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Effects of Feedback Complexity on Dynamic Decision Making

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Abstract

Prior research shows people suffer from misperceptions of feedback, generating systematic dysfunctional behavior in the presence of dynamic complexity - settings with multiple feedback loops, time delays, and nonlinearities. However, prior work has not adequately mapped the effect of these elements of complexity on performance. We report an experiment where subjects managed an inventory in the face of stochastic sales, a classic dynamic decision task. We vary the time delays and strength of the feedback loops to explore the impact of these elements of dynamic complexity on behavior. Subjects faced financial incentives and had opportunities to learn. Yet performance was significantly worse than optimal across all conditions. Subjects outperformed a naive "do-nothing" rule in the simple conditions, but performance deteriorated dramatically with increasing time delays and feedback effects, and most were outperformed by the do-nothing rule in the complex conditions. Regression analysis of subjects' decisions showed most ignored the supply line of pending

analysis of subjects' decisions showed most ignored the supply line of perturbing production and undercontrolled the system. Undercontrol increased significantly with growing time delays and feedback strength, showing subjects were insufficiently adaptive despite perfect knowledge of system structure and parameters. Subjects' understanding of complex feedback settings declines as delays between cause and effect increase and as actions have stronger side effects. Few indications were found of active experimentation or learning: the need to control seemed to override the ability to learn.



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