© DEC 2025 | IRE Journals | Volume 9 Issue 6 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I6-1713029

Techno-Behavioural Gravity Theory (TBG Theory): A New Model on Technology - Human Behaviour Nexus

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Abstract- ***The rapid integration of digital technologies into everyday life has intensified scholarly debates regarding how technological systems influence human behaviour. Existing theoretical frameworks ranging from technological determinism to social shaping theories offer explanations on technological mediated behaviours. It suggests internal processes through which an initial cause leads to an effect. Such cause-effect relationship fails to fully capture both the internal and external influences that contribute to forming an individual's worldview and behavioural patterns. It thus fails to take cognisance of the subtle, persistent, and systemic ways technology reorganizes and shapes behavioural patterns over time. This paper introduces the Techno-Behavioral Gravity Theory (TBG Theory), a novel model that posits technology as an environmental force that exerts behavioural gravity on individuals and societies. Through its embedded affordances, algorithmic priorities, and institutionalized norms, technology gradually draws human behaviour toward patterns aligned with its internal logic. The theory proposes three interconnected mechanisms: Affordance Gravity, Algorithmic Gravity, and Institutional Gravity, that collectively explain how technological systems shape communication, decision-making, social interaction, and normative expectations. The paper outlines the core propositions, theoretical logic, and potential research pathways for empirical testing. TBG Theory, therefore, expands existing knowledge by offering a unified explanation of behavioural restructuring due to emerging digital environments and provides actionable insights for policymakers, designers, and behavioural researchers.***

Keywords: Affordance Gravity, Algorithmic Gravity, Digital Systems, Human Behaviour, Institutional Gravity, Techno-Behavioural Gravity Theory

I. INTRODUCTION

The increasing integration of digital technologies into communication, commerce, governance, and social interaction has raised significant questions about how technology shapes human behaviours, decision-making, social and economic interaction, as well as social norms and values. The phenomenon that underpins the development of the Techno-Behavioural Gravity (TBG) Theory is the observation that the digital environment is gradually, structurally, and often unconsciously influencing human behaviour in systematic ways. Given its dynamic ecosystem of connected technologies and platforms as well as servers, the world is gradually becoming a global village with webs of communication networks which enable interactions and socio-economic activities with ease. The Digital platforms, through their designs, algorithmic mechanisms, and embedded rules, create environments that subtly direct user attention, choices, and interactions. Over time, repeated engagement within these environments leads to behavioural patterns that are shaped as much by the architecture of technology as by individual preferences. The ubiquity of smartphones, computers, social media applications, and algorithm-driven platforms has intensified the influence of information and communication technology to a large extent, thus making it increasingly critical to understand how the digital systems is exerting a "gravitational pull" on human behaviour.

Existing theories including technological determinism theory (TDT) (McLuhan,1962) and social shaping technology theory (SSTT) (MacKenzie and Wajcman, 1999) provide important insights into technological influence on human behaviours, but are limited in their explanatory scope. For instance, TDT assumed a linear model of innovation and technological determinism. The basic tenets of technological determinism theory are that technology is the primary force that drive social change, shaping human culture, thought, behaviour, and societal structures, rather than the other way around. The core principles of the theory include technology as a primary driver of historical and social shifts, and thus inevitable, change, as its societal effects, are largely unavoidable and follow a

determined path. The others assumptions as seen in the argument of Veblen (reported in Brette, 2010) are extensions of human senses and bodies, altering perceptions, and extending consequences more than the specific content it carries. In all these, the theory maintained that technology creates its own path, forcing societies to adapt to its inherent power and leading to new norms and systems.

The social shaping technology theory (SSTT) contributed variables that provide alternatives to the argument of TDT. Its basic assumption is that technology isn't autonomous but emerges from society, and is shaped by existing social, cultural, political, and economic factors. It thus emphasizes that development is a social process with "forking paths," (Weithman, 2023), seeking to show that different societal inputs influence the emergence of varied technological forms and impacts experience by members of the society. The SSTT therefore factors in social process that sees technology as a negotiation among diverse groups (users, makers, regulators) with different interests. Its rejection of determinism suggests interpretive flexibility in the use of technologies, designs and adoption, as well as reinforcement of existing power structures, which potentially exclude some groups while empowering others. In this context, the SSTT presents the relationship between technology and society as one of mutual shaping. The argument is similar to that of Bijker, Hughes and Pinch (1987) on the social construction of technology framework and Callon and Latour's (1992) actor-network theory.

