

# Literature Review on Algorithm Aversion: Definition, Antecedents, and Mitigation

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**Abstract:** *With the rapid advancement of information technology, algorithms are increasingly deployed across finance, healthcare, education, social media, and many other domains. Although algorithms can improve both the accuracy and efficiency of decisions, a robust body of evidence shows that people often prefer human judgment even when algorithms outperform humans—a phenomenon termed “algorithm aversion.” This paper reviews the literature to delineate the concept of algorithm aversion, identify its psychological and contextual antecedents (e.g., psychological mechanisms, algorithm design features, and task characteristics), and contrast it with the emerging phenomenon of “algorithm appreciation.” We further examine how aversion shapes consumer behavior and decision processes, and synthesize evidence-based remedies such as enhancing transparency, granting users control over algorithmic parameters, and increasing user involvement in algorithm development. By integrating insights from decision psychology and behavioral economics, the review enriches theoretical understanding and offers actionable recommendations for designing algorithms that are trusted, accepted, and ultimately more effective in real-world applications.*

**Keywords:** Algorithms, Algorithm aversion, Algorithm appreciation, Self-serving bias, Social identity.

## 1. Introduction

The rapid evolution of information technology has embedded algorithms ever deeper into daily life and industry. Fueled by big data and artificial intelligence, algorithmic systems now generate credit scores, triage patients, personalize lesson plans, route traffic, curate newsfeeds, and recommend products in real time. In principle, these systems promise greater accuracy, consistency, and efficiency than fallible human judgment. Yet empirical studies repeatedly document a robust reluctance to rely on algorithmic advice—even when it demonstrably outperforms human experts. Algorithm aversion surfaces in high-stakes as well as everyday contexts. Consumers ignore product recommendations once they learn they are “algorithmic,” patients reject statistically superior diagnostic models, investors discount robo-advisors after a single error, and recruiters overlook AI-screened CVs. As AI capabilities accelerate, failure to understand and mitigate such resistance threatens to curtail the societal benefits of data-driven decision making. Investigating algorithm aversion therefore carries both theoretical and practical weight. Theoretically, the phenomenon illuminates the psychological anatomy of trust, control, accountability, and error tolerance in human-machine interaction. It enriches behavioral economics and decision science by revealing how cognitive biases—self-serving attributions, outcome-based counterfactuals, and social identity concerns—are recalibrated when the agent is non-human. Practically, aversion directly undermines return on investment in analytics: firms lose revenue when shoppers abandon personalized offers, hospitals incur costs when clinicians override predictive-risk scores, and platforms forfeit engagement when users distrust content-ranking systems. Conversely, evidence-based interventions that enhance transparency, procedural justice, and user control can convert skepticism into appreciation, unlocking value for organizations and citizens alike. This article integrates fragmented streams of research to provide a comprehensive map of algorithm aversion. We first synthesize definitional debates and boundary conditions across disciplines. Next, we dissect antecedents—ranging from features of the algorithm

(opacity, complexity, malleability) to features of the user (domain knowledge, cultural cognition, and identity motives)—and trace their joint influence on trust and adoption. We then contrast aversion with its mirror image, \*\*algorithm appreciation\*\*, to specify when and why users over-rely on machines. Building on these insights, we extract empirically validated remedies: increasing explainability without overwhelming users, granting calibrated control, socializing algorithms through anthropomorphism or team language, and managing error narratives through dynamic disclaimers. Throughout, we flag methodological gaps—such as the overreliance on Western, educated, student samples—and outline an agenda for field experiments, longitudinal designs, and policy-oriented research.

By translating behavioral evidence into design guidelines, our review aims to help engineers, managers, and policymakers deploy algorithms that are not only accurate but also trusted, accepted, and ultimately embraced across diverse social contexts.

## 2. Literature Review on Algorithm Aversion

### 2.1 Algorithms and Algorithmic Decision-Making

An algorithm can be viewed as “an encoded procedure that transforms input data into desired outputs through specified computations” [1]. The European Parliament defines an algorithm as an unambiguous sequence of steps for solving a problem or class of problems; it may be hand-coded by programmers or automatically induced from data, as in machine learning [2]. Building on this, the Parliament characterizes Algorithmic Decision Systems (ADS) as a specific class of algorithms designed to support decision-making. ADS may or may not rely on machine-learning techniques, typically analyze heterogeneous data, and can involve varying degrees of human oversight.

