



RESEARCH ARTICLE

Cooperation with autonomous machines through culture and emotion

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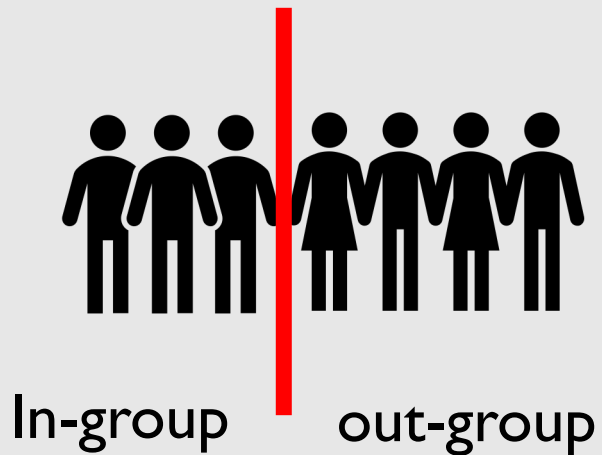
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Social robotics journal club 01/05/2020

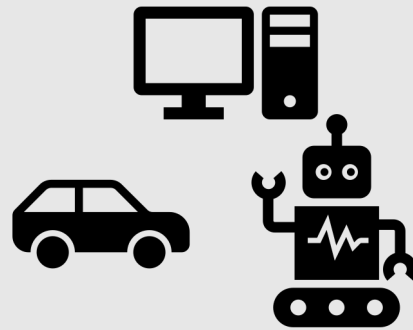
Te-Yi Hsieh

Background and Research aims

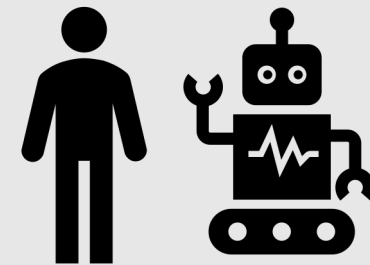
- Social categorisation



Out-group



How to promote human-machine cooperation?



If positive cultural cues and artificial emotions can overcome the possible impact of our out-group bias towards robots?

Evidence in literature

- People treated machines differently based on machines'
 - Gender – male or female voices (Nass, Moon, Green, 1997)
 - Race of a virtual face (Nass, Isbister, Lee, 2000)
 - Accent (Khooshabeh, Dehghani, Nazarian, Gratch, 2017)
- Reeves and Nass's "Media Equation"

Evidence in literature

- Mentalization brain region (mPFC) showed no activation when playing rock-paper-scissors with a machine (Gallagher et al.), nor when playing prisoner's dilemma games with a machine (McCabe et al.)
- People experienced less negative emotion (less activation in bilateral anterior insula) when getting an unfair offer from a machine, compared to getting that from a human (Sanfey et al.)

We perceive less mind in machines

Hypothesis

1. positive cues of cultural membership could mitigate the default unfavorable bias people have towards machines.
2. emotion expressions could override expectations of cooperation based on cultural membership.

Method

- Iterated prisoner's dilemma games against virtual agents

A Payoff Matrix

		Counterpart	
		Cooperation	Defection
Participant	Cooperation	5 / 5	2 / 7
	Defection	7 / 2	4 / 4

2 × 2 × 3 between-participants factorial design:

counterpart type (human vs. machine) ×
counterpart culture (United States vs. Japan) ×
emotion (competitive vs. neutral vs. cooperative)



Task with Anonymous15: Round 1 of 20

		Anonymous15	
		GREEN	BLUE
You	GREEN	You 5 Anony 5	You 2 Anony 7
	BLUE	You 7 Anony 2	You 4 Anony 4

Outcome of Round 1:
You: GREEN (2 points)
Anonymous15: BLUE (7 points)

ROUND 1 IS OVER.

