

Specifics of the application of quadratic methodology for the study of social communication processes

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Abstract

Aim. The article substantiates the distinctive features of applying quadratic methodology as a synergistic combination of interpreted holism, quantum journalism, the theory of social inmutation, and the category of inmutational handicap for the multidimensional analysis of social communication processes.

Methods. The study employs theoretical analysis and the conceptual integration of four approaches. The procedure involves the sequential, parallel, or cyclical application of four analytical lenses to communication objects, followed by the synthesis of results. For operationalisation, provisional indicators of a conditional unit – the “holistic impact index / HI, Holistic Impact Index” – and network analysis of integrity are proposed. The numerical HI indicators are expert-illustrative and require empirical verification.

Results. A four-stage model/algorithm of synergistic analysis has been developed: (1) reconstruction of the holistic picture of the communication object; (2) quantum analysis of informational influence (superposition of meanings and the observer effect); (3) identification of the mechanisms of persistent negative changes (inmutation); (4) assessment of the cost and reliability of the communication signal (inmutation handicap). The model is illustrated using eight interrelated cases of information confrontation (2022–2026, drawn from open sources), covering public addresses by leaders, deepfakes, election campaigns, interstate tensions and large-scale influence operations (Doppelgänger, Matryoshka, AI-generated content in the elections in India, Romania and Moldova, the Israel–Iran war, etc.).

Conclusions. The integration of the four approaches enables a multidimensional investigation of the mechanisms, resilience and transformative potential of social communications. The model has practical value for the analysis of disinformation, deepfakes and information-psychological operations, as well as for the development of communication security strategies. Limitations include the predominantly theoretical nature of the model and the need for empirical verification of the indicators. Prospects lie in the refinement of metrics, the application of network analysis and the testing of the model on an expanded set of cases.

Introduction

Contemporary processes of social communication unfold under conditions of profound mediatization, information overload, a crisis of trust in signals, the mass dissemination of fakes, deepfakes and simulacra, as well as ‘signal wars’. Traditional linear, structuralist or purely quantitative/qualitative methods frequently prove inadequate for analysing the non-linearity, integrity, uncertainty and transformational (including negative) effects of communication. The principal problem lies in the absence of a unified integrated methodological toolkit capable of simultaneously encompassing the purposefulness of communication systems, the quantum aspects of uncertainty and observation, the mechanisms of negative transformations, and the signal ‘cost’ of communication.

Analysis of Previous Research and Publications

Contemporary research into social communication is increasingly integrating interdisciplinary approaches. Among the most promising directions are quantum metaphors and models in communication theory, evolutionary-biological theories (notably costly signalling), empirical studies of the impact of disinformation and deepfakes, and psychophysiological methods for measuring the emotive and cognitive effects of media content.

1. Quantum approaches in communication theory and media.

Christian Aspalter (Aspalter, 2024) formulates a metatheory of human interaction in which ‘entanglements’ function as causal forces. Jack Myers (Myers, 2025) develops quantum media theory as an extension of the media ecology of McLuhan and Postman, emphasising superposition, entanglement and the probabilistic flow of information in the age of AI. A. Bhadra (Bhadra, 2024) applies superposition, entanglement, the Heisenberg principle and decoherence to multimodal media messages. The majority of such works remain at the level of metaphors and conceptual models, yet they open heuristic possibilities for analysing uncertainty, the multiplicity of meaning and the act of influence upon the ‘collapse’ of interpretation. At the same time, these approaches inadequately capture the mechanisms of irreversible negative transformations of public consciousness.

2. Theories of signals and the handicap principle (costly signalling).

The classical handicap theory of A. Zahavi (Zahavi, 1975) and its mathematical formalisation by A. Grafen (Grafen, 1990) assert that the reliability of a signal is ensured by its high cost to the sender. In the social sciences the theory is employed to explain status practices, diplomacy and strategic interaction. Recent reviews (Számádó, Czégel, & Zachar, 2019; Penn, & Számádó, 2020; Számádó, Samu, & Takács, 2022; Számádó, Zachar, Czégel, & Penn, 2023; Számádó, Zachar, & Penn, 2026) clarify that not all honest signals are necessarily ‘costly’ in equilibrium; nevertheless, the concept remains a powerful instrument for analysing ‘cheap’ signals (anonymous fakes, deepfakes). Classical theory largely fails to take account of the ontological indivisibility of communication systems and the quantum aspects of meaning-making.