In order to address the gap in technological influence on human behaviour, we reviewed three other theories/models, viz: the Affordance theory, Algorithmic governance, and Socio-technical systems theory, which offer useful perspectives on the interplay between technology, human behaviour, and social norms. Affordance theory highlights how action possibilities provided by technologies shape user interaction, emphasising the role of perceived and actual affordances in guiding behaviour rather than assuming technology is neutral (Norman 1988, Gibson 1977). Algorithmic governance highlights how automated systems and data-driven decision processes and steer behaviour and social dynamics through ranking, recommendation, and prioritisation mechanisms, effectively acting as governance tools in digital contexts. Socio-technical systems theory emphasises the interdependence of social and technological factors in shaping organisational and individual behaviour. However, these theories, individually, fail to explain the gradual, cumulative, and often unconscious behavioural alignment that occurs as individuals repeatedly interact with digital systems. While technological determinism exaggerates the unilateral power of technology, social constructivist approaches tend to understate the subtle but pervasive influence of embedded technological cues. Neither fully captures how repeated interactions with platform affordances, algorithmic filtering, and normative pressures cumulatively align user behaviour with system structures. This gap highlights the need for a unified theoretical framework capable of integrating these influences comprehensively.

The review of the theories helps to propose a nexus between “affordance-algorithmic-institutional gravity” in behavioural theorising. The term "gravity" suggests that these structures exert a strong, often invisible, pull-on behaviour. The nexus therefore, provides a conceptual framework that explains how human behaviour is shaped by the interplay between technological capabilities (affordances), automated decision-making processes (algorithms), and established social structures and rules (institutions). These formed the building blocks of the “techno-behavioural gravity theory (TBG theory)”. The novelty here is that beyond the lineal model innovation presented by technological determinism theory and the mutual shaping effect between technology and society presented by the social shaping of technology theory, the TBG theory leverage the explanation of existing technologically related theories with respect to affordances, constraints, preconditions, and unintended consequences (Baym, 2015) by adding algorithmic gravity, and institutional gravity, and thus accommodate the subtle, persistent, and systemic ways technology reorganizes and influence human behavioural patterns over time. It creates a feedback loop that profoundly influences human behaviour in several ways: shaping perception and action, reinforcing norms and biases, creating feedback loops, and altering social interactions.

While technological affordances represent potential actions that a technology offers to a user, in the digital realm, affordances are not merely physical but also social and communicative. These include the ability to instantly connect, share information, and / or remain anonymous. The specific affordances of platforms (like the "like" button or infinite scroll) are instrumental in shaping user experiences and behaviours. Algorithmic gravity is operationalised to include processing user data to personalize experiences, filtering of content, and automating decision-making. It included introducing a layer of automated influence, reinforcing existing behaviour patterns and sometimes amplifying certain trends, such as group polarization or engagement with emotional content. Institutional gravity refers to formal and informal rules, norms, and social structures that govern behaviour (e.g., legal systems, social norms, market dynamics, corporate policies).

The aim of this paper is to establish a unified conceptual and theoretical framework: “affordance-algorithmic-institutional gravity nexus” for the building of Techno-Behavioural Gravity (TBG) Theory, that explains how technological architectures, algorithms, and institutionalised norms collectively restructure and influence human behaviour over time. By building on the insights of Affordance theory, Algorithmic governance, and Socio-technical systems theory, TBG Theory conceptualises technology as an environmental system that exerts a form of behavioural gravity, whereby the combined influence of design, algorithmic mediation, and social norms gradually aligns human actions with system-imposed patterns. This approach provides a multidimensional perspective that bridges existing theoretical gaps, enabling a more comprehensive understanding of human behaviour in digitally mediated environments.

The paper follows a standard theoretical structure to ensure clarity and comprehensive coverage. It begins with this introduction, a conceptual background, situating TBG Theory within the context of digital technologies and human behaviour. This is followed by the theoretical framework itself, which identifies the core constructs, including affordances, algorithmic curation, and institutional gravity, and explicates their interactions. Subsequent sections present the theory’s propositions and assumptions, providing testable statements derived from the integrated theoretical foundations. The internal logic of the theory is then discussed, illustrating how behavioural patterns emerge and consolidate over time. Methodological implications are considered, detailing how qualitative and quantitative research methods can empirically assess the theory. Finally, the paper concludes with a summary of contributions, limitations, and directions for future research.

II. CONCEPTUAL AND THEORETICAL BACKGROUND

Scholars have long debated the relationship between technology and behaviour. Classical technological determinism argues that technology directly shapes society (Winner, 1977), whereas the social shaping of technology argues that human actors define technological outcomes (Bijker, Hughes, & Pinch, 1987). More recent frameworks, including affordance theory, algorithmic governance, and socio-technical systems theory, highlight the importance of design features, algorithmic outputs, and institutional structures (Norman, 1988; Just & Latzer, 2016; Baxter & Sommerville, 2011). These existing theories provide valuable insights, but they are limited in scope and tend to examine isolated dimensions rather than the cumulative behavioural influence of technology as an integrated system.

Existing theories inadequately explain gradual behavioural drift, long-term social norm changes, and the subtle feedback loops embedded in digital platforms (Van Dijck, 2013; Zuboff, 2019). They also fail to unify design affordances, algorithmic filtering, and normative expectations under a single behavioural model. In this sense, the theories are insufficient for capturing the systemic, temporal, and interactive aspects of behaviour that emerge in digitally mediated environments, making them partially outdated in explaining contemporary techno-social dynamics.

