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Technarrative Model (NTM) for the Symbolic-Emotional Evaluation of Architectural Space: A Neutrosophic Multiperspectivism Approach

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Abstract. This research answers the need to evaluate an architectural space from a non-technical standpoint relative to its symbolism/emotion charge that is not taken into account by the design/planning of such public spaces. This research problem is sociologically relevant as today; architecture does not only dictate the layout of the physical world but also the group existence, sensitivity to experiences and modes of social appropriation. Yet the state-of- the-art literature provides purely professional and empirical avenues of investigation driven by economic/aesthetic value with no pathway for understanding appreciation of ambiguity and the multiple perspectives at play. Thus, a Neutrosophic Technarrative Model (NTM) is proposed which stems from neutrosophic multiperspectivism method that deems the integration of contradictory evaluations, via triads ⟨ T, I, F ⟩ and OWA aggregation operators, valid. The need for tension to be quantified, polarization to be acknowledged and uncertainty/haze to be evaluated creates a fair, symbolic-emotional assessment of an architectural space. Ultimately, findings show that community members, builders, preservationists, and tourists show support for their symbolic/emotional contributions to the space resulting in mixed compilations of somewhat conflicting results that can easily be articulated. Theoretically, this manuscript contributes to literature by providing for a formalized rubric for symbolic assessment and practically, the findings support an effective means for more sustainable, empathetic and inclusive architectural projects in the future.

Keywords: Neutrosophic, Multiperspectivism, Architecture, Symbolism, Emotion, Indeterminacy, Evaluation

1. Introduction

Architecture, more than a technical exercise, constitutes a cultural language that shapes perceptions, emotions, and ways of life. Built spaces not only respond to functional needs but also convey symbolic meanings capable of generating belonging or rejection in their users. In a scenario where cities face tensions between modernization, heritage preservation, and social appropriation, it is essential to develop tools that allow for the evaluation of the symbolic-emotional component of architecture from a rigorous scientific approach. This study proposes, as an answer, the Neutrosophic Technarrative Model (NTM), a methodological framework that integrates neutrosophic multiperspectivism to address the inherent complexity of such assessments.

Historically, architectural evaluation processes have focused on material and technical parameters, prioritizing functionality, energy efficiency, or economic impact. While these factors are essential, they have left the experiential dimension that characterizes human-space interaction in the background [1].

Throughout the 20th and 21st centuries, approaches such as environmental psychology, architectural phenomenology, and, more recently, neuroarchitecture, have underlined the need to understand how people experience and make sense of places [2]. Along the way, the idea has been consolidated that a space acquires value not only for what it is, but for what it represents for those who inhabit or visit it.

The rise of applied neuroscience in architecture has reinforced this interest. Various studies have shown that spatial configurations influence emotional state, psychological well-being, and social behavior [3]. However, these approaches, although revealing, often lack mechanisms that systematically integrate the multiple and often contradictory perceptions of the different actors involved in urban life. This creates a gap between scientific evidence on spatial effects and its translation into operational criteria for planning and design.

Consequently, a fundamental question emerges that guides this research: how can we comprehensively assess the symbolic-emotional dimension of architectural space in contexts where divergent perceptions, uncertainty, and conflicting interests coexist? This question points to a methodological gap that limits decision-makers' ability to design culturally sensitive, inclusive, and emotionally meaningful architectural projects.

Current literature offers partial approaches. On the one hand, urban assessment often relies on quantitative indicators of accessibility, mobility, or sustainability [4]. On the other hand, qualitative methodologies capture stories, memories, and meanings, but are difficult to translate into comparable metrics [5]. None of these perspectives alone can grasp the complexity of symbolic-emotional processes, characterized by ambiguity, contradiction, and variability.

Technarrative Model (NTM) seeks to integrate the diverse voices of actors—residents, tourists, heritage authorities, developers—under a multiperspectivist framework that does not reduce complexity, but rather recognizes and formalizes it. Indeterminacy, rather than being eliminated, becomes a central element of the analysis. Thus, the NTM is presented as a bridge between the subjectivity of perceptions and the objectivity of a mathematical model that organizes and makes them visible.

The method used, based on neutrosophic multiperspectivism , allows each symbolic-emotional attribute to be represented by triads $\langle T, I, F \rangle$, aggregated with OWA operators, and calculated metrics of similarity, polarization, and plithogenic contradiction. This provides a robust diagnosis of the tensions that arise around architectural projects, detecting both areas of consensus and hotbeds of conflict [6]. The tool therefore becomes a resource for managing urban disputes and for making more inclusive decisions.

