

Applying game theory on the front lines

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The age-old game of strategy, often confined to chessboards and computer screens, is now being employed to tackle real-world threats against societies, economies and infrastructure, according to new University at Buffalo School of Management research.

Published in the *European Journal of Operational Research*, [the study](#) analyzes the use of attacker-defender games and reveals a connection between [game theory](#) and safety.

"In the wake of ever-evolving adversarial threats, governments worldwide have invested trillions to safeguard their nations," says the study's lead author Kyle Hunt, Ph.D., assistant professor of management science and systems in the UB School of Management. "Through [game theory](#) modeling, strategic interactions between defensive agencies and adversaries can be studied to tackle some of the world's most pressing security challenges, in both the physical and cyber environments."

The researchers analyzed 127 journal articles published between 2005 and 2021 and found that attacker-defender games have a wide range of use, including infrastructure and asset protection, inspection and screening, and patrolling.

These games use mathematics to model strategic interactions between those defending against threats and those perpetrating them, according to Hunt.

"Imagine a resource allocation model where a government needs to optimally distribute limited defensive resources to protect a set of vital targets, such as airports. On the other side, adversaries aim to identify and exploit vulnerabilities at these targets," he says. "This [model](#) reflects the essence of strategic games, where [decision-makers](#) manage an intricate dance of protection and infiltration."

The researchers say future studies should focus on developing new models to study contemporary threats, engage with subject matter experts and test these models in real-world scenarios.

More information: Kyle Hunt et al, A review of attacker-defender

games: Current state and paths forward, *European Journal of Operational Research* (2023). [DOI: 10.1016/j.ejor.2023.04.009](https://doi.org/10.1016/j.ejor.2023.04.009)

Provided by University at Buffalo

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