

How do we cooperate under uncertainty: A dual-process perspective

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BACKGROUND

- Cooperative behaviors have mostly been investigated using social dilemmas (Van Lange, Joireman, 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 prisoner's 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 conceptualize decisions as arising from a competition between intuitive versus deliberative 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 overrule selfish impulses (Achtziger, Alós-Ferrer, & Wagner, 2011).

AIM

Investigating the role of intuitive mental processing on cooperation in experimental games involving uncertainty.

HYPOTHESIS

After playing 2 versions of a prisoner's dilemma, participants would show:

- 1) Uncertainty: ↓ cooperation under uncertainty and ↑ cooperation without uncertainty.
- 2) Time Pressure manipulation: ↓ cooperation under time delay condition ↑ cooperation under time pressure condition

METHOD

PARTICIPANTS



n = 88

Age:
M = 21.90, SD = 3.28



n = 24

MATERIALS

Experimental Software: Ztree

Questionnaires:

Positive and Negative Affect Schedule (PANAS-VRP);

Big Five Inventory;

Submissive Behaviour Scale (SBS);

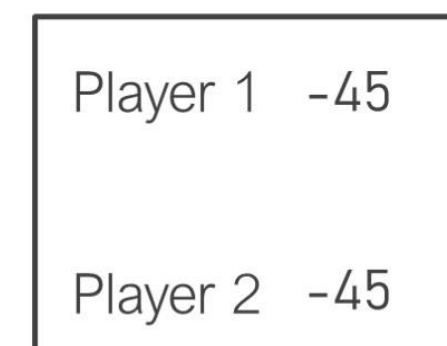
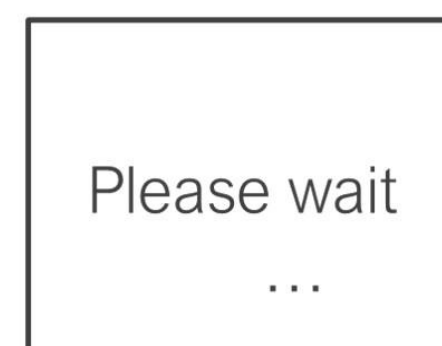
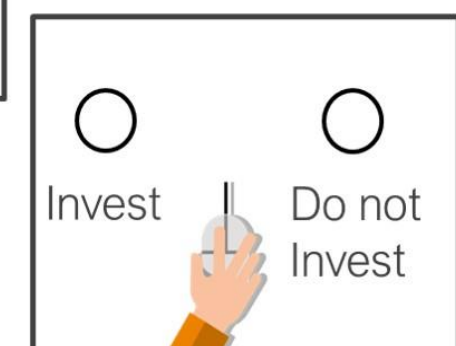
Interpersonal Reactivity Index (IRI);

Risk-taking Measure: Balloon Analogue Risk Task (BART).

PROCEDURE

Deterministic Prisoner's Dilemma

		Player 2	
		Invest	Not Invest
Player 1	Invest	-45, -45	-60, -40
	Not Invest	-40, -60	-52, -52



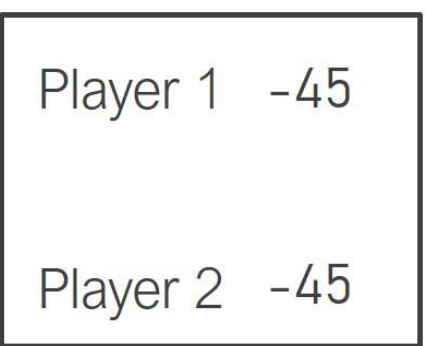
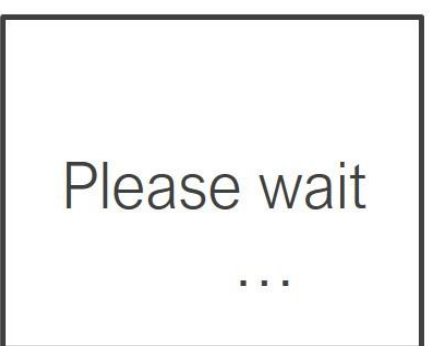
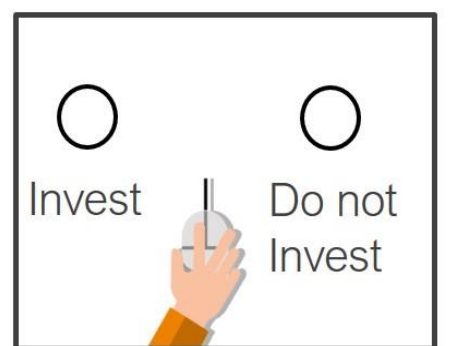
Time Pressure
"Under 10 seconds"



Time Delay
"Deliberate and think carefully"

Stochastic Prisoner's Dilemma

		Player 2	
		Invest	Not Invest
Player 1	Invest	-45, -45 20% -145, 20% -45	-60, -40 40% -100, 60% -0
	Not Invest	-40, -60 80% -100, 20% -45	-52, -52 52% -100, 48% -0