3. Research into the impact of disinformation and deepfakes.

Meta-analyses by the International Panel on the Information Environment (2026) establish that text-based generative disinformation is perceived as increasingly credible over time, whereas attitudes towards visual deepfakes become more sceptical. Corrective information produces a small-to-moderate effect, while general warnings sometimes generate a ‘liar’s dividend’. The crisis of trust in institutions and the media is regarded as a structural problem, exacerbated by platform business models and generative AI (Chesterman, 2026). Empirical studies are frequently limited to unidimensional metrics of reach or engagement.

The author’s own developments (Kholod, 2011–2026) encompass socio-communication engineering, the theory of societal inmutation, quantum journalism, interpreted holism and the category of the inmutational handicap. Nevertheless, a comprehensive synergistic integration of the four aforementioned approaches into a single ‘quadratic methodology’ remains a methodological lacuna.

Thus, despite progress in each of these directions, the scholarly discourse does not offer models capable of simultaneously: (1) treating communication as an irreducible whole; (2) integrating the quantum principles of uncertainty, superposition and the influence of observation; (3) capturing the mechanisms of negative irreversible transformations; and (4) assessing the ‘cost’ and reliability of signals. The absence of such an integrated methodology constitutes a lacuna, the filling of which opens new heuristic horizons.

The aim of the study lies in substantiating the specificity of applying quadratic methodology as a synergistic combination of four approaches for the multidimensional, purposeful analysis of social communication processes.

To achieve this aim it is necessary to define the content of quadratic methodology, to characterise each of its four components (with compact operational definitions), to substantiate the procedures for their joint application, to illustrate the application through concrete cases (based on open sources), and to outline the heuristic potential, limitations and prospects.

The object of the research is the processes of social communication, while the subject is the specificity of applying quadratic methodology to their study.

Research Methods and Procedures

By “quadratic methodology” we understand the synergistic combination of interpreted holism (Kholod, 2022), quantum journalism (Kholod, 2021–2025), the theory of societal inmutation (Kholod, 2011) and the category of inmutational handicap (Kholod, 2026). Operational definitions of key concepts:

- Interpreted holism – a transformed version of Smuts’ classical holism (Smuts, 1926), according to which the communication object is regarded as an ontologically indivisible system; the whol is not reducible to the sum of its parts and is not amenable to mechanical dissection without loss of meaning. Operationally: the quality of interpretation of a part is substantially lower than the quality of interpretation of the whol (indivisibility index).

- Quantum journalism – the adaptation of the principles of superposition, Heisenberg’s uncertainty principle, the observer effect and entanglement to the analysis of communication processes. Operationally: the recording of multiple competing interpretations until the moment of “collapse”, together with the measurement of changes in engagement metrics following the act of observation/verification.

- Theory of inmutation – the process of introducing irreversible (or highly persistent) negative changes into behavioural models and into the epistemic and axiological structures of the individual and of society. Operationally: the retention of deformed meanings/values across repeated measurements, accompanied by the decline of institutions/sources.

- Inmutational handicap – a synthetic concept that combines the idea of irreversible negative transformation with the mechanism of costly signalling. Operationally: the relative cost of the signal (the sender’s costs + risks / ease of falsification) correlates with its resistance to refutation.

The application of the four elements together produces a synergistic effect. The procedure consists in the sequential, parallel or cyclic overlaying of the four optics onto a single communication process, followed by the synthesis of the results.

Meaning and procedure for applying the unit “Hol-Index” (Holistic Impact Index, HI).

For the quantitative operational measurement of the intensity of the impact of communication processes within the quadratic methodology, we propose a composite unit of measurement – the Hol-Index (Holistic Impact Index, HI). This unit integrates the results obtained from the application of the four analytical optics and enables a transition from qualitative description to comparative (illustrative) quantitative-qualitative analysis of different communication acts and operations.

Meaning of the Hol-Index (HI)

The HI is a multidimensional indicator of the strength/intensity of the impact of a communication object, which simultaneously reflects:

- the ontological indivisibility of the phenomenon (wholness);
- the level of uncertainty and the effect of the act of observation (quantum dimension);
- the depth and persistence of negative transformations (inmutation);
- the relative “cost” and reliability of the signal (inmutational handicap).

Unlike one-dimensional metrics of reach or engagement, the HI captures the synergistic effect of the four approaches and enables communication acts of different natures to be compared on a single scale.