Thus, the objectives of this article are: (i) to present the theoretical and methodological foundation of the Neutrosophic Technonarrative Model, (ii) to apply the neutrosophic multiperspectivism approach in an architectural case study to evaluate its symbolic-emotional dimension, and (iii) to discuss the contributions of the model to the development of architectural and urban policies that integrate technical rationality, cultural sensitivity and emotional well-being of users [7].

2. Preliminaries

2.1. Symbolic and Emotional Architecture

Architecture is not limited to the construction of physical structures; it also constitutes a cultural language laden with meanings, emotions, and symbols that articulate the relationship between human beings and their environment. Through forms, materials, and spatial configurations, messages are transmitted that influence collective memory and the way individuals interpret the world they inhabit. In this way, architectural spaces can be read as texts, laden with implicit narratives that engage with those who experience them daily.

Architectural symbolism has been a subject of reflection since ancient times, when temples and monuments not only served religious or civic functions but also represented social values and cosmological visions. Today, this symbolic component remains, although transformed by contemporary urban dynamics. Modern cities, undergoing processes of globalization, tend to standardize their landscapes, which sometimes weakens local identities. Faced with this tension, symbolic architecture emerges as a resource to reaffirm its identity in a globalized context.

Collective identity is closely linked to the way communities recognize and appropriate spaces. Iconic buildings, plazas, or residential complexes generate feelings of belonging that transcend their practical utility. However, the loss of these symbolic references, whether due to gentrification or urban renewal, can lead to uprooting and social fragmentation. Thus, architecture ceases to be a mere physical support and becomes a mediator of social ties, strengthening or weakening community cohesion.

In recent decades, neuroarchitecture has offered an innovative framework for understanding how built environments directly impact the emotional experience of users. Neuroscientific research has shown that spatial configurations, lighting, and even material textures can alter moods, induce calm, stimulate creativity, or generate anxiety [8]. This interdisciplinary approach reinforces the idea that architecture is not neutral, but actively shapes human experience.

The emotional perception of a space depends not only on sensory factors but also on culturally accumulated meanings. The same building can inspire pride in some and rejection in others, depending on the historical or political narratives that permeate it. In this sense, the symbolic charge is not universal, but situated and dynamic. Hence the importance of integrating methodologies capable of capturing the diversity of experiences and perceptions, rather than imposing homogeneous interpretations.

Criticism of traditional architectural evaluation models points out that they tend to ignore subjectivity. Technical indicators such as energy efficiency or cost-benefit, although necessary, do not explain why certain spaces are deeply significant while others are indifferent. Incorporating the symbolic-emotional dimension means expanding the analytical framework to include intangible categories, but crucial for habitability and social well-being [9].

Some authors argue that architecture should be understood as a relational phenomenon, in which individual perceptions, cultural contexts, and historical conditions converge. Thus, architectural symbols are not static, but constantly reinterpreted in response to social changes. The same building can be interpreted as an icon of progress in one era and as a reminder of inequality in another [10]. This mutable nature demands flexible methodological approaches that are open to contradiction.

Likewise, environmental neuroscience has identified correlations between certain architectural patterns and the activation of brain regions associated with emotion and memory [11]. This type of finding scientifically legitimizes the relevance of emotional architecture, showing that spaces have the capacity to influence individuals' cognitive processes. Such contributions provide empirical support for the symbolic role that has historically been attributed to architecture from more qualitative approaches.

In practical terms, considering the symbolic-emotional dimension is fundamental for urban planning and decision-making in architectural projects. Spaces that ignore collective identity can fail to achieve social appropriation, while those that integrate shared meanings strengthen community cohesion and promote well-being. Heritage management, neighborhood regeneration, and the design of public facilities find in this perspective an opportunity to connect with citizens on deeper levels.

In conclusion, symbolic and emotional architecture constitutes a fertile field for rethinking the relationships between space, culture, and human experience. Far from being an accessory component, the symbolic-emotional dimension defines the quality of urban life and the way people construct their identities. The articulation between symbolism, collective identity, emotional perception, and neuroarchitecture opens up new possibilities for analysis, intervention, and design, shaping an architectural paradigm that recognizes the centrality of the human element in dwelling.

