

The Impact of Algorithmic Nudges on Self-Regulation and Task Acceptance in Gig Economies

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Abstract

The rapid expansion of digital labor platforms has given rise to sophisticated algorithmic management systems that not only allocate tasks and set remuneration but also increasingly deploy behavioral nudges to steer worker conduct. This paper presents a systemic investigation into how algorithmic nudges influence self-regulation and task acceptance among gig economy workers, moving beyond individual-level psychological inquiry to emphasize structural trade-offs, platform architectures, governance frameworks, and infrastructure-level implications. The analysis draws on interdisciplinary perspectives from information systems, behavioral economics, operations management, and science and technology studies to map the mechanisms through which real-time goal-setting prompts, dynamic incentive framing, and predictive just-in-time notifications reshape worker decision-making. It is argued that while nudges can temporarily boost platform liquidity and worker responsiveness, their pervasive deployment introduces significant risks, including the erosion of autonomous self-regulation, the inducement of cognitive dependency on algorithmic guidance, and the disproportionate exploitation of vulnerable worker populations. The paper examines the architectural design choices that encode nudge logics into platform infrastructures, highlighting the tension between optimization for short-term system efficiency and the long-term sustainability of worker livelihoods. Particular attention is devoted to fairness, transparency, and accountability in algorithmic nudging practices, with critical evaluation of existing regulatory approaches and proposals for participatory design mechanisms. By reframing algorithmic nudges as a socio-technical governance tool rather than a neutral design intervention, the study calls for a reorientation of platform policy toward infrastructures that support worker agency, resilience, and informed consent. The paper concludes with a forward-looking agenda for the co-design of nudge architectures that align platform business models with broader societal values of dignity and fairness in the future of work.

Keywords

algorithmic nudges, gig economy, self-regulation, task acceptance, algorithmic management, platform governance, behavioral design.

1. Introduction

The gig economy has emerged as a dominant mode of organizing flexible, on-demand labor across a vast array of sectors, from ride-hailing and food delivery to microtasking and freelance professional services. Central to the operation of these platforms is the use of algorithmic systems that dynamically match workers with tasks, set piece-rate compensation, and evaluate performance through aggregated user feedback mechanisms. However, beyond these logistical coordination functions, platform algorithms increasingly engage in a form of behavioral management that can be conceptualized as algorithmic nudging. Drawing on the foundational insights of choice architecture, these nudges are designed to influence worker behavior not through coercion or explicit mandates but through subtle alterations of the decision environment. In the gig context, such nudges may take the form of surge pricing heat maps, earning goal progress bars, personalized task recommendations emphasizing proximity or convenience, and just-in-time alerts that convey social comparisons or scarcity signals. Despite the growing prevalence of these techniques, their impact on the fundamental psychological processes of self-regulation and the economic phenomenon of task acceptance has not been systematically explored at a system level, with most extant research focusing either on individual user experience or on labor market outcomes in isolation.

This paper argues that algorithmic nudging in gig economies must be understood as an infrastructural phenomenon that reconfigures the relationship between worker cognition and platform control. The design, deployment, and refinement of these nudges are not value-neutral; they embed specific organizational goals within the digital architecture that mediates every transaction. The platform's continuous collection of granular behavioral data enables a distinct mode of hyper-personalized persuasion that operates in real time and at scale, a phenomenon that scholars have termed the hypernudge. By intervening at the moment of decision-making, algorithmic nudges have the potential to either scaffold worker self-regulatory capacities or to systematically undermine them by supplanting internal motivation and volition. Similarly, task acceptance, which in traditional employment contexts involves a complex calculus of effort, opportunity cost, and personal inclination, becomes susceptible to design features that exploit cognitive biases to increase conversion rates. Understanding the structural trade-offs involved requires moving beyond micro-level experimental findings to engage with the architecture of the platforms themselves, the governance frameworks that enclose them, and the broader policy implications for labor market fairness and sustainability.

The present analysis therefore adopts a systemic orientation, synthesizing insights from computer science, behavioral economics, critical algorithm studies, and operations management. The subsequent sections examine the architectures of algorithmic nudging, the psychological pathways of self-regulation disruption, the dynamics of task acceptance under persistent behavioral steering, the structural trade-offs inherent in nudge-centric platform design, the governance and accountability challenges that arise, and future trajectories for worker-centric infrastructures. Throughout, the discussion is informed by cross-domain comparisons with other algorithmic governance domains, such as social media and financial trading platforms, where analogous dynamics of attention capture and decision steering have been extensively documented. By foregrounding the socio-technical nature of algorithmic nudges, the paper aims to contribute a holistic perspective that situates technical design choices within their broader ethical, economic, and political contexts.