Formula for calculation

The basic additive model of the Hol-Index takes the form:

$$HI = w_1 \cdot H + w_2 \cdot Q + w_3 \cdot I + w_4 \cdot C \quad (1)$$

where:

- (H) – integrity indicator (stage 1);
- (Q) – quantum indicator (stage 2);
- (I) – inmutation index (stage 3);
- (C) – cost/reliability of signal index (stage 4, Costly/Handicap);
- (w_1, w_2, w_3, w_4) – weighting coefficients ($\sum w_i = 1$), which are determined either by expert judgement (Analytic Hierarchy Process – AHP) or empirically (on the basis of correlations with real impact effects).

In this article, agreed weights have been used for the illustrative calculations:

$$0.25 + 0.25 + 0.30 + 0.20 = 1.00$$

(with an emphasis on persistent negative transformations while preserving the balance of the four optics).

These weights are preliminary; repeated AHP procedures involving other groups of experts are provided in order to verify their robustness.

Each component is normalised to the interval [0; 1] (or [0; 10] for ease of interpretation). Where necessary, a multiplicative modification of the model may be adopted. Operational indicators of the components (preliminary).

Stage 1. Integrity (H).

$$H = D \times (1 - R) \quad (2)$$

where:

- (D) – connectivity density (semantic/multimodal network density);
- (R) – reducibility index.
- Semantic/multimodal coherence (network density, semantic similarity).
- Indivisibility index: $1 - (\text{quality of interpretation of parts} / \text{quality of interpretation of the whole})$.

Alternatively (as described in the text):

$$H = 1 - \frac{\text{quality of interpretation of the parts}}{\text{quality of interpretation of the whole}} \quad (3)$$

Stage 2. Quantum influence (Q).

- Superposition index (number of competing interpretations or Shannon entropy).
- Observer effect (change in engagement metrics after dissemination/verification).

$$Q = \gamma \cdot S_{sup} + \delta \cdot \Delta_{obs} \quad (4)$$

- S_{sup} — superposition index (the number of competing interpretations or Shannon entropy);
- Δ_{obs} — observer effect (change in engagement metrics after dissemination/verification).
- $\gamma + \delta = 1$ — standard weighting coefficients (similar to w_1, w_2, w_3, w_4 in the Hol-Index formula) that normalise the contribution of the two components of the quantum indicator. Their sum equals 1 so that Q remains within the range [0; 1] (or [0; 10]).

The coefficients γ and δ are preliminary/expert-based and require empirical calibration.

Stage 3. Inmutation (I).

- Persistence of negative changes (retention of distorted meanings over 1–6 months).
- Epistemic deformation (change in trust levels).

$$I = \varepsilon \cdot P + \zeta \cdot E \quad (5)$$

where:

- P – indicator of resilience to negative changes (persistence of distorted meanings), $P \in [0; 1]$;
- E – indicator of epistemic deformation (change in the level of trust) $E \in [0; 1]$;
- ε, ζ – weighting coefficients ($\varepsilon + \zeta = 1$);
- $I = \varepsilon \cdot \text{persistence} + \dots$ epistemic shift;
- $C = \eta \cdot \text{relative cost} + \theta \cdot \text{reliability}$.

Stage 4. Inmutational handicap / signal cost (C).

- Relative cost: (costs + risks) / ease of falsification.
- Reliability index (correlation between cost and resistance to refutation).

$$C = \eta \cdot C_{rel} + \theta \cdot R_{sig} \quad (6)$$

C_{rel} – relative cost of the signal:

$$C_{rel} = \frac{\text{costs} + \text{risks}}{\text{ease of falsification}} \quad (7)$$

(normalized to [0; 1]);

- R_{sig} – signal reliability index (correlation between cost and resistance to refutation), $R_{sig} \in [0; 1]$;
- $\eta + \theta = 1$ – weighting coefficients.

All coefficients are subject to calibration on pilot data. The indicators are preliminary in nature and require empirical validation (NLP tools, network analysis, longitudinal surveys, inter-expert agreement).

Procedure for applying the Hol-Index.

1. For each case, four components are calculated (qualitatively or quantitatively).
2. The components are normalized.
3. Weight coefficients are applied.
4. The HI is computed.
5. Values are compared, visualized, and correlated with external criteria.

Applying the Hol-Index transforms the quadratic methodology from a predominantly qualitative tool into a hybrid qualitative–quantitative model. The numerical scores in this article are expert-illustrative and serve only for within-model comparisons.