2.2. Multiperspectivism in evaluation processes.

The analysis of architectural and urban assessment processes cannot be reduced to the technical perspective of specialists. In practice, any built space involves multiple actors, each with distinct interests, values, and perceptions. This diversity of positions demands methodological frameworks capable of integrating plurality without reducing it to a forced consensus, since conflict also constitutes a legitimate source of information and must be made visible.

The local community is often the most directly affected by architectural interventions. Its perspective focuses on symbolic appropriation, rootedness, and the continuity of neighborhood identity. In contrast, the real estate market evaluates projects based on profitability and their ability to generate economic value. Both perspectives are valid, but they often conflict. The methodological task is to recognize these divergences and turn them into analytical inputs rather than obstacles.

Cultural heritage introduces another relevant angle. Institutions and specialized agencies tend to prioritize the material preservation and historical authenticity of spaces, while everyday users may demand adaptations that facilitate their current use. This clash between strict conservation and contemporary functionality exemplifies the complexity of articulating multiperspective assessments , where normative rigidity can conflict with the social life of spaces [13].

Multiperspectivism proposes an inclusive approach that recognizes the coexistence of divergent interests. Unlike unidimensional models, this approach incorporates heterogeneous, even contradictory, narratives to map the structure of agreements and disagreements. Evaluation, in this sense, ceases to be a closed technical opinion and becomes a dynamic process of negotiation and collective learning.

However, integrating multiple perspectives is not without its difficulties. The literature on urban governance shows that participatory processes can be captured by elites or dominated by more powerful discourses, rendering minority voices invisible [14]. Therefore, methods must be designed with mechanisms that ensure equity in the representation of stakeholders, avoiding the reproduction of inequalities in decision-making.

From a methodological perspective, various tools have been developed to manage this complexity. Multicriteria analysis, cognitive maps, and fuzzy decision-making methods are examples of approaches capable of organizing heterogeneous preferences. However, these techniques face limitations when indeterminacy or contradiction become predominant. In such cases, neutrosophic logic offers a promising framework for formalizing conflict and ambiguity as constitutive elements of the evaluative process [15].

International experience shows that incorporating multiple perspectives not only enriches assessments but also increases the legitimacy of the results. Participatory evaluations of urban projects show that when stakeholders feel their voices have been heard, decision implementation is smoother and less contentious [16-17]. Conversely, the exclusion of certain sectors tends to generate resistance, protests, or even outright rejection of architectural interventions.

Another aspect to consider is temporality. Stakeholder perceptions are not static: they change over time, as the city evolves and social needs change. A space valued positively at one time may lose its legitimacy at another. Therefore, multiperspectivism requires periodic assessments that capture the dynamic nature of the relationships between stakeholders, heritage, the market, and the community.

In management terms, applying a multiperspectivist approach implies accepting the incompleteness of diagnoses. There is no single truth about the value of an architectural space, but rather a mosaic of perceptions that must be articulated. Recognizing this plurality, far from weakening the assessment, strengthens it by reflecting the real complexity of urban processes. The challenge lies in designing analytical frameworks capable of balancing this diversity with operational criteria.

In short, multiperspectivism in evaluation processes constitutes an epistemological shift: it displaces the idea of evaluation as an objective and definitive outcome, and instead conceives it as a social, open, and conflictual process. By integrating the voices of community, heritage, market, and users, tensions are not eliminated, but rather are transformed into input for more just and sustainable decision-making. This approach opens the possibility of moving toward a participatory architecture that is not only constructed in material terms, but also in symbolic and emotional terms.

2.3. Neutrosophic philosophy and perspectivism

Neutrosophic philosophy [18] provides a formal and mathematical framework for the philosophical school of perspectivism. This relationship can be understood through the following key connections [19].

The most explicit link between neutrosophy and perspectivism is the Principle of Referential Relativity [18]. This principle states that "the truth, falsity, and indeterminacy of any proposition depend on the frame of reference in which it is examined." This means that an idea can be true in one context, false in another, and indeterminate in a third. This is the central thesis of perspectivism: there are no absolute truths; rather, knowledge is always conditioned by the observer's point of view. Neutrosophy adopts this idea and establishes it as a fundamental principle of its system.

Perspectivism challenges classical logic, which is based on a strict true/false duality. Unlike traditional logic, Neutrosophy introduces the concept of degrees of truth, falsity, and indeterminacy. This allows for the mathematical modeling of a reality where propositions are not absolutely true or false, but exist on a spectrum, as a perspectivist approach would suggest [20].