2. Algorithmic Management and Nudge Architectures in Gig Platforms

Contemporary gig platforms function as multi-sided markets where the core operational logic hinges on maintaining high levels of asset liquidity on the supply side while meeting fluctuating consumer demand with minimal latency. Algorithmic management systems have evolved from relatively static rule-based dispatching to complex, machine-learning-driven orchestrators that continuously optimize for a suite of key performance indicators, including acceptance rates, completion times, and customer satisfaction scores. The architectural foundation of these systems typically comprises a data ingestion layer that captures real-time telemetry from worker smartphones, a predictive analytics engine that forecasts demand-supply imbalances, and a decision-support module that issues targeted prompts to individual workers. Nudge architectures are embedded within this latter module, often as a discrete sub-system that applies behavioral templates to the raw signals generated by the predictive models. For instance, when the platform anticipates a surge in demand in a particular geospatial zone, it may not merely display a higher price multiplier; it may also craft a notification message that leverages loss aversion framing, highlighting how much it would cost the worker to miss the earnings window.

The technical design of these nudge architectures raises significant questions about modularity, transparency, and auditability. In many platforms, the behavioral layer is tightly coupled with the pricing and matching engines, making it difficult to isolate the effect of a specific nudge from concomitant changes in economic incentives. This entanglement reflects a broader trend in platform engineering toward end-to-end integration, where the traditional boundaries between operations research, user experience design, and behavioral economics collapse into a single optimization surface. While such integration enables rapid A/B testing and adaptive personalization, it also obscures the causal pathways through which algorithmic interventions affect worker outcomes. From a systems perspective, the lack of architectural decoupling between the core transaction mechanism and the behavioral steering layer constitutes a potential risk to system robustness, as unanticipated interactions between pricing shocks and psychological anchors can generate volatile supply-side dynamics, such as herding behavior followed by rapid withdrawal of worker capacity.

Comparative analysis with algorithmic architectures in automated trading and social media feed curation illuminates both convergences and divergences. In high-frequency trading, algorithmic nudges manifest as order-flow previews and volume-weighted average price signals that aim to influence market participant behavior without altering the underlying market microstructure. In social media, engagement-maximizing recommender systems deploy variable reward schedules and social validation cues to shape user scrolling and sharing patterns. Gig platforms borrow elements from both domains: they exploit variable reward schedules through stochastic surge bonuses and utilize social validation via leaderboards and community acceptance rate benchmarks. However, the stakes for gig workers are fundamentally different, as task acceptance directly translates into income provision and physical safety considerations, dimensions that are absent in purely virtual environments. The architectural implication is that nudge designs must be evaluated not only for their effectiveness in steering immediate behavior but also for their second-order effects on worker wellbeing, financial stability, and long-term platform participation.

3. Self-Regulation Theory and the Psychological Mechanisms of Digital Nudges

Self-regulation refers to the set of cognitive, affective, and motivational processes through which individuals set goals, monitor progress toward those goals, and adjust their behavior in response to feedback and changing circumstances. In traditional work settings, self-regulation

is supported by stable institutional structures such as fixed schedules, supervisory feedback, and career progression pathways that provide external scaffolding for goal-directed effort. Gig workers, by contrast, operate in an environment characterized by radical flexibility and institutional void, where they must independently structure their work routines, set earnings targets, and manage the cognitive and emotional demands of unpredictable task flows. Algorithmic nudges intervene precisely at this juncture, offering digital substitutes for the scaffolding that is normally provided by organizational membership. Goal-setting dashboards, earnings progress bars, and tailored task suggestions configure a digital self-regulation environment that can either augment or displace the worker's own regulatory capacities.