The Techno-Behavioural Gravity (TBG) Theory positions itself as an integrative framework that synthesizes these elements into a coherent model of behavioural gravity. By combining the insights of affordance theory, algorithmic governance, and socio-technical systems theory, TBG Theory explains how design features, algorithmic prioritization, and institutionalised norms collectively produce

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DOI: https://doi.org/10.64388/IREV9I6-1713029

predictable patterns of human behaviour over time. It situates itself as a bridge between technological determinism, which overemphasizes unilateral technological power, and social constructivism, which underemphasizes structural technological influences.

Conceptually, the TBG Theory is focused on the behavioural outcomes shaped by digital environments, including gradual alignment with system cues, reinforcement of habits through algorithmic feedback, and adaptation to institutionalised norms within socio-technical systems. It does not, however, attempt to explain every psychological or cognitive mechanism at the individual level, nor does it address technological development processes in isolation from user interaction. Instead, its boundaries are clearly defined around the integrated influence of technological affordances, algorithmic mediation, and institutional norms on observable and predictable behavioural patterns.

Theoretical Foundation

The TBG Theory rests on the idea that technological systems create structured environments that pull human behaviour toward specific patterns. Three core constructs form the basis of this gravitational pull, viz: (i) Affordance Gravity: defined as behavioural pathways shaped by the design features of technology. (ii) Algorithmic Gravity: defined as behavioural shifts driven by algorithmic prioritization and curation, and (iii) Institutional Gravity: defined as behavioural normalization produced by embedded norms and socio-technical expectations. These constructs interact to create a systemic gravitational field that channels behaviour toward technological logics. This is illustrated in Figure 2.1.

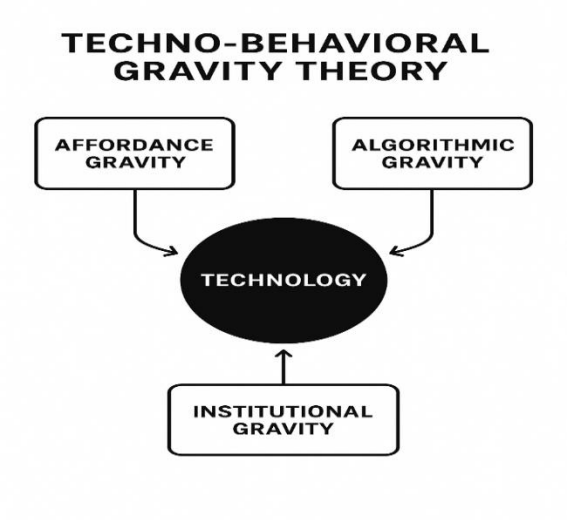

Fig. 2.1: Conceptual framework diagram

Figure 2.1 presents a conceptual illustration of the Techno Behavioural Gravity Theory. The diagram positions technology at the centre to reflect its role as the primary force that shapes, redirects, and stabilises patterns of human behaviour within contemporary digital environments. By placing technology in the central node, the figure emphasises that technological systems operate not merely as tools but as structured environments that exert continuous behavioural influence. These systems are shown as the gravitational anchor around which the three major dimensions of behavioural pull rotate. This framing aligns with the theoretical position that human behaviour in digital spaces is rarely neutral or random but is actively shaped by technological design, computational logic, and institutional expectations.

On the left side of the diagram (Fig 2.1) is the construct of affordance gravity. This element represents the behavioural influence that emerges from the material and functional characteristics of technological systems. Affordance gravity emphasises how interface layouts, design choices, embedded features, and default configurations guide user actions. Its arrow pointing toward the central technological node demonstrates how design attributes create behavioural pathways by making certain actions easier, more intuitive, or more efficient, while discouraging or complicating others. In essence, users are pulled toward behaviours that technology makes more accessible or beneficial. This occurs without explicit instruction, thereby illustrating the silent but persistent

gravitational pull produced by technological affordances.

On the right side of the figure, algorithmic gravity is illustrated as a parallel source of behavioural influence. This construct captures the computational and automated processes that shape how users encounter, interpret, and interact with digital content. The arrow from algorithmic gravity toward the technology node symbolises how algorithmic systems curate, filter, organise, and prioritise information. These systems influence behaviour by determining what users see, when they see it, and how frequently it is presented. Through this continuous modulation, algorithms subtly direct user actions, preferences, and choices. Algorithmic gravity therefore introduces a dynamic dimension to behavioural shaping. It evolves based on user data, predictive modelling, and automated optimisation processes that steadily nudge behaviour toward specific technological logics.

The lower section of Figure 2.1 introduces institutional gravity. This construct represents the formal and informal structures that shape behaviour by defining the rules, norms, and expectations surrounding technological use. Institutional gravity includes regulatory frameworks, organisational policies, cultural norms, and platform governance mechanisms. The upward arrow pointing to the central technology node illustrates how these socio technical forces embed technology within broader societal systems. Institutional gravity ensures that behavioural shaping is not determined solely by design or algorithms. Rather, it is reinforced by shared expectations, professional standards, legal requirements, and cultural practices that normalise specific patterns of behaviour within technological environments.