Research Results

The model/algorithm of synergetic analysis comprises four stages, which may operate cyclically, in parallel, or both:

- 1) reconstruction of the holistic picture of the communication object;
- 2) quantum analysis of communication influence;
- 3) identification of mechanisms underlying persistent negative changes (inmutation);
- 4) assessment of signal cost and reliability (inmutational handicap).

The quadratic methodology was applied to fifty interrelated cases of information confrontation from 2022–2026 (based on open sources, investigations, and public data). Each case is examined through four analytical lenses.

Cases of applying the quadratic methodology (1–8).

Case 1. Public Addresses by President of Ukraine V. Zelenskyy to World Parliaments (2022–2025).

Object of analysis: A series of video addresses by President of Ukraine Volodymyr Zelenskyy to parliaments and peoples of the world, initiated from the first days of the full-scale invasion. Each address combines verbal text (calls for support, descriptions of war crimes, the peace formula), visual elements (recordings from a bunker, in camouflage, against the backdrop of destroyed cities or in the presidential office), location (Kyiv under shelling), and immediate audience reaction. These acts were documented via official channels, disseminated on social media, and broadcast by global news outlets, generating global resonance and influencing parliamentary decisions on aid to Ukraine (Office of the President of Ukraine, 2022–2025).

Analysis using the quadratic methodology.

Holistic: An indivisible act (text + visual + location + reaction + resonance).

Quantum: Superposition (symbol of resistance / instrument of mobilization / object of propaganda) + strong observer effect.

Inmutation: Protective functions that block demoralization.

Signal cost: High (physical risk to the speaker) → enhanced reliability.

Case 2. Russian deepfake featuring the “capitulation” of President Zelenskyy and accompanying IPSOs (March 2022).

Object of analysis: a video in which deepfake technology is used to depict Volodymyr Zelenskyy ostensibly calling on Ukrainian military personnel to lay down their arms and surrender. The video was accompanied by cyber-attacks on Ukrainian television channels (the appearance of text on the scrolling news ticker) and its mass dissemination via Telegram channels and Russian social networks. The operation formed part of a broader information-psychological special operation (IPSO) aimed at demoralising the population and the armed forces at a critical juncture in the defence of Kyiv. Rapid official refutation and forensic analysis revealed technical deficiencies (unnatural facial expressions, accent, artefacts) (Pearson, & Zinets, 2022; Meta, 2022).

Analysis according to the quadratic methodology.

Holistic: an element of a systemic operation (video + hack + dissemination).

Quantum: high superposition of interpretations + observer effect.

Inmutatio: an attempt to initiate irreversible negative transformations.

Signal cost: low (anonymity) → rapid loss of persuasive force.

Case 3. Donald Trump’s communication strategies during the 2024 presidential campaign.

Object of analysis: a complex of Donald Trump’s communicative acts during the 2024 campaign, encompassing rallies, social media posts, podcasts, interviews, AI-generated images and responses to legal proceedings. Each act combined verbal messages (“betrayal by the elites”, “we will take America back”), a visual style (aggressive, populist), emotional charge and a legal context (judicial risks). The strategy made extensive use of non-traditional channels (Rogan, TikTok) and constructed a narrative of systemic victimhood while simultaneously positioning him as a strong leader (The New York Times, 2024; Axios, 2024).

Analysis according to the quadratic methodology.

Holistic: the unity of verbal, visual, emotional, legal and political contexts.

Quantum: sharp superposition of meanings + continuous modification by the observer's field.

Inmutatio: consolidation of the “elite betrayal” narratives and deformation of trust in institutions.

Signal cost: high personal cost (judicial/reputational risks).

Case 4. Deepfakes during the Brazilian presidential elections (2022).

Object of analysis: a series of deepfake and shallowfake materials that circulated during the 2022 presidential elections in Brazil. Videos and audio featuring forged faces and voices of the candidates (Lula da Silva, Bolsonaro) and journalists were disseminated primarily via WhatsApp, TikTok and Twitter. The materials were used both to discredit opponents and to create an illusion of support. The operations were closely linked to platform algorithms and network dissemination, undermining trust in the electoral process and in official sources of information (VEJA, 2022; Carter Center, 2022).

Analysis according to the quadratic methodology.

Holistic: linkage to network dissemination and algorithms.

Quantum: superposition of “truth / fake”.

Inmutatio: undermining of trust in the electoral process.