At a cognitive level, well-designed nudges can reduce decision fatigue by highlighting salient options, simplifying cost-benefit calculations, and providing clear feedback on current standing relative to self-set benchmarks. A recent model and field experiment demonstrated that personal goal-setting prompts delivered through a platform interface significantly increased worker effort and earnings, underscoring the potential for nudges to act as effective self-regulation aids [5]. From the perspective of control theory, such prompts function as external reference signals that help workers reduce discrepancies between their current state and their desired goal state. However, the systemic risk is that prolonged reliance on algorithmic reference signals may atrophy the worker's own capacity to generate intrinsic goals and to evaluate task opportunities independently of platform-provided cues. This dynamic parallels findings from the cognitive offloading literature, where the availability of external memory aids reduces the spontaneous employment of internal memory strategies. When the platform assumes the role of the regulator, the worker's self-regulatory musculature is exercised less frequently, potentially leading to a state of learned algorithmic dependency.

Moreover, the temporal granularity at which algorithmic nudges operate can disrupt the natural cadence of self-regulation. Effective self-regulation typically involves cycles of goal setting, effort investment, disengagement, and reflection that unfold over hours or days. In contrast, platform nudges are often engineered to minimize latency between stimulus and response, compressing the decision cycle into seconds. A driver receiving a ping for a nearby ride is subjected to a confluence of nudges, including time-limited acceptance windows, auditory chimes, and visualizations of foregone earnings, that collectively bypass deliberative processing. This temporal compression undermines the reflective component of self-regulation, making it less likely that the worker will integrate their immediate choice into a broader personal strategy for workload balancing, skill development, or career progression. Over time, the worker's decision-making repertoire becomes increasingly reactive and fragmented, a condition that is structurally advantageous for the platform's real-time liquidity needs but detrimental to the development of sustainable self-management practices.

4. Task Acceptance Dynamics: From Persuasion to Dependence

Task acceptance in gig economies is the pivotal behavioral outcome that directly determines both worker earnings and platform performance. Economists have traditionally modeled acceptance decisions as a function of wage offer, trip characteristics, and worker opportunity cost. Algorithmic nudges complicate this model by layering psychological influences that can shift the decision threshold independently of the objective economic attributes of the task. For example, a surge heat map that color-codes neighborhoods by demand intensity provides not just informational content but also a perceptual priming effect that makes higher-priced zones appear more attractive than they would if presented in a neutral numerical format. Research on algorithmic labor has documented how such framing effects, combined with sunk cost

illusions created by accumulated acceptance streaks, can lead workers to accept tasks that a rational cost-benefit calculation would reject [6]. The cumulative effect is a decoupling of task acceptance from underlying economic optimization, a phenomenon that has direct implications for worker welfare and market efficiency.

The transformation of task acceptance from a deliberative choice into an algorithmically guided reflex is accelerated by the personalization capabilities of modern platform architectures. By continuously tracking individual worker behavior, including cancellation patterns, earnings thresholds, and even physiological indicators of fatigue inferred from phone usage data, platforms can construct individual-level persuasion profiles. These profiles enable the deployment of targeted nudges that are calibrated to specific vulnerability points. A worker known to be highly responsive to social comparison may receive push notifications such as “Drivers in your area are earning 20 percent more this hour,” while a worker motivated by goal completion may see a progress bar suggesting they are only two rides away from their daily target. This micro-targeting, which mirrors techniques used in digital advertising and political persuasion, raises the specter of a new form of labor market segmentation where the most psychologically susceptible workers are algorithmically identified and disproportionately exploited to maintain system-level capacity [7].

From a systems perspective, the normalization of such hyper-persuasive environments carries the risk of creating a fragile equilibrium. When a significant portion of the workforce becomes dependent on algorithmic nudges to structure their participation, any technical failure, policy intervention, or market shock that disables or alters the nudge architecture can trigger abrupt and unpredictable changes in aggregate supply. This dependency backfire effect has been observed in other technology-mediated ecosystems, such as financial markets where the withdrawal of algorithmic liquidity provision causes flash crashes. In the gig economy context, a platform’s decision to scale back behavioral nudges in response to regulatory pressure or public criticism could, paradoxically, lead to a collapse in task acceptance rates as workers lose the external stimulus they have come to rely upon. Sustainable platform design must therefore grapple with the challenge of developing nudging practices that strengthen rather than supplant worker autonomy, ensuring that the labor supply function remains robust even in the absence of continuous algorithmic steering.