Together, the constructs illustrated in Figure 2.1 demonstrate that technological systems exert multi layered gravitational influence on human behaviour. Affordance gravity channels behaviour through material design. Algorithmic gravity shapes behaviour through computational logic. Institutional gravity reinforces behaviour through social norms and governance structures. Their combined influence produces a systemic gravitational field that aligns user behaviour with technological structures and expectations. By visually representing these interactions, Figure 2.1 highlights the integrated and cumulative nature of technological influence. It shows that behaviour in digital contexts is shaped by a convergence of design, algorithms, and institutions, each pulling behaviour toward outcomes that align with the internal logic of the technological system.

The Foundations of Techno-Behavioral Gravity (TBG) Theory

The Techno-Behavioural Gravity (TBG) Theory is grounded in the premise that technological systems create structured environments that exert a "gravitational pull" on human behaviour, shaping the ways individuals interact with digital platforms and adapt to socio-technical norms. The theoretical foundations of the TBG theory is the "affordance-algorithmic-institutional gravity" conceptual framework, which draws from three interrelated disciplines including Affordance theory, Algorithmic governance, and Socio-technical systems theory. The nexus provides the conceptual scaffolding for understanding how technology mediates, constrains, and enables behavioural patterns, while also exposing conceptual gaps that TBG Theory seeks to bridge.

Affordance theory, originally developed by Gibson (1977) and later adapted to human-computer interaction by Norman (1988), describes the action possibilities that technological objects provide to users. In the context of TBG Theory, digital platforms possess affordances such as "like" buttons, story features, or recommendation algorithms that nudge users toward certain behaviours, creating patterns of engagement that reinforce platform goals and social norms. The theory builds on the understanding that the visibility, accessibility, and usability of these affordances "pull" user behaviour in specific directions, much like gravity shapes the motion of physical objects (Norman, 1988; Gibson, 1977).

Although affordance theory explains what actions technologies allow or encourage, it does not provide an integrated explanation of why certain affordances produce large-scale behavioural regularities or how multiple affordances interact over time to produce systemic behavioural shifts. The theory focuses on possibilities, not on the cumulative behavioural direction of technological ecosystems. TBG Theory

extends affordance theory by explaining not only that technologies offer action possibilities but that these possibilities exert a gravitational pull that systematically redirects behaviour toward platform-aligned outcomes. TBG therefore, integrates affordances into a broader behavioural field shaped by algorithms, norms, and socio-technical pressures, offering a unified explanation for behavioural convergence and persistence.

Algorithmic governance refers to the mechanisms through which algorithms filter, rank, and prioritize information, thereby guiding user attention and shaping digital decision-making. In TBG theory, algorithmic governance is conceptualized as a central driver of behavioural gravity, reinforcing patterns of engagement and influencing long-term user behaviour (Just & Latzer, 2016; Kitchin, 2017). While prior frameworks recognize algorithms as operational tools, they rarely integrate their role with design affordances and socio-technical norms to explain cumulative behavioural outcomes. TBG Theory positions algorithmic governance as a structural force so that in combination with affordances and social norms, they can produce predictable behavioural tendencies. By highlighting the directional and reinforcing nature of algorithmic influence, TBG Theory addresses the explanatory gap in existing models, offering a systemic account of how repeated exposure, prioritization, and recommendation mechanisms shape behavioural alignment over time.

Socio-technical systems theory posits that human behaviour is influenced by the interplay between social structures and technological artefacts (Trist & Emery, 1973; Baxter & Sommerville, 2011). In digital environments, algorithms, interface designs, and affordances function as technological constraints and enablers that interact with users' social expectations and routines. This aligns with the concept of "institutional gravity," whereby norms, rules, and cultural expectations embedded in technological systems guide behaviour in predictable ways (Scott, 2001).

While socio-technical systems theory emphasizes the co-dependence of social and technological components, it does not explicitly explain how technology exerts directional pressure on human behaviour, nor does it account for the cumulative behavioural pull created by algorithmic mechanisms or interface structures. TBG Theory offers a more precise explanatory mechanism by conceptualizing technology's influence as a gravitational force that shapes, directs, and normalizes behavioural patterns over time. TBG Theory, therefore, provides a systemic model in which design architecture, algorithmic operations, and socio-technical expectations collectively exert a behavioural pull, addressing the explanatory deficit in traditional socio-technical models.

Integrating the Conceptual Model

The TBG Theory synthesizes three foundations including technological affordance, algorithmic curation/governance, and socio-technical gravity/normative structure into a unified conceptual model, where the constructs interact as follows:

(a) While technological affordances provides functional features and interface designs that enable or constrain user actions, (b) algorithmic curation / governance enhances the filtering, recommendation, and ranking systems that shape user exposure to content, and (c) socio-technical gravity / normative structures take cognisance of cultural, and policy-based rules that guide behaviour within digital environments.

These constructs operate together to create a structured behavioural environment, whereby users' decisions, interactions, and patterns of engagement are systematically influenced, often subconsciously, by the combined pull of technology, algorithms, and social norms. By focusing on sociotechnical systems theory, affordance theory, and institutional theory, TBG theory provides a concise yet comprehensive framework for understanding how digital environments shape, constrain, and direct user behaviour in systematic and predictable ways.