Signal cost: low + ease of refutation → low long-term resilience.

Case 5. Mass deployment of AI voice clones and deepfakes during the Indian general elections (2024).

Object of analysis: the mass use of AI voice clones of politicians and personalised telephone calls during the 2024 general elections in India. Parties employed synthesised voices of leaders (Modi, Kejriwal and others) to address voters in regional languages, as well as deepfake videos. The system combined personalisation, algorithmic dissemination and low production costs, reaching tens of millions of voters. This resulted in a blurring of the boundary between authentic and synthetic messaging (The Atlantic, 2024; The New York Times, 2024).

Analysis according to the quadratic methodology.

Holistic: a system of personalised calls, cloned voices and algorithms.

Quantum: superposition of “authentic appeal / synthetic manipulation”.

Inmutatio: reduction of trust in the “live” voice.

Signal cost: low-to-medium → limited long-term reliability.

Case 6. Russian information operation Doppelgänger / Storm-1516 (2023–2026).

Object of analysis: the large-scale Russian operation Doppelgänger / Storm-1516, which involved the creation of hundreds of fake clone websites of Western media outlets, AI-generated content and bot networks. The materials imitated authoritative publications (Le Monde, Der Spiegel and others) and disseminated narratives aimed at undermining support for Ukraine and eroding trust in the media in Europe and the United States. The operation ran from 2023 to 2026 and continuously adapted (Bloomberg, 2026; EU DisinfoLab, 2023–2026).

Analysis according to the quadratic methodology.

Holistic: infrastructure of fake imitation websites + AI content.

Quantum: superposition of “authoritative source / disinformation factory”.

Inmutatio: undermining of support for Ukraine and erosion of trust in the media.

Signal cost: low personal cost at large scale.

Case 7. AI-amplified information campaign during the Romanian presidential elections (2024–2025).

Object of analysis: an AI-amplified campaign during the 2024–2025 presidential elections in Romania, which included the mass use of TikTok accounts, synthetic content and algorithmic promotion of the candidate Călin Georgescu. The operation led to the annulment of the first-round results amid suspicions of foreign interference. The content combined narratives of a “popular breakthrough” with elements of disinformation about external influence (POLITICO, 2024; The New York Times, 2025).

Analysis according to the quadratic methodology.

Holistic: algorithmic amplification + synthetic content.

Quantum: superposition of “popular breakthrough / foreign interference”.

Inmutatio: annulment of the round results and deformation of trust in the procedure.

Signal cost: low for external actors.

Case 8. Information operations surrounding the Hamas attacks of 7 October 2023 and the subsequent war in Gaza (2023–2025).

Object of analysis: a mass of narratives, fakes, deepfake videos and photographs that accompanied the Hamas attacks of 7 October 2023 and the subsequent war in Gaza. The materials were disseminated by both sides of the conflict, closely interwoven with real events, creating high initial uncertainty and consolidating polarised images of victim/aggressor. The operations employed both state resources and anonymous networks (open sources and investigations 2023–2025).

Analysis according to the quadratic methodology.

Holistic: a mass of narratives, fakes and deepfakes in interrelation with real events.

Quantum: high initial uncertainty + observer effect.

Inmutatio: consolidation of polarised images and polarisation.

Signal cost: varies (state resources vs anonymous networks).

The synergy of the four approaches makes it possible not only to describe communicative acts, but also to compare the intensity of influence, the durability of negative changes and the relative reliability of signals.

Table 1. Qualitative-comparative analysis of the 8 cases according to the Hol-Index (HI) (preliminary assessments based on textual descriptions; require empirical validation)

No. salary	Case	H	Q	I	C	Relative HI
1.	Zelensky's address	High	High	Medium-high	High	High
2.	Deepfake "surrender"	High	High	High	Low	Medium-high
3.	Trump's strategies	High	High	High	High	High
4.	Deepfakes Brazil	Medium-high	High	Medium-high	Low	Average
5.	AI clones India	High	High	Medium-high	Low-medium	Medium-high
6.	Doppelganger	High	High	High	Low	Medium-high
7.	Romania 2024–2025	High	High	High	Low	Medium-high
8.	Gaza / 7.10.2023	High	High	High	Variable	High

Key observations:

- The highest relative HI is in cases with high integrity + strong quantum effect + stable inmutation + high signal value (1, 3, 10).
- Anonymous deepfakes and AI operations often have high short-term Q and I but low C, which lowers long-term HI.
- All assessments are preliminary qualitative.