5. Structural Trade-Offs and System-Level Design Considerations

The integration of algorithmic nudges into gig platforms presents a set of deep structural trade-offs that system architects and business strategists must navigate. The most fundamental of these concerns the tension between short-term operational efficiency and long-term human capital development. Nudges that optimize for immediate task conversion are highly effective at reducing idle time and matching supply with urgent demand spikes. However, these same nudges may discourage workers from engaging in exploratory behavior, such as trying new task types, learning complementary skills, or taking strategic rest breaks that preserve long-term health and motivation. Exploration is essential for the evolution of a versatile and resilient workforce, but it has minimal short-term payoff and is often penalized by acceptance rate metrics. Platforms thus face a classic exploration-exploitation dilemma, where the exploitation of known worker response patterns through nudges crowds out the experimentation that generates adaptive capacity at both individual and system levels.

Another critical trade-off involves fairness and non-discrimination. Algorithmic nudges that personalize behavioral prompts based on worker profiles can inadvertently exacerbate existing inequalities. If the nudge system learns that workers from lower-income

neighborhoods are more responsive to loss-framed notifications, it will deliver a higher frequency of such psychologically intense prompts to that demographic, potentially increasing their work hours and exposure to occupational hazards beyond what they would autonomously choose. This constitutes a form of statistical discrimination mediated by behavioral profiling, distinct from but related to the algorithmic wage discrimination documented in prior studies [8]. Furthermore, the opacity of machine learning models that power personalization makes it difficult to audit for these emergent disparities. From a governance standpoint, platform designers must consider incorporating fairness constraints directly into the optimization objectives of nudge engines, ensuring that the distribution of persuasive load does not systematically burden protected or vulnerable groups.

The architectural implications of these trade-offs suggest the need for a modular platform design that separates the core task allocation function from the behavioral prompting layer, with well-defined interfaces that allow independent auditing and worker configurability. Such a separation would enable workers to set personal parameters governing the types, frequency, and intensity of nudges they receive, effectively transforming nudging from a unilateral management tool into a negotiated feature of the digital work environment. This proposal aligns with emerging research on algorithmic worker agency, which advocates for design interventions such as preference toggles, transparency dashboards, and collective co-design forums [9]. However, implementing such modularity poses non-trivial engineering challenges, including the need to maintain system performance while respecting hundreds of thousands of individualized nudge preferences, and the risk that workers who opt out of nudges may face indirect penalties through reduced task visibility or lower algorithmic ratings. Addressing these challenges requires a holistic re-engineering of the platform's trust model, moving from adversarial to cooperative relationships between workers and the algorithms that mediate their labor.

6. Governance, Fairness, and Platform Accountability

The governance of algorithmic nudges in gig economies remains a regulatory gray zone, situated uneasily between consumer protection law, labor regulation, and data privacy frameworks. Existing legal instruments were not designed to address the subtle, continuous, and personalized manipulation enabled by digital choice architectures. The European Union's proposed Artificial Intelligence Act and the Platform Work Directive represent nascent attempts to impose transparency obligations and algorithmic accountability on platform operators, yet their provisions on behavioral nudging remain underdeveloped relative to the sophistication of the techniques deployed. The legal concept of undue influence, traditionally applied to contexts such as high-pressure sales or predatory lending, may offer a useful analog for assessing when algorithmic persuasion crosses the threshold from acceptable marketing to exploitative manipulation. However, translating this concept into actionable technical standards requires interdisciplinary collaboration among legal scholars, systems engineers, and behavioral ethicists.

Transparency alone is insufficient as a governance remedy, given the well-documented limits of disclosure in enabling meaningful user agency under conditions of information asymmetry and cognitive load. A worker who is presented with a detailed technical description of the nudge logic is unlikely to be in a position to counteract its effects in real time, particularly when the nudge is designed to exploit automatic cognitive processes. Therefore, governance frameworks must move beyond informational transparency toward structural protections, including default time buffers that prevent instant acceptance, mandatory cooling-off periods

after prolonged work sessions, and algorithmic impact assessments that require platforms to model and publicly report the distributional effects of their nudge regimes. Analogous to environmental impact assessments in physical infrastructure projects, algorithmic impact assessments would compel platforms to systematically evaluate the potential harms of their behavioral design choices before deployment, shifting the burden of proof from regulators and workers to the platform itself.