Neutrosophy takes up traditional ideas, asserting that truths within one frame of reference can become falsehoods in another, and vice versa. This approach emphasizes the fluidity of knowledge and encourages analyzing ideas from multiple perspectives, a central goal of perspectivist thought.

If perspectivism asserts the existence of multiple valid perspectives, the question arises as to which logical system to use for its analysis. There is no single "true logic"; instead, there are a variety of logical frameworks, each offering different perspectives on truth and validity [21]. Neutrosophy aligns itself with this pluralism, presenting itself not as the sole logic, but as a flexible and powerful tool, particularly suited to contexts of indeterminacy and contradiction, natural consequences of the coexistence of multiple perspectives.

Perspectivism inevitably leads to contradictions when two valid points of view oppose each other. Classical logic cannot address this without ruling out one of the perspectives. Neutrosophy, however, is designed to embrace indeterminacy, paradox, and the interplay between opposites and neutrals.

By allowing the values of T and F to be independent, neutrosophy can formally model a proposition that is both true and false (a dialectical state, T = 1, F = 1). This is a straightforward formalization of how a contradiction between two opposing perspectives would manifest itself [22].

The indeterminacy component (I) is crucial, as it allows us to analyze and quantify the ambiguity, vagueness, or uncertainty that arises when perspectives are confusing or incomplete.

While perspectivism focuses on the coexistence of the thesis (<A>) and its various antitheses (<antiA>) , neutrosophic goes a step further by systematically introducing and studying the neutrothesis (<neutA>) . The neutrothesis represents the spectrum of neutralities: ideas or states that are neither the thesis nor the antithesis, but rather lie in the space in between. In this way, neutrosophy not only validates multiple perspectives (<A> and <antiA>) , but also analyzes the "continuum of neutralities" that connects and balances them, thus enriching the perspectival analysis [23, 24].

To achieve this, neutrosophy proposes two principles of active research [25]:

- Looking for "common parts in uncommon things."
- Looking for "uncommon parts in common things."

The intended result is a "synthesis" that integrates elements of opposites, similar to Hegelian dialectics, but with the clear inclusion of their neutralities.

Neutrosophy is related to perspectivism in that they share a common philosophical foundation. However, neutrosophy is distinguished by its focus on a more specific, integration-oriented analytical method. It is not limited to the philosophical affirmation of the existence of multiple points of view, but offers tools—such as values (T, I, F), referential relativity, logical pluralism, and contradiction management—to analyze, model, and understand a world defined by uncertainty, ambiguity, and the coexistence of multiple realities. It is, as its title suggests, a new paradigm for thinking about an intrinsically perspectivist world .

Neutrosophy is a philosophical and methodological framework that studies the relationship between opposites and their indeterminacies. Its main objective is to find commonalities between opposing concepts and identify differences in similarities, thus achieving a more nuanced and integrative understanding.

2.4. Perspectivism as a framework for plural logics

Perspectivism is a philosophical framework that asserts that knowledge, truth, and interpretation are always conditioned by the observer's point of view. It questions the existence of absolute, context-independent truths and emphasizes the multiplicity of valid perspectives that coexist in complex systems of thought. While perspectivism is often associated with Friedrich Nietzsche in Western philosophy, its conceptual roots go back much earlier, in non-European traditions.

2.5. The Neutrosophic Model of Multiperspectivism

Representation of a perspective: multineutrosophic sets

The core model is the representation of a perspective not as a single value, but as a complex structure using multineutrosophic sets [26]. A perspective becomes a triplet of ordered sequences, capturing multiple facets of truth, indeterminacy and falsity simultaneously [27].

Refined Neutrosophic Set/Logic/Probability/Statistics is isomorphic with Multi -Neutrosophic Set/Logic/Probability/ Statistics, as both structures represent multidimensional assessments of truth, indeterminacy, and falsity[28]. In Multi -Neutrosophic Systems (SMNS), the components $T_j, I_k, F_l$are treated as duplicates, representing multiple coexisting truths, uncertainties, and falsities. In contrast, in Refined Neutrosophic Systems (SRNS), these same components are considered subunits: subtruths, subindeterminacies, and subfalsehoods. Because of this isomorphism, any theoretical or computational model designed for multineutrosophic structures can be directly applied to refined neutrosophic structures, preserving the semantic and algebraic interpretation.