Discussion of results

The proposed quadratic methodology demonstrates the heuristic potential for multidimensional analysis of social communication processes. The four-stage algorithm allows moving from fragmentary description to systemic understanding, taking into account nonlinearity, uncertainty, and transformational potential.

Comparison with other models and approaches.

To more clearly define the place of quadratic methodology in contemporary scientific discourse, it is useful to compare it with several common analytical frameworks.

1. *Quantum approaches in communication and media theory* (Aspalter, 2024; Myers, 2025; Bhadra, 2024).

These models effectively use the metaphors of superposition, entanglement, and the observer effect to describe the multiplicity of meanings and the impact of the act of observation. Their strength is the emphasis on uncertainty and the probabilistic nature of information flows in the AI era. At the same time, they hardly capture the mechanisms of persistent (irreversible or highly persistent) negative transformations of social consciousness and do not offer tools for assessing the “value” of a signal. The quadratic methodology integrates quantum principles as one of the four equal components and complements them with the dimensions of inmutation and handicap, which allows us to move from describing uncertainty to analyzing long-term consequences.

2. *Classical handicap theory / costly signaling* (Zahavi, 1975; Grafen, 1990 and modern refinements).

The theory explains the reliability of a signal due to its high cost to the sender and is widely used in studies of status behavior, diplomacy, and strategic communication. However, it practically ignores the ontological indivisibility of communication systems and the quantum aspects of meaning formation. The quadratic model retains the idea of signal cost (component C), but embeds it in a broader context of integrity, superposition, and inmutation, which makes the analysis suitable for evaluating both “expensive” official appeals and “cheap” anonymous deepfakes.

3. *Traditional linear, structuralist and unidimensional empirical approaches* (classical models of mass communication effects, reach/engagement metrics, content analysis).

These approaches work well with measurable indicators of dissemination and audience response, but they often reduce the complex act of communication to individual variables and poorly capture nonlinearity, systemic integrity, and long-term transformative effects. Quadratic methodology consciously abandons reductionism in favor of a holistic view and adds dimensions that traditional metrics rarely capture.

4. *Models for analyzing information operations and disinformation* (EU DisinfoLab approaches, computational propaganda research, meta-analyses of the impact of generative disinformation).

These frameworks are strong in documenting the infrastructure of operations, network diffusion, and short-term effects. However, they rarely integrate ontological (integrity), epistemic (superposition and collapse of interpretations), and axiological (persistent deformation of values) dimensions in a single model. The quadratic approach offers just such integration and allows operations of different natures to be compared using a single (albeit preliminary) HI measure.

5. *Media-ecological approaches* (development of the ideas of McLuhan and Postman).

They focus on the environment as a message and long-term changes in perception. Quadratic methodology partially overlaps with them through a holistic component, but adds operationalized tools for capturing negative transformations and signal reliability, which are lacking in classical media ecology.

Thus, the comparative analysis shows that the quadratic methodology does not replace existing approaches, but complements them, filling the gaps between metaphorical quantum models, signal theory, one-dimensional empirical metrics, and applied disinformation research. Its integrative advantage lies in the simultaneous consideration of four dimensions, which is especially important in the context of hybrid information confrontations.

The practical value of the model lies in the ability to identify "weak spots" of communication operations (high inmutation potential at low signal cost) and develop communication security strategies.

Research limitations.

1. The predominantly theoretical and methodological nature of the model and the qualitative nature of the illustrations limit statistical generalization.
2. HI indicators are preliminary in nature and require operationalization, standardization, and validation (NLP, network analysis, longitudinal data, inter-expert agreement).
3. The weighting coefficients are expert-illustrative; AHP results may vary depending on the composition of the experts.
4. The algorithm needs to adapt to different types of objects.
5. Key concepts continue conceptual refinement.
6. The illustrative nature of the cases (especially 2025–2026, according to open sources) limits representativeness.

These limitations do not negate the heuristic value of the model, but clearly outline the need for further empirical work.

Conclusions

The article substantiates the specifics of the application of the quadratic methodology as a synergistic model for studying social communication processes. Its conceptual basis is formed by four interrelated approaches: interpreted holism, quantum journalism, the theory of social inmutation, and the category of inmutation handicap. Their combination allows us to overcome the limitations of reductionist, linear, and one-dimensional analysis and to consider the communication process as a holistic, nonlinear, and transformational system.