匿名29とのタスク：1 / 20ラウンド

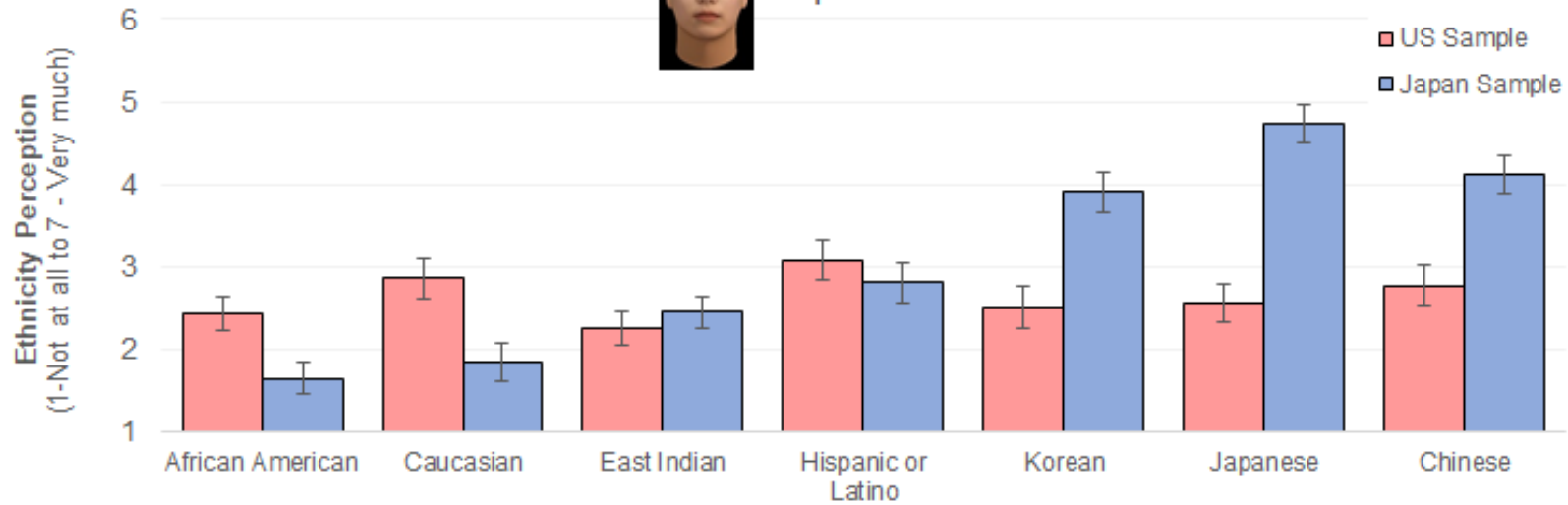
		匿名29	
		緑	青
あなた	緑	あなた 5 匿名29 5	あなた 2 匿名29 7
	青	あなた 7 匿名29 2	あなた 4 匿名29 4

ラウンドの結果1:
あなた：緑 (2ポイント)
匿名29：青 (7ポイント)

