might happen to me.
   Frecuentemente, sueño despierto y fantaseo acerca de las cosas que me podrían pasar.
2. I often have tender, concerned feelings for people less fortunate than me.
   Frecuentemente, tengo sentimientos de compasión y de preocupación hacia la gente menos afortunada que yo.
3. I sometimes find it difficult to see things from the "other guy's" point of view.
   Frecuentemente, encuentro difícil ver las cosas desde el punto de vista de otras personas.
4. Sometimes I don't feel sorry for other people when they are having problems.
   A veces no me siento muy preocupado por otras personas cuando tienen problemas.
5. I get involved with the feelings of the characters in a novel.
   Me siento realmente identificado con los sentimientos de los personajes de una novela.
6. In emergencies, I feel apprehensive and ill at ease.
   En situaciones de emergencia me siento desconfiado e incómodo.
7. I am usually objective when I watch a movie or play, and I don't often get completely caught up in it.
   Generalmente, soy objetivo cuando veo una película u obra de teatro y no suelo sentirme completamente inmerso en ellas.
8. I try to look at everybody's side of a disagreement before I make a decision.
   Intento tener en cuenta cada una de las opiniones en un desacuerdo antes de tomar una decisión.
9. When I see someone being taken advantage of, I feel kind of protective toward them.
   Cuando veo que se están aprovechando de alguien, me siento un poco protector con esa persona.

10. I sometimes feel helpless when I am in the middle of a very emotional situation.
A veces me siento indefenso cuando estoy en medio de una situación con mucha carga emocional.

11. I sometimes try to understand my friends better by imagining how things look from their point of view.
A veces trato de entender mejor a mis amigos imaginándome cómo se deben ver las cosas desde su punto de vista.

12. Becoming extremely involved in a good book or movie is somewhat rare for me.
Es muy raro para mi llegar a sentirme extremadamente involucrado en un buen libro o película.

13. When I see someone get hurt, I tend to remain calm.
Cuando veo que alguien sufre suelo mantener la calma.

14. Other people's misfortunes do not usually disturb me a great deal.
Las desgracias de otras personas no me suelen intranquilizar demasiado.

15. If I'm sure I'm right about something, I don't waste much time listening to other people.
Si estoy seguro de tener la razón en algo, no pierdo demasiado tiempo escuchando los argumentos de los demás.

16. After seeing a play or movie, I felt as though I were one of the characters.
Después de ver una película u obra de teatro me he sentido como si fuera uno de los personajes.

17. Being in a tense emotional situation scares me.
Me asusta encontrarme en una situación emocionalmente tensa.

18. When I see someone being treated unfairly, I sometimes don't feel very much pity for them.
A veces no siento mucha lastima cuando veo que alguien está siendo tratado injustamente.

19. I am usually pretty effective in dealing with emergencies.
Suelo ser bastante efectivo al enfrentarme a situaciones de emergencia.

20. I am often quite touched by things that I see happen.
Frecuentemente, me siento afectado emocionalmente por cosas que veo que pasan.

21. I believe that there are two sides to every question and try to look at them both.
Considero que cada situación tiene dos lados e intento tener en cuenta a ambas partes.

22. I would describe myself as a pretty soft-hearted person.
Me describiría como una persona bastante sensible.

23. When I watch a good movie, I can very easily put myself in the place of a leading character.

Cuando veo una buena película me pongo muy fácilmente en el lugar de uno de los personajes principales.

24. I tend to lose control during emergencies.

Tiendo a perder el control durante las emergencias.

25. When I'm upset at someone, I usually try to "put myself in his shoes" for a while.

Cuando estoy disgustado con alguien, suelo intentar ponerme en su lugar por un momento.

26. When I am reading an interesting story or novel, I imagine how I would feel if the events in the story were happening to me.

Cuando estoy leyendo una historia o novela interesante, imagino cómo yo me sentiría si los eventos de la historia me estuvieran pasando.

27. When I see someone who badly needs help in an emergency, I go to pieces.

Cuando veo que alguien necesita ayuda urgentemente, me siento al borde del colapso.

28. Before criticizing somebody, I try to imagine how I would feel if I were in their place.

Antes de criticar a alguien, trato de imaginar cómo yo me sentiría si estuviera en su lugar.