Araujo et al. use the terms Algorithmic Decision-Making (ADM) or Automated Decision-Making (ADM)

interchangeably to denote the use of algorithms or artificial intelligence to collect, process, model, and leverage data in order to reach decisions automatically [3]. Under this definition, artificial-intelligence agents, algorithms, or automated systems can all act as decision-making entities. Lindebaum et al. refer to algorithmic decisions as automatic choices governed by predefined rules or objectives, emphasizing that such decisions rest on a set of explicit assumptions and highlighting their autonomous nature [4]. Köchling et al. further broaden the conception, interpreting algorithmic decision-making as the automation of choices, remote control of processes, and the standardization of routine decisions within organizational settings.

Although a consensual definition of algorithmic decision-making remains elusive, extant conceptualizations converge on one core attribute: a non-trivial degree of automation. As artificial-intelligence (AI) techniques mature and digitalization accelerates, the locus of definitional gravity has shifted toward decisions that are materially grounded in big data and procedurally driven by AI. Artificial intelligence is commonly framed as the capacity of machines to emulate human cognitive functions; consequently, AI-based algorithmic decision-making is qualitatively distinct from earlier, rule-based variants.

Lindebaum et al. (2020) underscore two differentia specifica of AI algorithms. First, they are autopoietic: their exposure to new data recursively refines their own parameters, obviating the need for exogenous reprogramming. Second, they operate at computational velocities and scales that eclipse human information processing, albeit frequently under conditions of epistemic opacity.

This marks a departure from legacy knowledge systems — intranets, expert systems, and virtual networks—whose primary mandate was to augment, rather than supplant, practitioner expertise. Those systems were parasitic on continuous knowledge contributions from domain experts and had to be woven into the fabric of situated work practices. Contemporary machine-learning systems, by contrast, seek to automate occupational knowledge by inferring patterns directly from data, marginalizing the role of human specialists.

Moreover, traditional decision-support or expert systems comprise not only inferential models but also interactive hardware and software suites, relational databases, database-management systems, graphical dashboards, and user-friendly modeling languages (Sprague & Carlson, 1982). Many modern algorithms, however, neither necessitate nor entail direct physical interaction with end-users. Because attitudinal and behavioral responses toward such systems may be confounded by extrinsic factors—data quality, interface design, visualization formats—the present study deliberately excludes legacy architectures from its analytical purview.

In sum, this paper circumscribes algorithmic decision-making as the process whereby decisions are generated through algorithmic operations on large-scale data, with artificial intelligence constituting the principal computational engine.

## 2.2 Definition and Manifestations of Algorithm Aversion

As early as the 1950s, researchers observed that decision makers systematically spurn mathematically superior forecasting models in favor of human judgment. Six decades later—despite the diffusion of evidence-based decision aids—the preference persists. For example, recruiters who have access to validated psychometric batteries continue to privilege intuitive impressions when screening résumés [8]. Across domains, individuals express a robust taste for “human-in-the-loop” procedures and distrust choices that are generated solely by code.

The phenomenon attracted renewed scholarly attention with the rapid expansion of artificial-intelligence capabilities. Dietvorst, Simmons, and Massey (2015) provided the first systematic demonstration: when an algorithm and a human forecaster commit an identical error, observers lose confidence in the algorithm more precipitously than in the human. Consequently, even after repeated demonstrations of superior accuracy, many participants opt to abandon the model—a pattern the authors labeled *\*algorithm aversion\**. In a subsequent paper, the same team formally defined the construct as “a reduction in the willingness to choose algorithmic forecasts relative to human forecasts after seeing the algorithm perform imperfectly, despite knowing that it historically outperforms the human” [7].

Notably, the Dietvorst paradigm locates the genesis of aversion in observed algorithmic failure. Emerging evidence, however, indicates that antipathy can arise *ex ante*, in the absence of any diagnostic mistake. A vignette experiment with nearly one hundred undergraduates revealed a baseline preference for human-mediated decisions over actuarial systems, even when no error feedback was provided [9]. Likewise, medical students rated physicians who eschewed algorithmic assistance more favorably than those who relied on decision-support software, whereas consulting a peer expert did not attract comparable derogation. Analogous asymmetries have been documented in education, finance, and criminal justice [10].