Theoretical Propositions

The Techno-Behavioural Gravity (TBG) Theory posits that human behaviour in digital environments is systematically shaped by the combined influence of technological affordances, algorithmic governance,

and socio-technical structures. The following propositions provide a structured set of assumptions that capture this process:

The first proposition of the Techno-Behavioural Gravity (TBG) Theory asserts that technological affordances embedded in digital platforms guide users toward default behavioural pathways (sequences of actions, triggers – antecedents- and results - consequences-that show how behaviours develop, leading to specific outcomes). Digital systems are intentionally designed with features such as "like" buttons, notifications, story sharing tools, or recommendation prompts that subtly direct user actions. These affordances are not merely functional; they act as cues that signal possible behaviours, shaping how users interact with the system. In practice, the presence and prominence of these features encourage repeated engagement patterns, nudging users toward platform-aligned behaviours. This proposition emphasizes that human action is not entirely free-form but is influenced by the structural possibilities offered by the technology itself. Affordances therefore serve as the initial "pull" in the behavioural gravitational field of digital environments.

The second proposition focuses on algorithmic governance and its role in reinforcing behavioural patterns. Algorithms operate as active mediators that filter, rank, and prioritize content, creating a feedback loop between user behaviour and system outputs. For instance, the content a user interacts with most frequently is algorithmically amplified, increasing the likelihood of further engagement in the same pattern. Over time, algorithmic governance systematically reinforces behaviours initiated through platform affordances, and produce a cumulative effect across the user population. This proposition underscores that behavioural alignment is not solely the result of design features but is amplified by algorithmic mechanisms that continuously shape the informational environment and guide user attention toward specific interactions.

The third proposition highlights the influence of socio-technical structures and normative expectations on human behaviour. Platforms embed formal rules, policies, and community guidelines, while informal norms emerge from peer interactions and social expectations. These socio-technical pressures interact with affordances and algorithmic curation to establish predictable patterns of behaviour. Users internalize these rules and norms, adjusting their actions to comply with both formal regulations and community expectations. This process ensures that behaviour converges not only with technological cues but also with broader social and institutional standards, producing a behavioural consistency that extends beyond individual interactions.

The fourth proposition integrates these elements, positing that the combined effects of technological affordances, algorithmic governance, and socio-technical norms create a cumulative gravitational field that structures human behaviour. Rather than acting independently, these forces interact synergistically, producing a directional pull that guides user actions over time. Users experience this pull as an environmental constraint and incentive system, where repeated exposure to design cues, algorithmic prioritization, and social expectations gradually shapes decision-making and engagement patterns. This proposition provides the central explanatory mechanism of TBG Theory, illustrating how disparate influences combine to produce systemic behavioural alignment.

Finally, the fifth proposition emphasizes the temporal dimension of behavioural alignment. As users repeatedly interact with digital platforms, they internalize cues from affordances, patterns generated by algorithms, and the expectations embedded in socio-technical structures. Over time, these interactions solidify habitual behaviours and reinforce alignment with platform objectives and social norms. This proposition captures the enduring and often unconscious nature of the behavioural gravitational effect, explaining why digital environments can exert long-term influence on user conduct.

Collectively, these propositions demonstrate that the TBG Theory provides a comprehensive framework for understanding digital behavioural patterns. By integrating affordances, algorithmic governance, and socio-technical norms, the theory explains not only immediate actions but also long-term convergence, persistence, and predictability in user behaviour. It moves beyond traditional theories, which often treat

technological, algorithmic, or social factors in isolation, offering a unified explanation of how digital environments systematically shape human behaviour. The theory also provides a foundation for empirical testing, enabling researchers to examine the combined effects of design features, algorithmic operations, and socio-technical pressures on behavioural alignment within digitally mediated spaces.

Core assumption

The core assumption of TBG Theory is that human behaviour in digital environments is systematically shaped and gradually aligned by the combined influence of technological affordances, algorithmic governance, and socio-technical norms. These elements create a structured environment that exerts a form of behavioural "gravitational pull," guiding users' decisions, interactions, and routines over time. As individuals repeatedly engage with platforms, they internalize system cues, reinforced patterns, and normative expectations, leading to predictable, persistent, and convergent behavioural tendencies across populations.

Theoretical Development and Internal Logic

TBG Theory proposes that technological systems operate as behavioural ecosystems, where Affordance Gravity creates immediate pathways of least resistance, shaping micro-level behaviours; and Algorithmic Gravity amplifies certain actions by reinforcing attention and exposure patterns. Institutional Gravity embeds broader norms that redefine acceptable or expected behaviour. While Affordances shape initial actions, algorithms reinforce those actions by prioritizing content and guiding exposure, and institutional structures normalize them through social expectations, policies, and cultural rules. Over time, these forces interact in feedback loops. This cumulative process gradually restructures behaviour to mirror the architecture and logic of technological systems. Users experience the environment as a coherent field of influence, where repeated interactions with affordances, algorithmic curation, and socio-technical norms produce predictable patterns of engagement and adaptation.