A four-stage algorithm for quadratic analysis has been developed: reproducing a holistic picture of the communication object; identifying the multiplicity of its semantic interpretations and the observer effect; establishing mechanisms for the formation of stable negative changes; assessing the value, reliability, and potential persuasiveness of the signal. Such a sequence allows combining the ontological, epistemic, axiological, and pragmatic dimensions of social communication.

To operationalize the model, a Holistic Impact Index (HI) has been proposed, which integrates indicators of integrity, quantum impact, inmutation, and signal value. Its use creates the prerequisites for a comparative analysis of communication acts and information operations of various types. At the same time, the numerical estimates given in the study are of an expert-illustrative nature and cannot be considered as a finally validated measurement tool.

Testing the model on cases of public political communication, deepfakes, artificially generated content, election campaigns, and large-scale information operations has demonstrated its heuristic performance. In particular, the quadratic methodology allows us to distinguish between short-term communication effects and long-term inmutation effects, as well as to identify the relationship between the scale of influence, narrative stability, and signal reliability.

The practical significance of the proposed model lies in the possibility of its application for the analysis of disinformation, deepfakes, information and psychological operations and communication security strategies. The main limitations of the study are the theoretical and methodological nature of the development, the preliminary nature of the indicators, the expertise of the weighting coefficients and the insufficient empirical representativeness of the cases. Further research should be aimed at standardizing HI indicators, checking their reliability, involving network and automated content analysis, conducting longitudinal measurements and testing the model on a wider array of communication situations.

Statement

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Conflict of interest

There is no conflict of interest.

Ethics

The material presented in this article meets all the points and requirements put forward by the Ethics Commission of the Editorial and Publishing Department of the public organization «Scientific and Educational Center «SUCCESSFUL».

Use of generative AI

During the preparation of this manuscript, the author used Grok, an artificial intelligence tool developed by xAI, solely for language editing (improvement of English) and for generating illustrative mathematical calculations. The author reviewed and verified all AI-assisted content and accepts full responsibility for the integrity and accuracy of the work.

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Специфіка застосування квадратичної методології для дослідження процесів соціальних комунікацій

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Анотація

Мета дослідження. Обґрунтувати специфіку застосування квадратичної методології як синергетичного поєднання інтерпретованого холізму, квантової журналістики, теорії інмутації суспільства та категорії інмутаційного гандикапу для багатовимірного аналізу процесів соціальних комунікацій.

Методи дослідження. Теоретичний аналіз і концептуальна інтеграція чотирьох підходів. Процедура передбачає паралельне або циклічне викладання чотирьох аналітичних оптик на комунікаційний об'єкт із подальшим синтезом результатів. Для операціоналізації пропонуємо попередні індикатори умовної одиниці «хол-індекс» (HI, Holistic Impact Index) і мережевий аналіз цільності. Числові оцінки HI мають експертно-ілюстративний характер і потребують емпіричної валідації.

Результати. Розроблено чотириетапну модель/алгоритм синергетичного аналізу: (1) відтворення цільної картини комунікаційного об'єкта; (2) квантовий аналіз інформаційного впливу (суперпозиція змісту й ефект спостерігача); (3) виявлення механізмів стійких негативних змін (інмутація); (4) оцінювання надійності та якості комунікаційного сигналу (інмутаційний гандикап). Модель проілюстровано на восьми взаємопов'язаних кейсах інформаційного протистояння 2022–2026 рр. (за відкритими джерелами), що охоплюють публічні звернення лідерів, дипфейки, виборчі кампанії та масштабні операції впливу (Doppelgänger, Matryoshka, AI-контент у виборах Індії, Румунії, Молдови, події навколо ізраїльсько-іранської війни тощо).

Висновки. Інтеграція чотирьох підходів забезпечує багатовимірне вивчення механізмів дій, стійкості й трансформаційного потенціалу соціальних комунікацій. Модель має практичну цінність для аналізу дезінформації, дипфейків, інформаційно-психологічних операцій і розробки стратегій комунікаційної безпеки. Обмеженням є переважно теоретичний характер моделі й потреби в емпіричній валідації індикаторів. Перспективи, пов'язані з уточненням показників, мережевим аналізом й апробацією на розширеному масиві кейсів.

Ключові слова: квадратична методологія, соціальні комунікації, інтерпретований холізм, квантова журналістика, інмутація суспільства, інмутаційний гандикап, синергетичний аналіз, дипфейки, інформаційні операції.