

Replicating the Nature of Cooperative Behavior in the First-Person Perspective Task

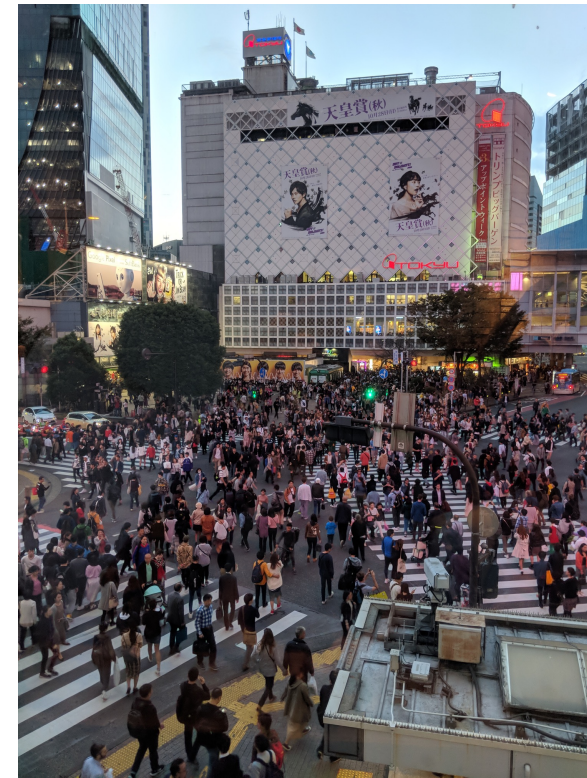
Shota Matsubayashi¹, Yuki Ninomiya¹, Kazuhisa Miwa¹, Hitoshi Terai²,
Takuma Yamaguchi¹, Hiroyuki Okuda¹, & Tatsuya Suzuki¹

¹Nagoya University, Japan, ²Kindai University, Japan
matsubayashi.shota.v0@f.mail.nagoya-u.ac.jp

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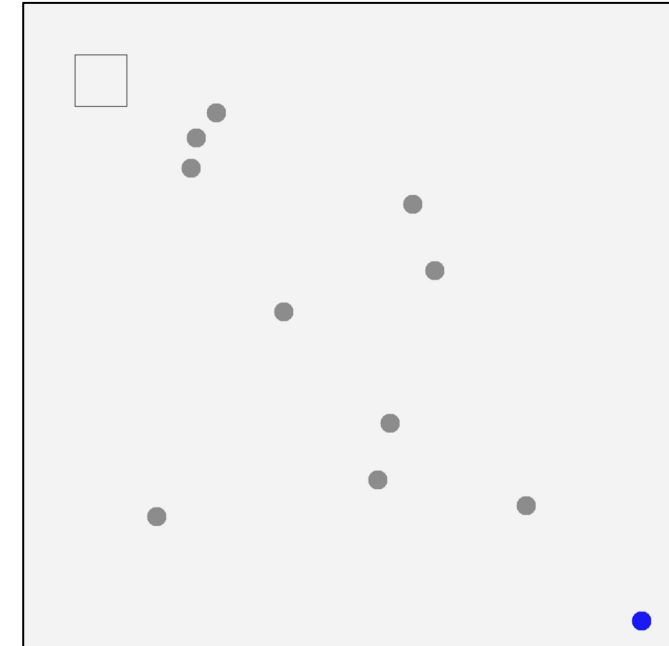


- Cooperative behavior is important in crossing interactions
 - Everyone can move **bidimensionally** (Weifeng et al., 2003)
 - It is not clear who has priority to cross (Uttley et al., 2020)



Shibuya Crossing in Japan

- Our previous study (Matsubayashi et al., 2024)
 - **Bird's-Eye Perspective (BEP)** experiment
 - Participants were asked to reach their goals through a space with **autonomous others**
 - Participants were given **cooperative, nonurgent, or urgent** intentions



Blue: Self-agent (participant)
Gray: Autonomous others

	Cooperative	Nonurgent	Urgent
Completion time	+	++	-
Amount of interruption	-		+

Summary of Results of One-sample *t*-tests and ANOVA

- **Nature of cooperative behavior:**

- Reduce interruption to others
- Reach goals earlier compared to nonurgent behavior

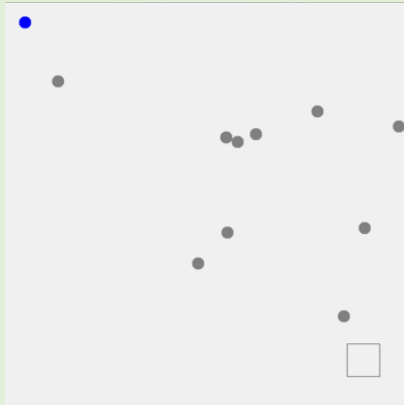
→ providing **other's benefit**

→ providing **self-benefit**

- Can the nature of cooperative behavior be reproduced in a **First-Person Perspective (FPP)** experiment?