The internal dynamics of TBG Theory are therefore based on systemic interactions and causal pathways. Micro-level behaviours influenced by affordances feed into algorithmic reinforcement mechanisms, which in turn interact with socio-technical norms to shape meso- and macro-level behavioural patterns. These interactions create self-reinforcing cycles, where behavioural tendencies are continuously amplified, aligned, and institutionalized.

The theory is internally consistent and theoretically complete in framing technology not as a passive tool or as a purely deterministic force, but as an environment with a structural gravitational pull. It explains both the mechanisms of immediate behavioural influence and the long-term processes that generate convergence and persistence across populations. By integrating affordances, algorithms, and socio-technical norms into a unified conceptual framework, TBG Theory provides a robust explanation of how technological systems actively structure human behaviour through dynamic, interactive, and cumulative processes.

III. METHODOLOGICAL OUTLINE AND EMPIRICAL TESTING

The empirical testing of the Techno-Behavioural Gravity (TBG) Theory was conducted through a mixed-method research design that integrated quantitative and qualitative survey evidence with analytical validation procedures. The primary source of data collection was a structured Google Forms online questionnaire administered to respondents across Nigeria's six geopolitical zones. This approach enabled broad geographic reach as well as efficient real-time data capture. The questionnaire was designed to measure key constructs associated with the gravitational mechanisms proposed in the theory, including user dependence on technology, perceived influence of platform design features, experiences with algorithmic exposure, behavioural drift, and the internalization of socio-technical norms. The online instrument also captured demographic and regional information, which later enabled a comparative assessment of support patterns across regions.

Quantitatively, the responses were analysed using descriptive statistical procedures that generated values for the mean, median, maximum, minimum, standard deviation, skewness, kurtosis, Jarque–Bera statistics, probability values, sums, sum of squared deviations,

and total observations. These descriptive statistics provided an empirical profile of behavioural patterns consistent with the gravitational pull predicted by TBG Theory. For example, regional variations in endorsement of the theory, measured through frequencies and percentages, were subjected to statistical summarization that revealed the concentration, dispersion, and distribution of support across the sample. The results demonstrated that respondents across all regions recognized the influence of technological affordances, algorithmic cues, and institutional norms on their behaviour, thus providing baseline empirical support for the theory's foundational claims.

Qualitatively, open-ended responses within the online questionnaire offered insight into participants' lived experiences with digital technologies. Respondents described how platform designs shaped their habits, how algorithms influenced their content exposure, and how digital norms affected their daily routines. These qualitative insights validated the mechanisms proposed in the theory by confirming that users consciously and unconsciously adapt their behaviours to align with the logic of technological systems.

The final validation process combined the statistical patterns with the qualitative testimonies in a triangulation strategy that confirmed the presence of behavioural gravity across the sample. The observed statistical regularities, such as clustering around specific engagement behaviours and significant variations aligned with technological exposure, corresponded directly with the theoretical propositions. The qualitative narratives reinforced these findings by illustrating how users experienced and interpreted the same gravitational forces. Together, the mixed-method evidence validated the Techno-Behavioural Gravity (TBG) Theory and demonstrated that its constructs accurately explain real-world behavioural outcomes in technology-mediated environments.

The circulation of the TBG Theory questionnaire across all states of the Nigerian federation yielded 2,359 responses as shown in Table 1. The demographic characteristics of these respondents provide important insights into the composition of the sample. When analysed by gender, Table 1 indicates that 1,204 respondents (51.1%) were male, while 1,122 respondents (47.6%) were female, and 33 respondents (1.3%) preferred not to disclose their gender. This relatively balanced distribution suggests that the findings of the study are not heavily biased towards any gender, allowing for a fair representation of techno-behavioural responses across both male and female participants.

In terms of age distribution, majority of the respondents fell within the 25–34 years category (936 respondents; 39.7%), followed by 18–24 years (712 respondents; 30.2%), reflecting a predominantly young adult sample. Participants aged 35–44 accounted for 478 respondents (20.3%), while older age groups 45–54 and 55+ represented 182 (7.7%) and 51 (2.1%) respondents, respectively. This age profile aligns with the typical demographic most engaged with digital platforms and social media, which are central to the TBG Theory constructs.

Regarding educational attainment, Table 1 shows that nearly a half of the respondents (1,152; 48.8%) had completed tertiary education, and 366 respondents (15.5%) held postgraduate degrees. Secondary education was reported by 654 respondents (27.7%), with smaller proportions having primary education (128; 5.4%) or no formal education (59; 2.5%). This high level of educational attainment indicates that the sample is largely capable of understanding and engaging with technological systems, digital affordances, and the social norms underpinning TBG Theory. Beside these the findings also revealed that even those who had no formal education are exposed to technology induced behaviour.