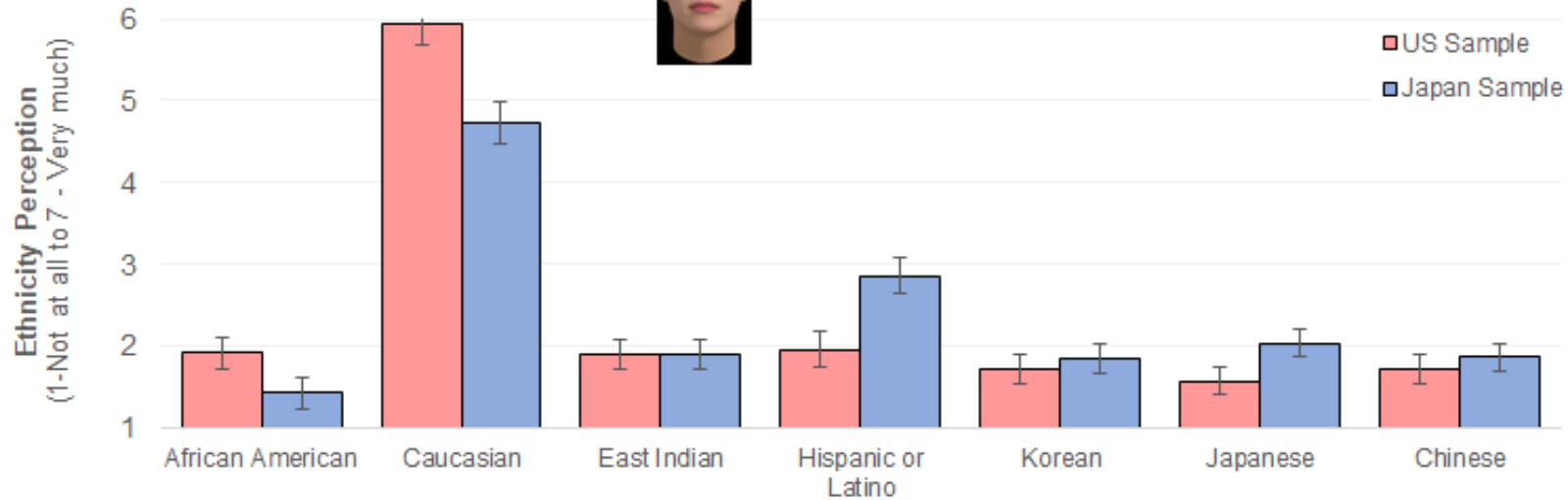
第1ラウンドは終了しました。







Japanese



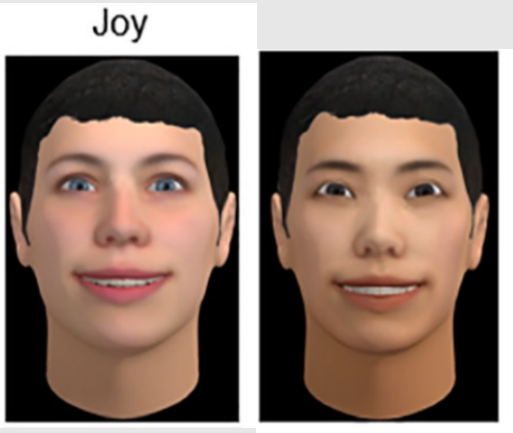
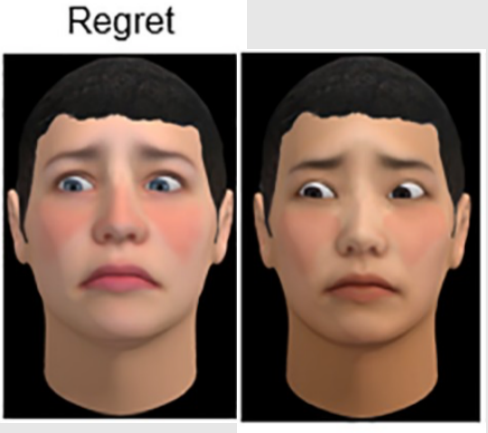
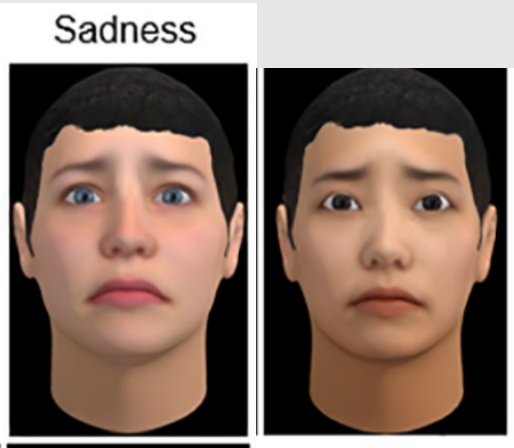
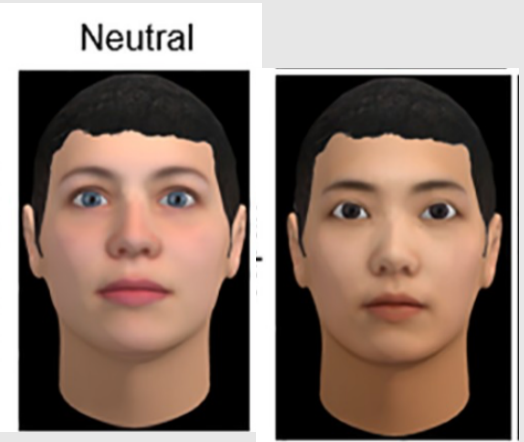
United States