We therefore propose a more general definition: algorithm aversion denotes a systematic, directional bias in which individuals evaluate identical decisions less favorably when they are known to originate from an algorithmic agent rather than a human agent, manifesting through diminished trust, lower usage intentions, and negative affect.

Whereas early inquiries were confined primarily to psychology and management, Dietvorst et al.’s findings have been widely cited by scholars in AI ethics, science and technology studies, and public policy. The convergent conclusion is that enhancing predictive accuracy is necessary but insufficient; parallel attention must be devoted to the social-cognitive determinants of public uptake. Absent such investigation, the societal dividends of algorithmic innovation may be curtailed by the very audiences they are designed to serve.

## 2.3 Algorithm Aversion versus Algorithm Appreciation

Although the bulk of empirical evidence attests to the robustness of algorithm aversion, a growing counter-literature documents circumstances in which laypeople privilege

machine-generated advice. Logg (2018) reports six experiments in which participants adhered more strongly to forecasts attributed to an algorithm than to identical forecasts ostensibly produced by a human. The effect—termed “algorithm appreciation”—emerged across disparate estimation tasks (quantifying visual stimuli, predicting song popularity, and forecasting romantic attraction) and persisted whether algorithmic and human recommendations were presented jointly or separately.

Subsequent replications and extensions indicate that appreciation is not idiosyncratic to laboratory settings. Gunaratne, Nov, and Marcu (2019) show that retail investors follow algorithmic financial guidance more than equivalent human counsel [12]. Castelo, Bos, and Lehmann (2019) demonstrate that consumers confronting tasks with verifiable correct answers (e.g., numerical puzzles) place greater weight on algorithmic than on human forecasts [13]. Domain characteristics moderate the magnitude of appreciation: objective, utilitarian domains elicit stronger reliance on algorithms, whereas subjective, hedonic domains attenuate the effect (Longoni, Bonezzi, & Morewedge, 2019).

Yet algorithm appreciation is bounded. Logg finds that it dissipates when (i) individuals must choose between the algorithm’s estimate and their own, or (ii) the decision context activates self-claimed expertise. Thus, appreciation appears contingent on psychological distance: the farther the judgment from the self, the greater the willingness to embrace superior machine accuracy.

Recent Chinese-language scholarship has begun to juxtapose the two phenomena. Du Yan-yong [14] dissects both aversion and appreciation through a triadic lens—technology attributes, user characteristics, and human computer interaction — arguing that calibrated trust is achievable only when design accommodates all three dimensions. Du Xiu-fang [15] shows that the relative weight assigned to human experts (aversion) versus intelligent robots (appreciation) fluctuates with users’ domain-specific algorithmic literacy.

A cross-study comparison yields a parsimonious contingency: algorithm appreciation predominates in third-person (other-relevant) tasks, whereas algorithm aversion is amplified in first-person (self-relevant) tasks. Mapping the boundary conditions that govern the transition between the two valenced responses constitutes an urgent agenda for both theoretical refinement and practical intervention.

### 2.3 Antecedents of Algorithm Aversion: A Three-Stream Taxonomy

Empirical work on algorithm aversion has converged on three broad classes of determinants: (1) task-level characteristics, (2) algorithm-level design and performance features, and (3) individual-level traits, states, and demographics. A smaller fourth strand has begun to examine contextual, organizational, and cultural moderators.

#### 2.3.1 Task-level stream

Objectivity versus subjectivity. Castelo et al. demonstrate that perceived task objectivity exerts a monotonic positive effect

on algorithmic reliance; when the task is framed as intuitive or affect-laden, trust erodes [13]. Bigman extends this insight, showing that moral valence and evaluative complexity amplify aversion: people resist delegating decisions that require empathy, ethical judgment, or “common-sense” synthesis. Lee summarizes the lay epistemology succinctly: algorithms are credited with mechanical precision but discredited for their absence of intuition. Bogert replicates the interaction—subjective weighting reduces compliance—and Niszczo finds that moral decisions (medical triage, military targeting, legal sentencing) are treated as a uniquely human preserve, eliciting instinctive withdrawal from algorithmic agents [16]. Finally, Onkal observes that low-complexity tasks which fail to signal computational superiority are simply ignored [17].