The accountability dimension also raises the question of who bears liability when algorithmic nudge architectures cause harm. If a worker is involved in a traffic accident while rushing to accept a time-limited surge task under the combined influence of scarcity framing and auditory prompts, the causal chain implicates not just individual driver error but also the design decisions that engineered the stressful decision environment. Courts and regulators are beginning to grapple with such distributed causation, and the outcome of these deliberations will shape the legal risk calculus for platform companies. Proactive platform governance strategies, such as the establishment of independent algorithmic ombudsman offices and worker-inclusive design councils, could mitigate liability risk while simultaneously building trust and legitimacy. These mechanisms would need to be supported by technical infrastructures for logging nudge delivery, acceptance timestamps, and worker state data, creating an evidentiary trail that enables retrospective analysis and contestation.

7. Future Trajectories: Toward Worker-Centric Infrastructures

The future evolution of algorithmic nudging in gig economies is not predetermined by technological imperatives but will be shaped by strategic choices made by platform firms, regulatory bodies, and worker collectives. One plausible trajectory is a competitive arms race in behavioral optimization, where platforms vie for worker attention through ever more sophisticated and immersive nudge technologies, potentially incorporating augmented reality interfaces, biometric sensing, and gamified loyalty systems. This path would likely deepen the dependency dynamics described earlier, concentrating design power in the hands of a few large platform operators and marginalizing worker voice. The resulting labor market would be characterized by high friction and low autonomy, with workers tethered to algorithmic signals that they neither understand nor control.

An alternative trajectory, and the one advocated in this paper, is the intentional construction of worker-centric infrastructures that rebalance the power asymmetries inherent in platform-mediated work. Such infrastructures would embed algorithmic nudges within a framework of informed consent, collective negotiation, and technological due process. Concretely, this could involve the development of open APIs that allow third-party worker agencies to build pro-worker nudging applications on top of platform data, creating a marketplace of choice architectures that compete on their ability to serve worker interests rather than platform profitability. Worker data cooperatives could pool behavioral data to train nudging models that optimize for sustainable income, health, and skill development, providing a counterweight to the platform's profit-maximizing algorithms. These innovations would transform the nudge from a tool of unilateral control into an instrument of worker empowerment, supporting rather than undermining self-regulation.

Realizing this vision requires a convergence of technical innovation, regulatory entrepreneurship, and grassroots organizing. Systems researchers can contribute by developing formal models and simulation environments that map the long-term system-level effects of different nudge regimes under various worker preference distributions and market conditions. Empirical field experiments, conducted with appropriate ethical safeguards and

informed consent, can generate the evidence base needed to distinguish welfare-enhancing from welfare-diminishing nudge designs. Collaborative efforts such as the Platform Design Toolkit and participatory value-sensitive design methodologies offer promising pathways for involving workers directly in the co-creation of the algorithmic environments that shape their daily lives. The central insight is that the architecture of algorithmic nudges is not merely a technical parameter but a site of political contestation over the future character of work, and that systemic research must engage with this political dimension directly rather than retreating into a posture of technical neutrality.

8. Conclusion

This paper has provided a systemic examination of the impact of algorithmic nudges on self-regulation and task acceptance in gig economies, emphasizing structural trade-offs, architectural design, governance challenges, and future policy directions. The analysis reveals that while algorithmic nudges can serve as effective tools for supporting worker goal attainment and platform liquidity, their pervasive and often opaque deployment introduces significant risks. These include the erosion of autonomous self-regulatory capacity, the creation of cognitive dependency on algorithmic guidance, the disproportionate exploitation of vulnerable worker segments, and the emergence of fragile labor supply dynamics that threaten system robustness. The current trajectory of nudge architecture design, which prioritizes short-term engagement metrics over long-term worker flourishing, is neither inevitable nor sustainable.

Addressing these challenges requires a multi-pronged strategy that encompasses technical redesign, regulatory innovation, and collective worker engagement. Platform architectures should be restructured to decouple the nudge layer from core transaction engines, enabling independent auditing and worker configuration. Governance frameworks must evolve beyond transparency mandates to establish structural protections, algorithmic impact assessments, and clear accountability mechanisms. Most fundamentally, the design of algorithmic nudges should be reimaged as a collaborative endeavor between platform operators, workers, and societal stakeholders, oriented toward the cultivation of worker agency rather than its circumvention. By situating algorithmic nudges within their broader socio-technical context, researchers and practitioners can contribute to the development of digital labor infrastructures that are not only efficient and innovative but also fair, resilient, and conducive to human dignity in the rapidly transforming landscape of work.

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