Columbia Business School's **Bruce Kogut** and two colleagues—Harvard Business School's Fabrizio Dell'Acqua and Yeshiva University's Patryk Perkowski—studied the impact of artificial intelligence on team functioning. They asked 110 two-person teams to play 12 rounds of *Super Mario Party*'s *Dash and Dine*, a video game in which players must collect ingredients for a recipe. After the first six rounds of play, one member of some teams was replaced by an intelligent agent. Over the next six rounds, those teams gathered, on average, three fewer ingredients than teams that continued as originally configured. **The conclusion:**

When AI Teammates Come On Board, Performance Drops
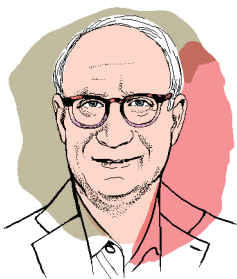
Professor Kogut, DEFEND YOUR RESEARCH

KOGUT: Prior studies have already explored the impact of artificial intelligence on individual and firm productivity, but we wanted to understand how AI affects organizational teams internally. After all, most work is done in teams. We were curious about the consequences of adding intelligent agents to teams, and not just for the people interacting directly with those agents. We also wanted to see what impact it had on the behavior and attitudes of colleagues who observed those interactions.

HBR: Why did you use *Super Mario Party* for your experiment? Wouldn't something corporate, like a data-entry task, have been a more logical choice? Video games are more cognitively demanding than your run-of-the-mill office task. They're also more motivating; who doesn't like Mario? *Dash and Dine* had a lot of advantages for our purposes. It's not hard to play, and many people have some experience with the Super Mario Bros. video games, although most of the subjects in the experiment had never played this particular one. The tasks involved depend on coordination and teamwork rather than only individual experience, and the game has built-in AI that we could easily tap to replace some of the players.

How did the experiment work? We started by having each participant play four one-minute rounds on their own. From the results we developed a skills index and determined each person's baseline level of play. Next we placed pairs of two-person teams in a room with a large-screen TV, a Nintendo Switch console, and four joysticks; each pair of teams constituted a "firm." Players had to work with their partners to retrieve fruits and vegetables from a table at the bottom of the screen. They also had to work with the other team in their firm to make sure their on-screen characters didn't crash into one another. It was a lot of fun.

What happened when you introduced the AI players? The AI players proved themselves far superior to the human ones in the rounds of individual play. On average they collected 7.5 ingredients per round, whereas the human players collected just 6.4—a difference of 17%. Only 3% of the human players outperformed the AI players. In fact, even in their worst rounds, the AI players outperformed 30% of the human players.

> **We learned that AI causes team sociability to fall, and that lessens members' motivation, effort, and trust.**

The team results were a different story. In the initial round after the AI players came on board, teams including an AI member retrieved 8% fewer ingredients, on average, than teams that had kept their original members did. The difference in performance shrank in half in the next four rounds and disappeared in the final one. But even if it's short-lived, a 4% dip in performance is significant—especially if you think about it from the perspective of a large enterprise with multiple AI projects in the works.

If the AI players were so much better, why did their teams do so much worse? Despite the AI's superior individual performance and the fact that bonuses were paid to the entire team if it performed well, 84% of respondents preferred to play with their human teammates. From surveys conducted at the midpoint and end of the experiment, we learned that AI causes team sociability to fall, and that lessens members' motivation, effort, and trust.

How do you know the decrease in performance wasn't simply a result of teams' being disrupted, whether by a new AI player or a new human one? One of the most intriguing things we found was that all-human teams playing alongside an AI-and-human team also saw drops in performance in the first round after the teammate change. In fact, those drops contributed equally to their firms' overall decrease in productivity. We call this the spillover effect. It's similar to what happens in an organization when an employee departs and established collaborative practices are shaken up. Things change: Routines and processes are disrupted, which harms performance. The same was true in the experiment. However, the introduction of an AI player uniquely extended this disruption to the adjacent all-human teams. Those teams, despite not undergoing a direct change, encountered vicarious challenges in adapting to the new AI-influenced dynamics within the interconnected environment.

Can managers guard against the spillover effect? They can mitigate the detrimental effects of introducing AI to team environments by partnering AI only with their most-skilled workers. The weaker the players on a human team in our experiment, the more that team suffered when given an AI member. The highly proficient players were better able to integrate new AI players, whether the player was on their own team or the adjacent team. The adept players' teams actually gathered slightly more ingredients after gaining an AI teammate. So companies looking to introduce AI to teams might start with employees who are skilled enough to make the best use of automation. In other words, high-skilled humans and intelligent agents working together are high performing.
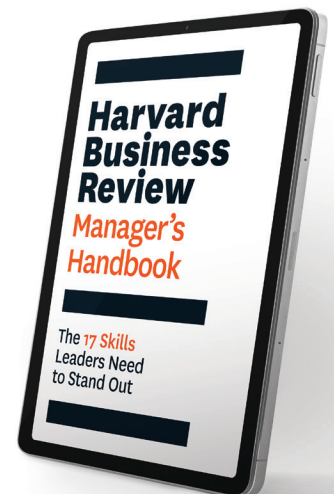
Managers have a major role to play in understanding why skilled humans and intelligent agents working on teams together are so productive and how this learning can help less-capable colleagues work effectively with AI partners. ⬡

Interview by **Juan Martinez**
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