The focus of the proposed model is to represent a perspective not as a singular assessment, but as a multidimensional assessment structure using multineutrosophic sets. A subject perspective on an entity $X$is expressed as

$$Ps(X) = \langle (t_1, t_2, \dots, t_n), (i_1, i_2, \dots, i_m), (f_1, f_2, \dots, f_k) \rangle \quad (5)$$

where :

where each component of the sequence captures a distinct dimension of the assessment :

- Sequence of Truths (T): Multiple, distinct, coexisting truths perceived by the subject ss s about X.
- Sequence of Indeterminacies (I): Various aspects of ambiguity, vagueness or irrelevance attributed to X.
- Sequence of Falsehoods (F): Simultaneously had false beliefs or denials that ss s is assigned to X.

This approach allows for more expressive and granular modeling of subjective knowledge, enabling nuanced reasoning under uncertainty.

The complete frame is composed of the following: items :

- A set of Subjects ($S = \{s_1, s_2, \ldots\}$) : Represents all entities that have a point of view (for example, individuals, communities, indigenous groups, legal systems).
- A Neutrosophic Perspective ($P_{s\,x}$) for each Subject : The neutrosophic representation of the view that a subject (s) has (n) on an entity (X).
- A relevance weight (W_s) for each perspective : A numerical perspective value, typically in the range [0, 1], that represents the importance or influence of a subject perspective in a specific analytical context. The sum of all weights should be normalized: $\sum Ws = 1$
- A Similarity Function (Sim (P_{ix} , P_{jx})) : A mathematical function that acts as a conceptual bridge, calculating the degree of closeness or affinity between any two perspectives in the system.

If perspectivism were limited to asserting the existence of isolated points of view, it would risk collapsing into relativism where dialogue is impossible. This is where Similarity emerges as a complementary and essential concept. Similarity [29] is the bridge that connects diverse perspectives, allowing for their comparison and integration.

- Perspectivism establishes the *what* : the existence of a multiplicity of valid points of view.
- Similarity establishes the *how* : the mechanism by which these points of view can be related, compared, and synthesized.

By identifying degrees of similarity, we can find common ground or understand the root of dissent. Similarity is the tool that marks operational perspectivism, turning a multiplicity of views into a source of enriched knowledge.

To formalize the function $Sim(P_{iX}, P_{jX})$it is essential to understand its foundation in set theory. A neutrosophic similarity relation is a direct and richer generalization of a fluff similarity relation and inherits its fundamental properties [30].

A similarity relation in fuzzy logic, denoted as R, is characterized by the degree of similarity μR (x, y)that satisfies the following [30] :

1. Reflexivity: Each element is perfectly similar to itself.$\mu R(x, x) = 1$
2. Symmetry: The similarity between two elements is the same regardless of the order. $\mu R(x, y) = \mu R(y, x)$
3. Transitivity (max - min) : If A is similar to B, and B is similar to C, then A is at least as similar to C as the lesser of two degrees of similarity.. $\mu R(x, z) \geq min(\mu R(x, y), \mu R(y, z))$

The construction of a similarity function for multineutrosophic sets builds upon these properties to manage the complex sequences of Truth, Indeterminacy and Falsity that define each perspective.

Formal Definition of Similarity Calculation Process

The following process formalizes the method for quantifying the similarity between two or more complex perspectives represented as multineutrosophic sets. The goal is to transform these qualitative, multifaceted representations into a comparable number value that represents their degree of affinity.

The process consists of three fundamental steps: Aggregation, Distance Calculation and Normalization.

Step 1: Aggregation Perspective (Dimensionality Reduction)

Objective: To transform the variable length sequences from each multineutrosophic perspective into a fixed dimension vector.

Input:

A multi -neutrosophic perspective $Pi(X)$for a subject if, defined as:

$$Pi(X) \; = < Ti, Ii, Fi > \quad (6)$$

where

- $T_i = (t_{i1}, t_{i2}, \ldots, t_{in}),$
- $I_i = (i_{i1}, i_{i2}, \ldots, i_{im}),$
- $F_i = (f_{i1}, f_{i2}, \ldots, f_{ik})$

They are sequences of values in the range [0, 1].

