AI in Action: Algorithmic Learning with Strategic Consumers

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This paper investigates the impact of artificial intelligence on the interaction between firms and consumers. It focuses on the use of learning algorithms in environments with strategic consumers — where learning must occur in the face of consumers who best-respond and adapt their behavior. The paper distinguishes between transparent algorithms and opaque algorithms. An algorithm is transparent if consumers observe its inputs, whereas it is opaque if consumers do not observe its inputs. The main results are as follows. First, opaque algorithms perform better than transparent ones. In contrast to a transparent algorithm, an opaque algorithm learns the optimal policy, and generates higher long-run profits than a transparent algorithm. Second, opaque algorithms lead to higher consumer welfare than transparent algorithms in many important cases. Consumers, on average, can benefit from having less information about the algorithm's inputs. Third, whether the firm benefits from using an algorithm instead of behaving strategically depends on consumers' access to the algorithm's inputs. When the

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algorithm is opaque, it yields higher payoffs than a fully strategic firm can obtain.

The remainder of the paper is organized as follows. Section **??** introduces the model. In Section **??**, we present the main results. Section **??** discusses our contribution to the literature in detail. Section **??** concludes. Proofs are relegated to the Appendix. An Online Appendix contains additional results and examples.[1]

[1]The Online Appendix is available at **[enter URL]**.