Competitive emotion style

	Agent cooperate	Agent defect
Participant cooperate	<p>Regret</p> 	<p>Joy</p> 
Participant defect	<p>Neutral</p> 	<p>Sadness</p> 

Cooperative emotion style

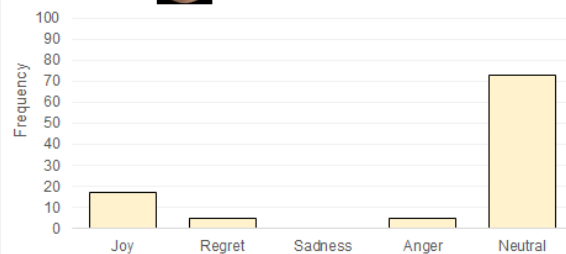
	Agent cooperate	Agent defect
Participant cooperate	<p>Joy</p> 	<p>Regret</p> 
Participant defect	<p>Sadness</p> 	<p>Neutral</p> 



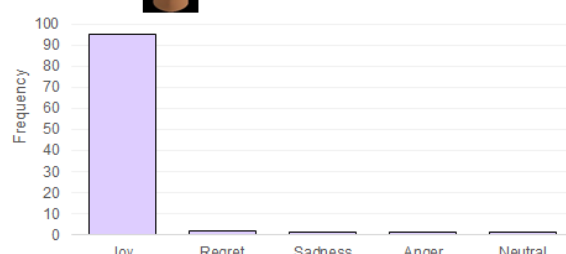
Japanese: Neutral



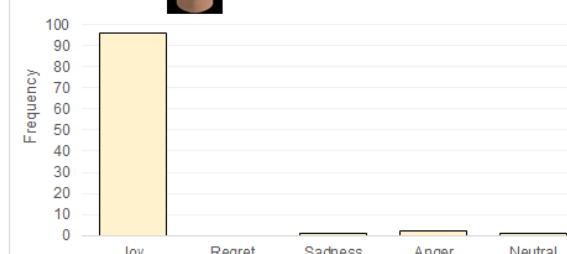
Caucasian: Neutral



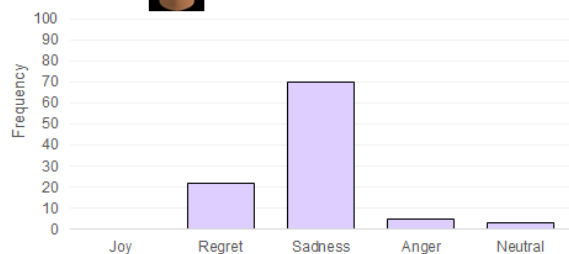
Japanese: Joy



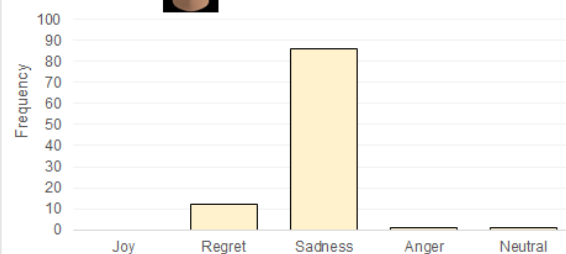
Caucasian: Joy



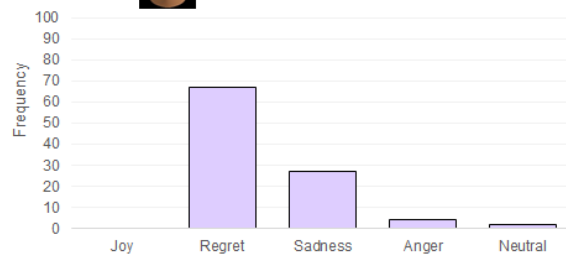
Japanese: Sadness