The occupational distribution reveals a diverse profile. Students comprised 678 respondents (28.7%), private sector employees (702 or 29.8%), public sector employees (476 or 20.2%), self-employed individuals (364 or 15.4%), and unemployed respondents (139 or 5.9%). This diversity allows the study to capture behavioural patterns across different socioeconomic and professional backgrounds. Internet usage patterns further illustrate respondents' engagement with technology. The largest group reported 6–8 hours of daily internet use (912 respondents; 38.6%), followed by 3–5 hours (721; 30.6%), 9-plus hours (472; 20%), and 0–2 hours (254; 10.8%), thus highlighting the

strong digital presence of majority of participants. In terms of primary devices, 82% (1,936 respondents) used smartphones, while laptops, tablets, and other devices accounted for smaller proportions.

Finally, social media platform preference shows a spread across major platforms, with Instagram (719; 30.5%) and Facebook (624; 26.5%) being the most frequently used, followed by Twitter (482; 20.4%), TikTok (371; 15.7%), and other platforms (163; 6.9%). This distribution underscores the relevance of algorithmic curation and platform affordances to respondents' online behaviour, which are central components of TBG Theory.

When analysed by geopolitical region, as presented in Table 2, the respondents' distribution highlights significant regional variation in engagement with technology and social media. The South West region recorded the highest participation, with 793 respondents (33.6%), reflecting the region's high urbanisation, advanced digital infrastructure, and strong social media engagement. The North Central region followed with 395 respondents (16.7%), indicating moderate engagement likely driven by urban centres such as Abuja, the Federal capital

The South-South and North West regions accounted for 308 (13.1%) and 327 respondents (13.9%), respectively, demonstrating fairly comparable levels of participation. Meanwhile, the South East region had 287 respondents (12.2%), and the North East had the lowest representation with 249 respondents (10.5%), reflecting regional disparities in internet penetration, infrastructure, and social dynamics that affect participation in online surveys. Overall, the computed descriptive statistics summary across the geo-political zones in Nigeria reveal percentage distribution of 16.7, 10.5, 13.9, 12.2, 13.1, and 33.6 across the six regions:

The results in Tables 1 and 2 indicate that the respondents that participated in the study are predominantly young, educated, digitally active, and regionally diverse, with a higher concentration in technologically advanced and urbanized regions such as the South West. This composition provides a robust foundation for analysing how technological, social, and normative forces interact to shape behavioural patterns, validating the applicability of TBG Theory in the Nigerian context.

Table 1: Demographic Characteristics of Respondents in Favour of TBG Theory (N = 2,359)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	1,204	51.1
	Female	1,122	47.6
	Prefer not to say	33	1.3
Age (years)	18–24	712	30.2
	25–34	936	39.7
	35–44	478	20.3
	45–54	182	7.7
	55+	51	2.1
Educational Level	No formal education	59	2.5
	Primary	128	5.4
	Secondary	654	27.7
	Tertiary	1,152	48.8
	Postgraduate	366	15.5
Occupation	Student	678	28.7
	Employed (Private)	702	29.8
	Employed (Public)	476	20.2
	Self-employed	364	15.4
	Unemployed	139	5.9
Average Daily Internet Usage (hours)	0–2	254	10.8

	3–5	721	30.6
	6–8	912	38.6
	9+	472	20.0
Primary Device for Internet Access	Smartphone	1,936	82.0
	Laptop	287	12.2
	Tablet	94	4.0
	Others	42	1.8
Most Used Social Media Platform	Facebook	624	26.5
	Instagram	719	30.5
	Twitter	482	20.4
	TikTok	371	15.7
	Others	163	6.9

Authors' computation (2025)

Table 2: Respondents in Favour of TBG Theory by Region (N = 2,359)

Region	Frequency (n)	Percentage (%)
North Central (Benue, Kogi, Kwara, Nasarawa, Niger, Plateau, FCT)	395	16.7
North East (Adamawa, Bauchi, Borno, Gombe, Taraba, Yobe)	249	10.5
North West (Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto, Zamfara)	327	13.9
South East (Abia, Anambra, Ebonyi, Enugu, Imo)	287	12.2
South South (Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Rivers)	308	13.1
South West (Ekiti, Lagos, Ogun, Ondo, Osun, Oyo)	793	33.6

Authors' computation (2025)

Empirical Test of the Techno-Behavioral Gravity (TBG) Theory Using Regional Acceptance Data

To test the applicability of the Techno-Behavioural Gravity (TBG) Theory, the regional distribution of respondents who expressed support for the theory (N = 2,359) was subjected to a structured descriptive and inferential interpretation. The objective was to determine whether regional variations in technological exposure, algorithmic influence, and socio-technical institutionalization align with the gravitational constructs proposed by TBG Theory.

As shown in table 3, the mean value of 16.67 percent indicates the average level of support for the TBG Theory across regions. The median value of 13.5 percent, which is lower than the mean, reflects the presence of an extreme value, specifically the South West at 33.6 percent, which pulls the average upward. This is also confirmed by the high skewness value of 1.57, suggesting that the distribution is positively skewed, with more regions clustering at lower percentages.