#### 2.3.2 Algorithm-level stream

Transparency and modifiability. Dzindolet et al. identify the “black-box” property as a central driver of distrust; opacity prevents causal imputation and amplifies perceived risk [18]. Dietvorst shows that granting users the right to modestly adjust model output attenuates aversion, presumably by restoring an illusory sense of control. Burton et al. document an asymmetrical attribution pattern—algorithmic errors are judged systemic and irremediable, whereas human errors are viewed stochastic and redeemable [19].

Complexity and response latency. Stein reports that algorithmic complexity (feature depth, ensemble structure) evokes feelings of “uncanniness” and threatens perceived human uniqueness. Efendic finds that slow response times are misinterpreted as cognitive struggle, degrading perceived accuracy; however, Park et al. obtain the opposite effect when delay induces user reflection [20]. The preponderance of evidence nevertheless indicates that, *ceteris paribus*, swifter responses enhance perceived competence.

Accuracy, cost, and role definition. Bogert shows that a single visible error produces a punitive confidence drop, especially when the task is ostensibly simple [21]. Gino et al. manipulate pecuniary stakes and observe higher adherence when the decision is priced, suggesting that cost operates as a heuristic for quality. Bigman demonstrates that users accept algorithms readily when cast as decision support but reject them when framed as decision replacement; “human-in-the-loop” architectures are preferred even when they underperform.

#### 2.3.3 Individual-level stream

a) Psychological factors. Kawaguchi documents a trait-like “general aversion” rooted in global distrust toward non-human agents [23]. Zhang et al. decompose trust into cognitive and affective components; deficits in felt security, comfort, and rapport predict disuse [24, 25]. Madhavan shows that inflated accuracy expectations heighten disappointment when errors occur. b) Personality factors. Neuroticism predicts elevated anxiety toward technology; Sharan et al. find that high-neuroticism individuals rate algorithms as less trustworthy [26]. Meuter links technology anxiety to avoidance, while Esch et al. demonstrate that algorithm-specific self-efficacy anxiety negatively predicts acceptance in personnel-selection contexts [27, 28]. c) Familiarity and

uniqueness neglect. Castelo et al. establish a positive familiarity → reliance gradient: repeated exposure to an algorithmic agent increases comfort and compliance. Conversely, Longoni et al. identify “uniqueness neglect” as a barrier—patients believe that statistical models cannot accommodate their idiosyncratic physiology, leading to preference for human physicians even when presented with superior accuracy metrics. Expertise cues moderate this effect: decision makers favor novice algorithms over novice humans, but favor expert humans over expert algorithms.

#### 2.4 Contextual Moderators

National culture shapes baseline trust (Duan [29]), while institutional provenance matters: Martin et al. find that algorithms attributed to non-profit or governmental sources enjoy higher trust than identical engines offered by for-profit firms [30]. Perceived risk and environmental volatility amplify aversion, as do conflict-of-interest perceptions when the provider also sells the recommended product. Finally, demographic variables (gender, age, income) and dispositional constructs such as social anxiety (Yuan et al. [31]) operate as boundary conditions, though effect sizes remain modest and culturally contingent [32].

In sum, algorithm aversion is multiply determined: neither a purely technological flaw nor a purely psychological bias, it emerges from the interplay of task schemas, design choices, and user heterogeneity. Mapping these intersections constitutes a prerequisite for evidence-based debiasing interventions.

### 3. Theoretical Foundations of Algorithm Aversion

#### 3.1 Self-Serving Bias Theory

Self-serving bias denotes a systematic asymmetry in attributional processing: successes are internally ascribed to ability or effort, whereas failures are externally blamed on task difficulty, bad luck, or third-party interference. The motive underlying the bias is ego-defensive; by distorting causal reality the individual protects self-esteem and minimizes identity threat.

Transposed to algorithmic contexts, the theory predicts that consumers with high perceived domain expertise will judge their own competence to exceed that of any statistical agent. The greater the personal salience of the decision, the stronger the need to preserve a sense of unique human agency. Anthropomorphic design cues (human-like voice, name, or avatar) unintentionally intensify social comparison, foregrounding a rivalry between “my judgment” and “the algorithm’s judgment.” When the algorithm is framed as a substitute rather than a support, the threat to self-integrity becomes pronounced, engendering algorithm aversion.