	Bird's-Eye Perspective (BEP)			First-Person Perspective (FPP)		
	Cooperative	Nonurgent	Urgent	Cooperative	Nonurgent	Urgent
Completion time	+	++	-	?	?	?
Amount of interruption	-		+	?	?	?

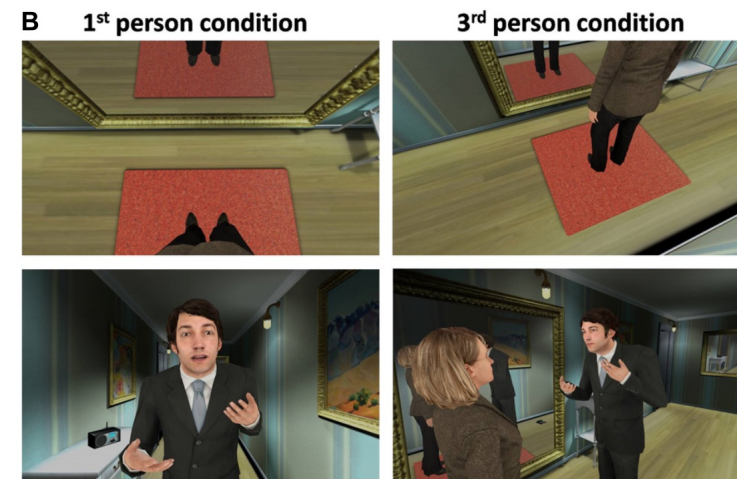
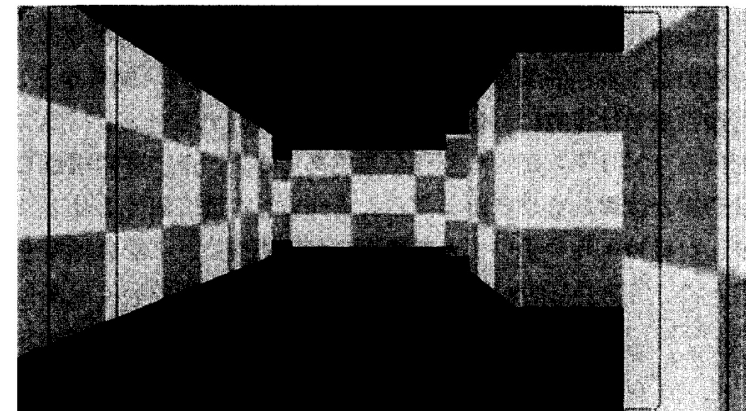
Bird's-Eye Perspective (BEP)



First-Person Perspective (FPP)



- Effect of perspective on **moving behavior**
 - FPP is difficult to accurately understand **the positional relationship** in a maze task (Nakanishi et al., 2010)
 - FPP will make it difficult to move smoothly
 - Cooperative behavior **will not reduce interruption** in FPP
- Effect of perspective on **psychological response**
 - Virtual experience in the FPP elicits stronger **emotional experiences** (Gonzalez-Liencrez et al., 2020)
 - FPP will evoke a stronger motivation of cooperation
 - Cooperative behavior **will also reduce interruption** in FPP