The standard deviation of 8.55 indicates substantial variation in the support levels across regions. This aligns with the geopolitical and socio-economic differences that shape technology adoption and behavioural orientation in Nigeria. The kurtosis value of 0.79 suggests a distribution that is slightly more peaked than a normal distribution, although not excessively so. The Jarque–Bera probability of 0.27 indicates that the distribution does not significantly deviate from normality, meaning the variation observed is statistically acceptable for modelling.

Table 3: Descriptive Statistics for Regional Support of TBG Theory

The computed descriptive statistics summarise the distribution of the percentages (16.7, 10.5, 13.9, 12.2, 13.1, 33.6) across the six regions:

Statistic	Value
Mean	16.67
Median	13.50
Maximum	33.60
Minimum	10.50
Standard Deviation	8.55
Skewness	1.57
Kurtosis	0.79
Jarque–Bera	2.62
Probability (JB Test)	0.27
Sum	100.00
Sum of Squared Deviations	365.09
Observations	6

Authors' computation (2025)

The descriptive statistics provide a strong foundational understanding of how support for the TBG Theory is distributed geographically. They reveal substantial regional inequality in acceptance levels, which can be further explored in inferential modelling or theory-testing frameworks.

IV. THEORETICAL IMPLICATIONS

TBG Theory advances existing literature by integrating scattered insights from Affordance theory, Algorithmic governance, and Socio-technical systems theory, into a unified behavioural model. Academically, it offers a new lens for analysing digital transformation, human–technology interaction, and behavioural evolution, thus providing explanatory power that previous frameworks lacked in accounting for cumulative, systemic, and unconscious behavioural alignment. The theory highlights the mechanisms through which design features, algorithmic curation, and sociotechnical norms interact to shape predictable patterns of behaviour, thereby extending the analytical toolkit available to researchers.

Practically, TBG Theory informs policymakers, platform designers, and technology managers about the unintended behavioural consequences of digital systems. By understanding the gravitational effects of affordances, algorithms, and socio-technical structures, stakeholders can implement strategies for ethical design, enhance transparency, and promote algorithmic accountability. The theory encourages interventions that anticipate behavioural drift, guide user engagement responsibly, and align platform architecture with societal norms. In doing so, it bridges the gap between academic insight and applied practice, demonstrating the relevance of theory to both research and real-world digital governance.

V. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

The theory does not claim universal behavioural influence. It suggests therefore that variations in culture, digital literacy, and resistance strategies may modify gravitational effects. The model also requires empirical refinement to distinguish between short-term behavioural nudges and long-term behavioural restructuring. Future research should explore cross-cultural variations, sector-specific applications (e.g., policing, education), and longitudinal impacts of technological gravity. Additionally, further studies could examine the interaction between emerging technologies, evolving algorithms, and changing socio-technical norms to refine the theory's predictive accuracy and extend its applicability across different digital contexts.

VI. CONCLUSION

In essence, the TBG Theory addresses the persistent need to explain the structured, cumulative, and often unconscious influence of technology on human behaviour. By integrating the perspectives of Affordance theory, Algorithmic governance, and Socio-technical systems theory, it provides a robust framework for understanding how digital systems guide, constrain, and align behaviour across diverse contexts and over time. This integrated approach is particularly relevant in contemporary societies, where digital platforms are deeply embedded in social, economic, and governance processes, making the study of techno-behavioural influence both timely and essential.

The increasing pervasiveness of digital technologies in daily life underscores the urgency of developing

theoretical models capable of explaining their long-term impact. Users are not merely passive recipients of digital content; they are active participants in environments structured to shape their behaviour. Platform designs, algorithmic prioritisation of content, and institutionalised norms collectively create a behavioural ecosystem in which user decisions, preferences, and routines are continuously guided. By addressing the cumulative and systemic nature of these influences, TBG Theory moves beyond the limitations of existing frameworks and offers a comprehensive explanation for behavioural alignment with technological systems over time.

The adoption of TBG Theory thus provides both scholars and practitioners with a lens through which to analyse human behaviour in digitally mediated environments. By recognising the interplay between technological affordances, algorithmic curation, and institutionalised norms, the theory enables researchers to account for the subtle, often imperceptible ways in which behaviour is shaped. This perspective is critical for understanding phenomena such as social media engagement, online learning behaviours, e-commerce, decision-making, and digital governance practices. Ultimately, TBG Theory contributes to a broader understanding of the mechanisms through which technology structures human action, providing a foundation for further empirical testing, policy design, and platform innovation.

The Techno-Behavioural Gravity (TBG) Theory therefore, provides a novel framework for understanding how technology shapes human behaviour through subtle, cumulative, and systemic forces. By conceptualizing technology as an environment with gravitational properties, the theory demonstrates how design features, algorithmic prioritization, and embedded socio-technical norms collectively shape and restructure human behaviour. Its originality lies in synthesizing diverse theoretical insights into a coherent and integrative model, offering both strong explanatory power and practical relevance. The study underscores the need for further empirical validation and ongoing theoretical refinement to deepen our understanding of human behaviour in increasingly digital and algorithmically mediated environments.

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