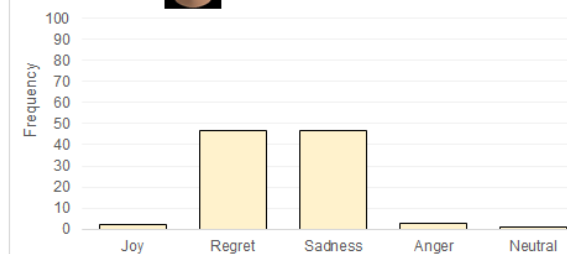
Caucasian: Sadness



Japanese: Regret



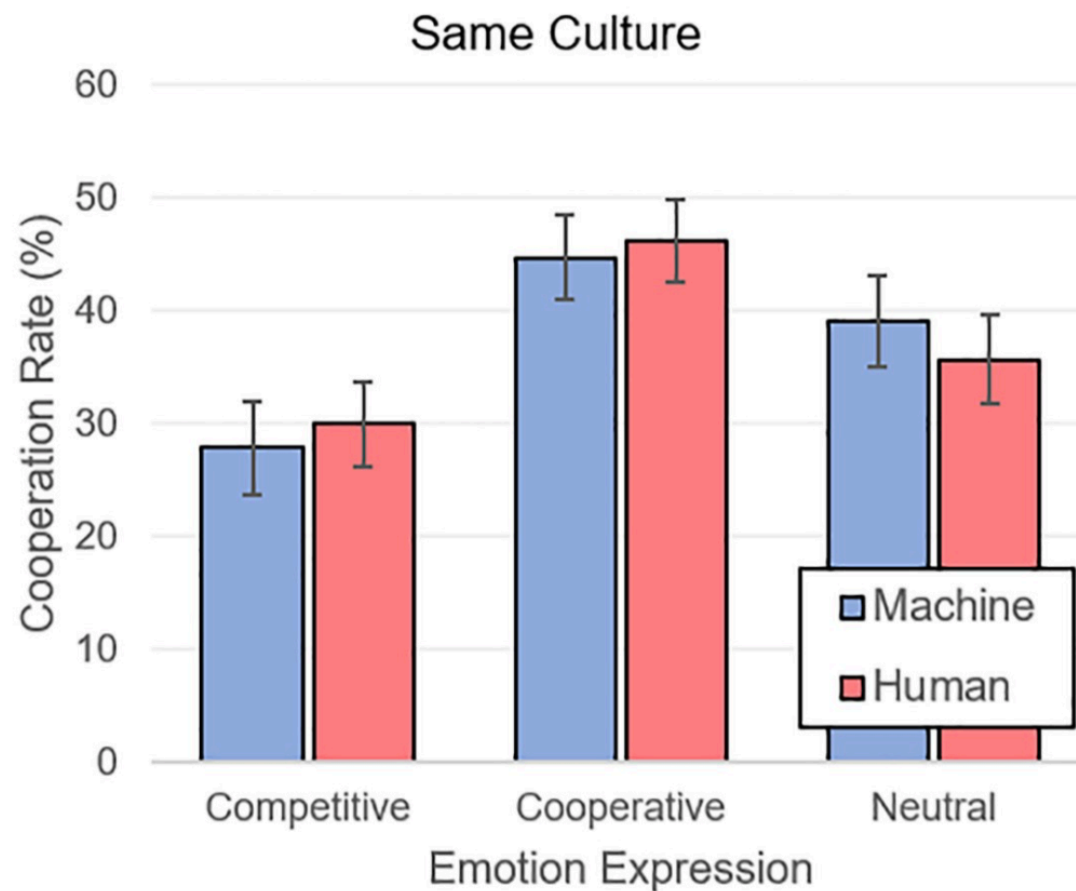
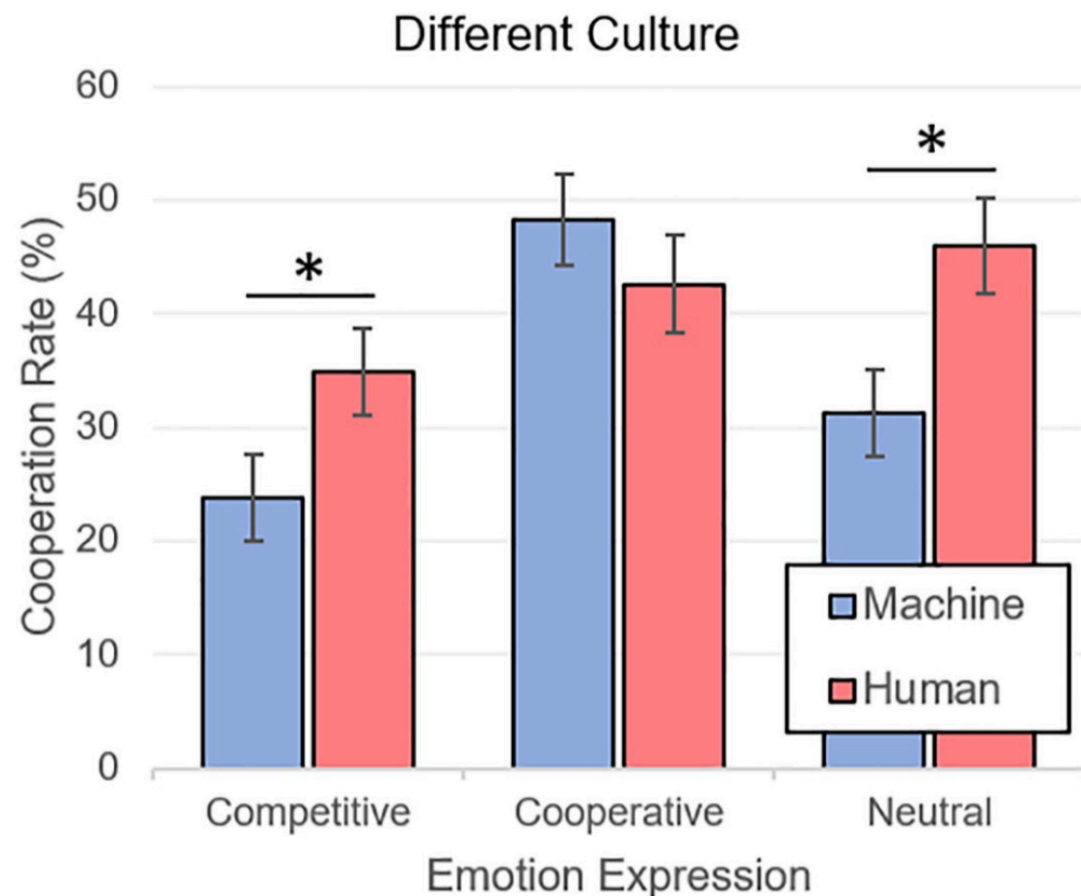
Caucasian: Regret



Analysis

- Split the data into two sets: playing against same-culture agent/
playing against different-culture agent
- $2 \times 2 \times 3$ between-participants factorial design:
counterpart type (human vs. machine) \times
counterpart culture (United States vs. Japan) \times
emotion (competitive vs. neutral vs. cooperative).
- Depend variable: cooperation rate

C Cooperation Rates



Main effect of counterpart type: human > machine ($P = .042$)
Main effect of emotion: cooperative > competitive ($P < .001$)
neutral > competitive ($P = .055$)
counterpart type \times emotion interaction ($P = .032$)

Main effect of emotion: cooperative > competitive $P < .001$
cooperative vs. neutral ($P = .104$)
neutral vs. competitive ($P = .100.$)

Conclusion

- humans will resort to familiar psychological mechanisms to identify alliances and collaborate with machines.
- Positive cultural and emotional cues can override the default expectations created from social categorisation and promote cooperation.
- Emotion had the strongest effect in our experiment, showing that even a machine from a different culture group could be treated like an in-group member

Discussion



Validation study?



