

Peers at Work: Economic Real-Effort Experiments in the Presence of Virtual Co-Workers

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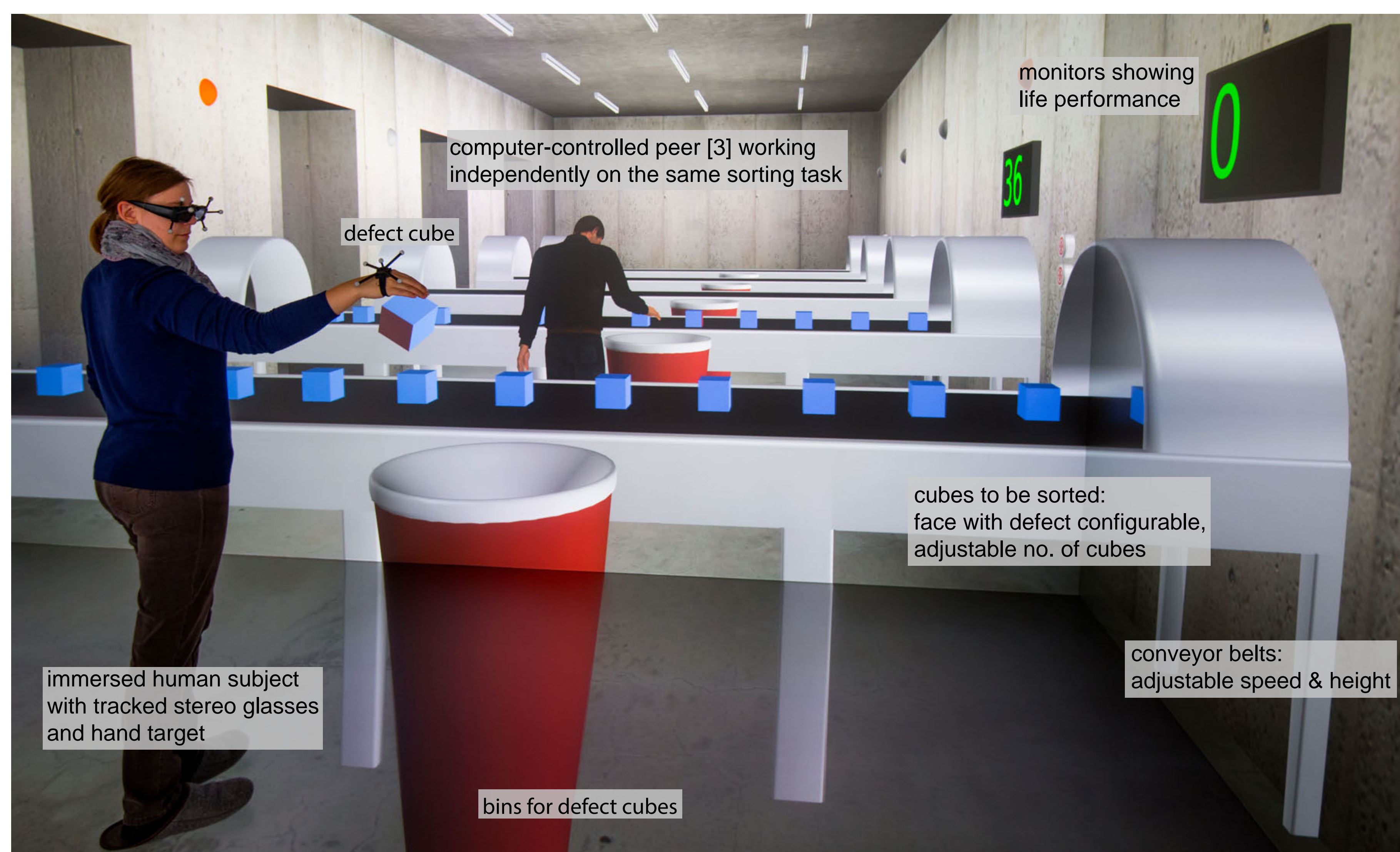
Introduction

- Experimental Economics uses controlled and incentivized field and lab experiments to analyze economic behavior.
- General challenges researchers face:
 - In the Field: lack of significant amount of experimental control
 - In the Lab: experiments are often perceived as sterile and abstract
- Challenges by investigating peer effects:
 - Reflection problem [2]: „Who is influencing whom?“

We address the general issues by enlarging the methodological toolbox of these experiments by means of Virtual Reality as done in [1].