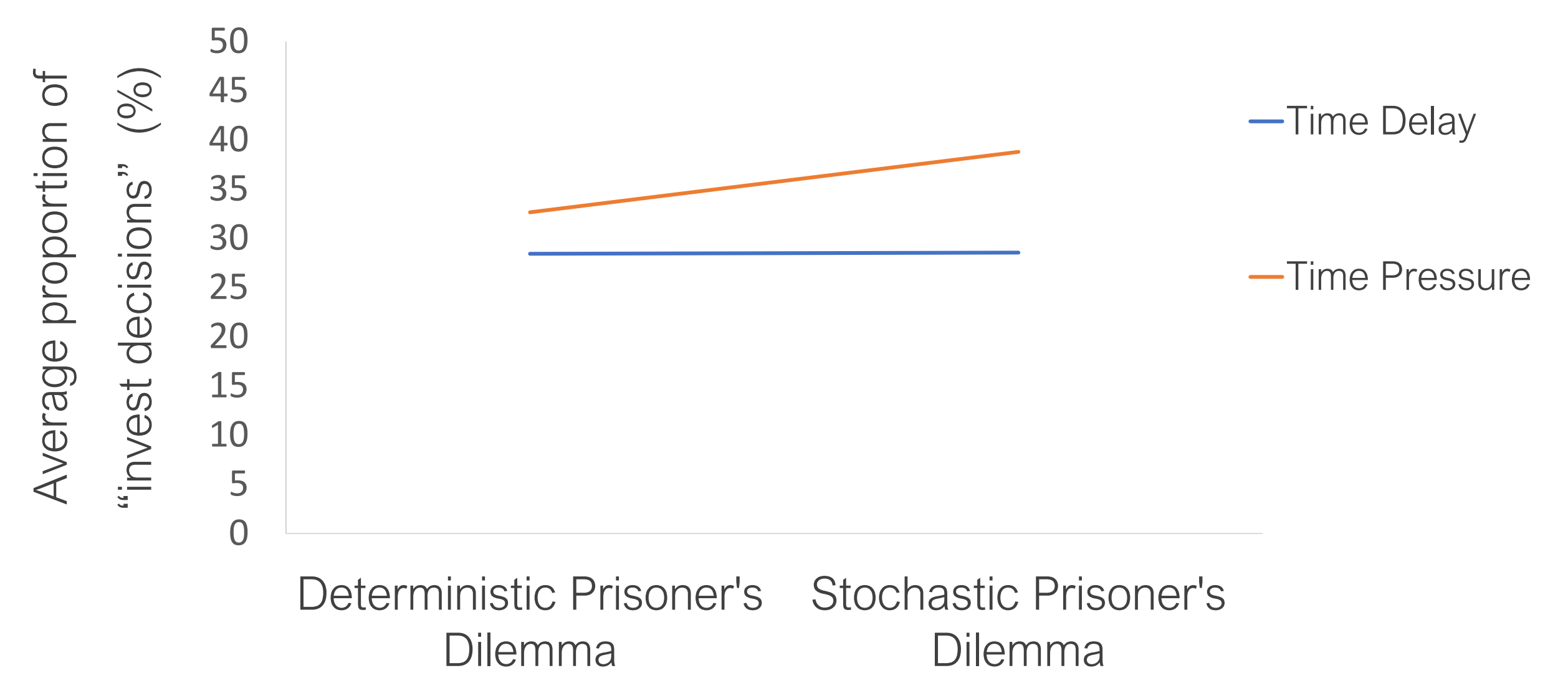
Time Pressure
"Under 10 seconds"



Time Delay
"Deliberate and think carefully"

RESULTS

Time pressure Manipulation x Cooperation Response



$$\log\left(\frac{p_{ijk}}{1-p_{ijk}}\right) = \beta_0 + \beta_1 \text{Type of Game}_{ijk} + \beta_2 \text{Time}_{ijk} + \beta_3 \text{Type of Game}_{ijk} \text{Time}_{ijk} + \beta_4 \text{SuperGame}_j + \beta_5 \text{Round}_k + \varepsilon_{ijk}$$

Type of Game : $\beta_1 = -.005, z = -.09, p = .93, OR = .995$ (95% CI: .885, 1.118)

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

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

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.



SCAN ME

ACKNOWLEDGEMENTS:

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REFERENCES

- Achtziger, A., Alós-Ferrer, C., & Wagner, A. K. (2011). *Social preferences and self-control*. Working Paper, University of Constance.
- Cone, J., & Rand, D. G. (2014). Time pressure increases cooperation in competitively framed social dilemmas. *PLoS one*, 9(12), e115756. <https://doi.org/10.1371/journal.pone.0115756>
- Gong, M., Baron, J., & Kunreuther, H. (2009). Group cooperation under uncertainty. *Journal of Risk and Uncertainty*, 39(3), 251-270. <https://doi.org/10.1007/s11166-009-9080-2>
- Kahneman, D. (2011). *Thinking, Fast and Slow*. New York, NY: Farrar, Straus and Giroux.
- Rand, D. G., Greene, J. D., & Nowak, M. A. (2012). Spontaneous giving and calculated greed. *Nature*, 489(7416), 427.
- Van Lange, P. A., Joireman, J., Parks, C. D., & Van Dijk, E. (2013). The psychology of social dilemmas: A review. *Organizational Behavior and Human Decision Processes*, 120(2), 125-141. <https://doi.org/10.1016/j.obhdp.2012.11.003>