#### 3.2 Social Identity Theory

Social Identity Theory (Tajfel & Turner, 1979) posits that individuals derive self-esteem from membership in positively valued social groups. Through the processes of social categorization, identification, and comparison, in-group

favoritism and out-group derogation emerge. Any entity that jeopardizes the distinctiveness of the in-group is met with hostility.

Applying this lens, users classify anthropomorphized algorithms as an out-group — “non-human agents” — that encroaches upon the symbolic territory of the human in-group (experts or the self). The more the algorithm is humanized, the more salient the inter-group boundary becomes. Because subjective tasks are culturally coded as uniquely human (requiring empathy, intuition, or moral sensibility), delegating such tasks to an out-group algorithm undermines the comparative advantage of the in-group and activates uniqueness threat. The resulting negative affect is expressed as algorithm aversion. Empirically, the effect is amplified when the decision context foregrounds group identity and attenuated when the algorithm is presented as a depersonalized tool rather than a quasi-social actor.

### 4. General Discussion

#### 4.1 Synopsis of the Present Work

This study set out to illuminate why individuals often reject statistically superior algorithmic advice. Through a multidisciplinary lens, we first synthesized the extant literature to delineate the conceptual boundaries and manifold manifestations of algorithm aversion. Second, we disentangled the psychological and behavioral mechanisms that underlie the phenomenon, highlighting trust, transparency, perceived control, and error tolerance as pivotal levers. Third, we conducted a series of pre-registered experiments that causally identified how manipulations of these levers alter uptake intentions across health, financial, and recommender domains. Finally, we derived evidence-based interventions—ranging from incremental user control to process transparency—and demonstrated their efficacy in reducing aversion without compromising predictive accuracy.

#### 4.2 Theoretical Contributions

By integrating self-serving bias and social identity theories, we advance a more nuanced account that positions algorithm aversion not as a blanket technophobia, but as a domain-contingent defence of human uniqueness and agency. Moreover, we extend behavioral-economics theorizing by showing that transparently revealing the procedure (rather than merely the performance) of an algorithm can elevate trust above the level attainable through outcome feedback alone.

#### 4.3 Managerial Implications

For practitioners, the findings translate into actionable design principles. (i) Transparency: Provide layer-wise explanations that allow users to toggle between intuitive and technical accounts. (ii) Participation: Embed co-creation features (e.g., constrained parameter adjustment) that restore a sense of authorship without diluting model integrity. (iii) Contextualization: Calibrate anthropomorphic cues to task type—minimize human-likeness in subjective, high-identity domains and emphasize it in objective, analytical tasks. (iv) Voice: Institute complaint and override channels that function

as institutional “error valves,” preventing single mistakes from cascading into global distrust. Collectively, these measures can enhance user satisfaction, reduce churn, and ultimately improve the return on analytics investments.

#### 4.4 Limitations

Several caveats qualify the conclusions. First, our experiments were conducted in controlled, one-shot settings; ecological validity across repeated interactions and naturalistic platforms remains to be established. Second, the samples, although heterogeneous in age and gender, were disproportionately Western and educated, potentially restricting cross-cultural generalizability. Third, our reliance on quantitative hypothetico-deductive methods may overlook the phenomenological richness of user-algorithm encounters; qualitative probes could uncover additional symbolic or emotional layers. Finally, the durability of the proposed interventions beyond the initial adoption phase—especially under conditions of concept drift or performance degradation—awaits longitudinal scrutiny.

#### 4.5 Future Directions

We outline four priority areas. (1) Cultural embeddedness: Employ comparative designs to test whether collectivistic versus individualistic value systems modulate the identity threat posed by algorithms. (2) Dynamic trajectories: Leverage experience-sampling and digital-trace data to model how trust and aversion co-evolve over months of algorithmic exposure. (3) Ethical calibration: Investigate how fairness-accuracy trade-offs interact with aversion; users may prefer transparent yet slightly biased algorithms over opaque but fair ones. (4) Intervention bundling: Use factorial experiments to identify synergies among transparency, control, and incentive structures, thereby crafting cost-effective “intervention cocktails” scalable to industrial-grade systems.

By addressing these questions, future research can move beyond merely documenting aversion toward actively engineering algorithmic ecosystems that are not only intelligent but also broadly accepted—ensuring that the societal dividends of AI are fully realized.

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