Cooperative behaviors have mostly been investigated using social dilemmas (Van Lange, Joreman, Parks, & Van Dijk, 2013). In most social dilemmas, members of a group may be uncertain about what their fellow group members will decide, as well as about the characteristics of the dilemmas themselves.

Some researchers studied cooperation under uncertainty using two versions of the prisoners’ dilemma: the stochastic and the deterministic prisoners’ dilemma. Uncertainty has been shown to reduce the willingness to cooperate in various social dilemmas (Gong, Baron, & Kunreuther, 2009).

Experimental manipulations of decision time are typically interpreted within the dual-process framework, which conceptualizes decisions as arising from a competition between intuitive versus deliberate cognitive processes (Kahneman, 2011). Some researchers have argued that when we apply this lens to cooperation, intuition favors cooperation and deliberation leads to selfishness (Rand, Greene, & Nowak, 2012), whereas others have contended that deliberation is needed to override selfish impulses (Achtziger, Alós-Ferrer, & Wagner, 2011).

**METHOD**

**PARTICIPANTS**

- Age: M = 21.90, SD = 3.28

**MATERIALS**

- Experimental Software: Ztree
- Questionnaires: Positive and Negative Affect Schedule (PANAS-VRP); Big Five Inventory; Submissive Behaviour Scale (SBS); Interpersonal Reactivity Index (IRI); Risk-taking Measure: Balloon Analogue Risk Task (BART).

**PROCEDURE**

- **Deterministic Prisoner’s Dilemma**
  - Payoff Matrix
  - Chose Stage
  - Time Pressure “Under 10 seconds”
  - Time Delay “Deliberate and think carefully”
  - Match Stage
  - Feedback Stage
- **Stochastic Prisoner’s Dilemma**
  - Payoff Matrix
  - Chose Stage
  - Time Pressure “Under 10 seconds”
  - Time Delay “Deliberate and think carefully”
  - Match Stage
  - Feedback Stage

**RESULTS**

- **Time Pressure Manipulation X Cooperation Response**

<table>
<thead>
<tr>
<th>Time Delay (%)</th>
<th>Time Pressure (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Type of Game: \( \beta_1 = -0.005, z = -0.09, p = .93, OR = .995 \) (95% CI: .885, 1.118)

Time: \( \beta_2 = -201 z = -3.44, p < .001, OR = .818 \) (95% CI: .729, .917)

Type of Game X Time: \( \beta_3 = -266 z = -3.25, p = .001, OR = .766 \) (95% CI: .653, .899)

**ACKNOWLEDGMENTS**

This study was conducted at a Psychology Research Centre (PSI/01/652), University of Minho, and supported by the Portuguese Foundation for Science and Technology and the Portuguese Ministry of Science, Technology and Higher Education through national funds, and co-financed by FEDER through COMPETE2020 under the PT2020 Partnership Agreement (POCI-01-0145-FEDER-000702).

**REFERENCES**


**CONCLUSION**

- Participants were more inclined to cooperate when forced to make their decision quickly rather than deliberately, as previously found (Cone & Rand, 2014; Rand, Greene, & Nowak, 2012).
- The present study suggests that intuitive mental processing—induced by time constraint manipulation—promotes cooperation, particularly when the social dilemma involves uncertainty.
- The difference between investment in Stochastic and Deterministic games did not reveal the pattern found by Gong, Baron, and Kunreuther (2009).

**FURTHER RESEARCH**

- Loss vs Gain context;
- One-shot interactions vs repeated interactions;
- Variations of time pressure manipulation.