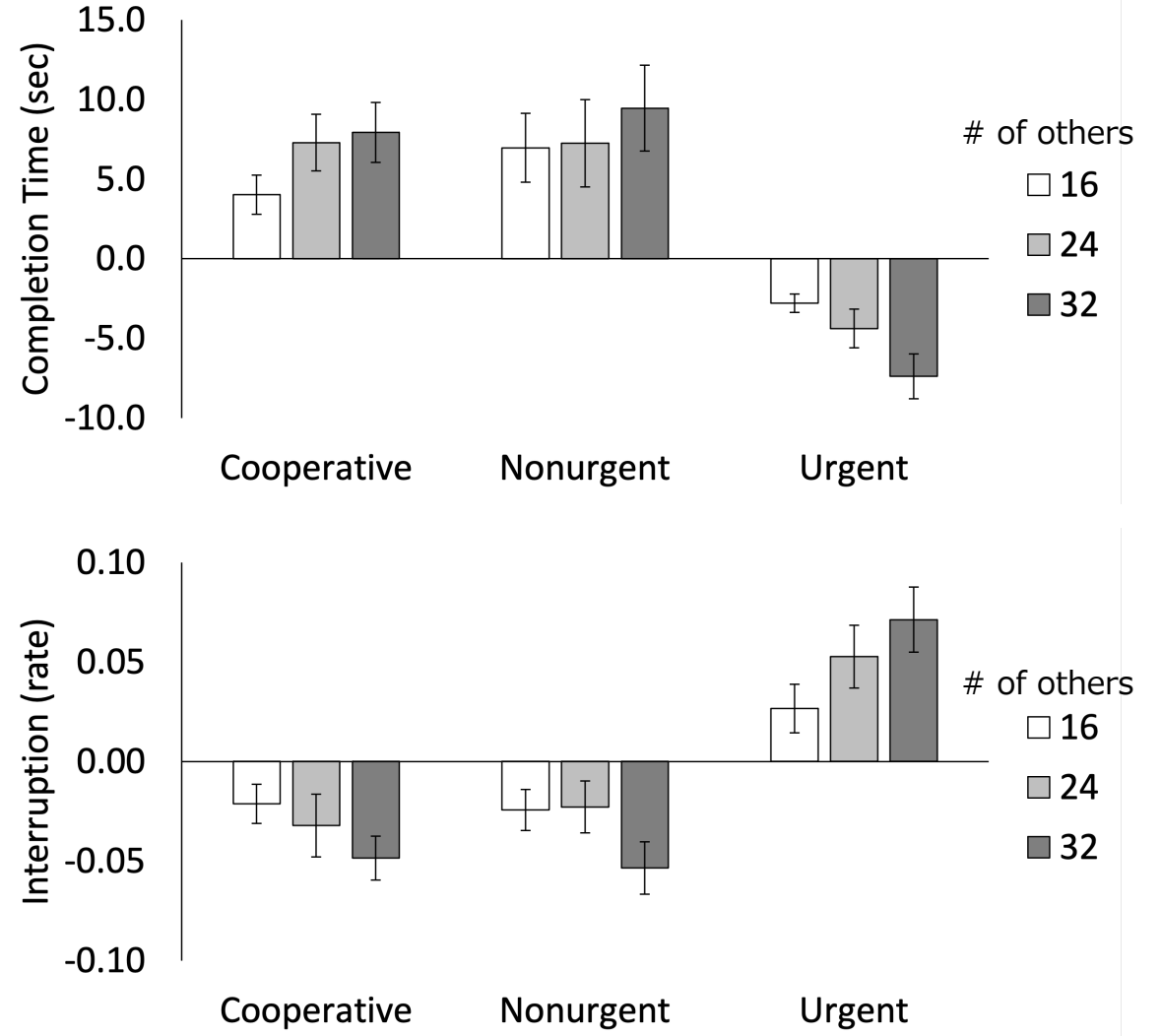


- Participants
 - 24 participants ($M_{age} = 48.08, SD_{age} = 12.18$)
- Stimulus
 - Driving simulator with 7 displays using Unity
 - Same joystick as BEP experiment
- Procedure
 - **Almost same as BEP experiment**
 - **Independent variable: Instruction**
 - Cooperative "Reach your goal while **considering others**"
 - Nonurgent "You have enough time and can go to your goal **slowly**"
 - Urgent "You do not have enough time and should reach your goal **fast**"
 - **Dependent variable: Performance**
 - Completion time
 - Amount of interruption



- Completion time

- Amount of interruption



Values indicate the differences from baseline with no instruction

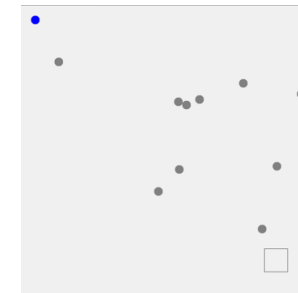
- **The trend of cooperative behavior could also be observed in FPP**
 - Reduce completion time and interruption
- However, there were **no salient differences from nonurgent behavior**
 - Do not reduce completion time and interruption as much as nonurgent behavior

	Bird's-Eye Perspective (BEP)			First-Person Perspective (FPP)		
	Cooperative	Nonurgent	Urgent	Cooperative	Nonurgent	Urgent
Completion time	+		-	+		-
Amount of interruption	-		+	-		+

Summary of Results of One-sample *t*-tests and ANOVAs

- **The basic nature of cooperative behavior was replicated** in FPP experiment
 - Reduce interruption to others → providing **other's benefit**
 - Reach goals earlier compared to nonurgent behavior → providing **self-benefit**

- However, there were **no salient difference between cooperative and nonurgent behaviors** in FPP experiment
 - Why? FPP is difficult to accurately understand **the positional relationship** (Nakanishi et al., 2010)
 - FPP makes it difficult to **notice others** approaching from the left or right, or to **identify the path** to goals
 - Participants might attempt to gain more positional information by **making large turns**, which leads to an increase in completion time

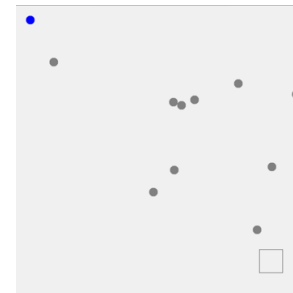


BEP



FPP

- In general, it is difficult to verify human **valid and reliable behavior** in **low-fidelity** environments
 - e.g., game, training system, low-cost simulator
- However, moving behaviors were **almost identical** in our BEP and FPP experiments
 - **BEP experiment is useful enough to verify moving behavior**
 - Such low-fidelity environments have the advantage of facilitating factor control
 → We can obtain **more insights about moving behavior** using BEP experiment



BEP



FPP

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