Gender of the virtual agents?



Analysis?



Interpretation of findings?



Should we customise social robots based on users' cultural background/gender...?

Does Removing Stereotype Priming Remove Bias? A Pilot Human-Robot Interaction Study

Tobi Ogunyale¹ De'Aira Bryant² Ayanna Howard²

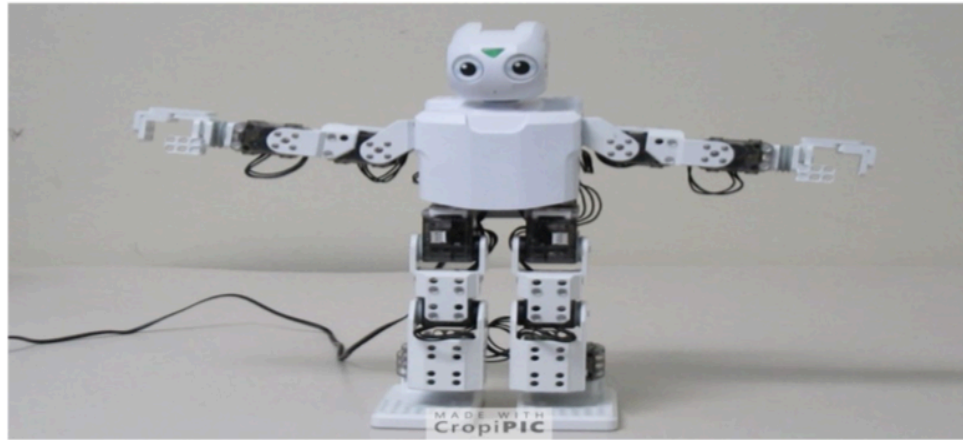


Figure 1. White ROBOTIS Darwin-Mini robot.

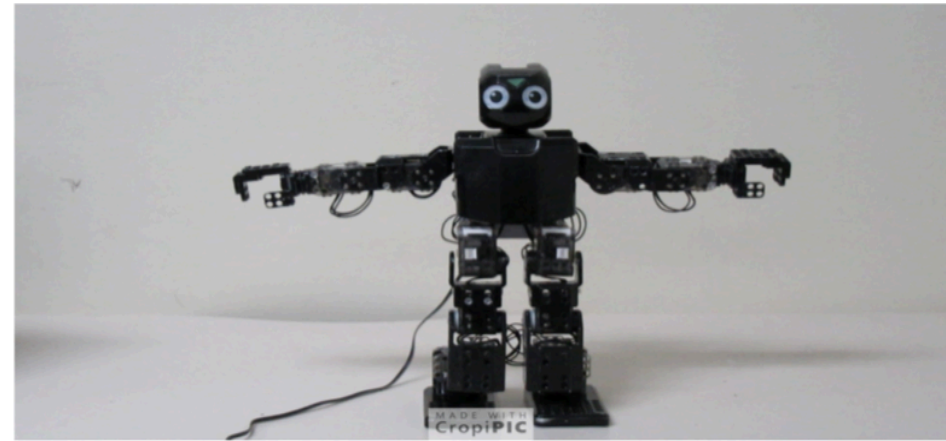


Figure 2. Black ROBOTIS Darwin-Mini robot.

Why Should We Gender? The Effect of Robot Gendering and Occupational Stereotypes on Human Trust and Perceived Competency

De'Aira Bryant

Jason Borenstein

Ayanna Howard