To overcome the reflection problem, we embed a computer-controlled, virtual agent as peer of the human subject.

Environmental Setup



- Scenario to conduct real-effort, sorting tasks: subject physically grasps a cube for inspection. If one face has a different color, the cube is defect and has to be sorted out.
- Apparatus: five-sided CAVE (no ceiling) with a size of 5.25m x 5.25m x 3.3m (w x h x d) providing a 360° horizontal field of regard.

Study 1: Proof-of-Concept

Research Focus	Does additional monetary incentives induce a higher work effort in the subjects?
Agent's Behavior	No agent present.
Treatments (Inbetween)	Four treatments after measurement of subject's individual ability: <ul style="list-style-type: none"> • Two fixed wage schemas: low, high • Basic wage plus two piece rate schemas (low, high) per correctly sorted cube
No. of Subjects	120
No. of Cubes	360 (102 defect)
Results	<ul style="list-style-type: none"> • Results in line with well-known behavioral response patterns <p>Average output increase in % between ability measurement and treatment</p> <p>Output defined as: no. of defect cubes sorted out minus no. of good cubes sorted out falsely</p> <p>Two-sided Mann-Whitney U Test revealed a significant output increase in PcsLo compared to FixLo and FixHi</p> <p>Additional VR aspects:</p> <ul style="list-style-type: none"> • Subjects could perfectly deal with environment and task • No indicators that VR-experience distorted results

Study 2: Productivity Effects

Research Focus	Are there non-confounded peer effects, i.e., do subjects react accordingly to their peer's performance?
Agent's Behavior	Predefined behavior: low and high productive agent
Treatments (Inbetween)	Two treatments after measurement of subject's individual ability: <ul style="list-style-type: none"> • Low productive agent performing same task • High productive agent performing same task
No. of Subjects	108
No. of Cubes	336 (68 defect)
Results	<ul style="list-style-type: none"> • Results in line with predictions of social comparison theory: Stronger peer effect by high similarities between peer and fellow worker <p>Average output increase in % between ability measurement and treatment</p> <p>Regression analysis reveals</p> <ul style="list-style-type: none"> • Significant performance increase for subjects with low ability in presence of low productive agent • Weaker corresponding reaction of subjects with low ability in presence of high productive agent

Study 3: Competition

Research Focus	Does competing against a peer elicit a higher performance in our subjects?
Agent's Behavior	Endogenously: agent's performance adjusted to subject's ability based on first phase
Treatments (Inbetween)	Two treatments after measurement of subject's individual ability: <ul style="list-style-type: none"> • Piece rate per correctly sorted cube • Pay based on relative performance compared to agent, who performs the same task (possibility to observe own and peer's current productivity at every time)
No. of Subjects	75
No. of Cubes	360 (180 defect)
Results	<ul style="list-style-type: none"> • Competition elicited a higher performance than piece rates • No decreasing performance with regard to last cubes in the competition treatment even for cases, in which the "winner" is fixed due to a large hitherto performance difference (subject is leading or lying behind with a large score difference)

Acknowledgements

The depicted research was funded by RWTH Aachen University as Exploratory Research Space Seed Fund Project (2014/15), as PathFinder Project in the Research Area Managerial & Organization Economics (2015/16), and by the project house ICT Foundations of a Digitized Industry, Economy, and Society (2016/2017).

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