Process :

Define an aggregation function $Agg(S)$that takes a sequence of numbers and reduces it to a single scalar value. SWhile several functions can be used (such as maximum, minimum, or median), the standard method is the arithmetic mean:

$$Agg_{avg}\,(S) = \left(\frac{1}{|S|}\right) \sum_{j=1}^{|S|} s_j \quad (7)$$

where |S| is the number of elements in the sequence S.

Apply this function to each of the three perspective sequences $P_{i(X)}$To obtain a three-dimensional aggregate vector:

$$V_i = < Agg(T_i), Agg(I_i), Agg(F_i) > \quad (8)$$

Production:

A set of aggregate vectors:

$$\{V_1, V_2, \ldots, V_n\},\; Vi \; = \langle T_i^{avg}, I_i^{avg}, F_i^{avg} \rangle \quad (9)$$

Step 2: Distance Calculation between Aggregate Vectors

Objective: To measure the geometric separation between each pair of perspectives in three-dimensional space (T, I, F).

Input:

Two added vectors:

$$V_a = < T_a, I_a, F_a > \; and \; V_b = < T_b, I_b, F_b >. \quad (10)$$

Process: A distance metric is used. The standard choice is the Euclidean distance, which calculates the length of the straight line connecting two points in space. The formula is:

$$Dist(Va, Vb) = \sqrt{(Ta - Tb)^2 + (Ia - Ib)^2 + (Fa - Fb)^2} \quad (11)$$

Production:

A distance value $d_{ab} >= 0$for each pair of perspectives (Pa, Pb).

Step 3: Normalizing the Distance into a Similarity Function

Objective: To convert the distance value, which has no fixed upper bound, into an intuitive and limited similarity score between 0 and 1.

Input: The distance $d_{ab} = Dist(V_a, V_b)$between two perspectives.

Process :

- Define the maximum possible distance in space . From each component $T, I, F \in [0,1]$The vector space is a unit cube. The maximum distance corresponds to the spatial diagonal from (0,0,0) to (1,1,1) , i.e.,

  $$D_{max} = \sqrt{3} \quad (12)$$

Define the similarity function $Sim(Pa, Pb)$as a complement of the normalized distance: $Sim(Pa, Pb) =$

$$1 - \left(\frac{Dist(Va,Vb)}{D_{max}}\right) = 1 - \left(\frac{sqrt\left((Ta - Tb)^2 + (Ia - Ib)^2 + (Fa - Fb)^2\right)}{\sqrt{3}}\right) \quad (13)$$

production:

A $Sim(Pa, Pb) \in [0, 1]$similarity score, where:

- $Sim = 1$implies that the added vectors are identical (dab=0), which represents g maximum similarity.
- $Sim = 0$It implies that the vectors are at the maximum possible distance, which represents the maximum dissimilarity.

3. Methodology

3.1. Research design

- **Mixed approach (qualitative-quantitative):** The methodology combines qualitative techniques, such as participatory workshops and narratives, with quantitative tools, such as statistical analysis and mathematical models, to capture both subjective perceptions and structured data.
- **Application of neutrosophic multiperspectivism :** A framework is used that integrates multiple points of view through neutrosophic logic, allowing the truth (T), indeterminacy (I) and falsity (F) of each judgment to be represented in a flexible and multidimensional system.

3.2. Procedure

1. **Definition of the architectural space under analysis:** Selection of a representative case, such as a cultural center located in a historic neighborhood, delimiting the universe of study.
2. **Stakeholder identification:** Inclusion of key groups such as residents, merchants, heritage authorities, tourists, and developers, ensuring a diverse representation of perspectives.
3. **Definition of symbolic-emotional attributes:** Establishment of categories such as identity, morphological continuity, perceived gentrification , community appropriation, photographic appeal, and noise/traffic, relevant to the evaluation.
4. **Judgment elicitation :** Data collection using adapted Likert surveys with indeterminate scales, a neutrosophic Delphi method for expert consensus, and participatory workshops to capture local narratives.

5. **Conversion to neutrosophic sets:** Transformation of judgments into triads ⟨ T, I, F ⟩ for each attribute, where T represents the degree of truth, I the indeterminacy and F the falsity, assigned in the range [0, 1].
6. **Weight assignment:** Determining the relative importance of each attribute and actor through agreed criteria or hierarchical analysis, normalizing the weights to sum to 1.
7. **Multiperspectivist aggregation :** Calculation of aggregate vectors ⟨ T, I, F ⟩ per perspective using OWA operators (Ordered Weighted Averaging) or D-OWA (Decoupled OWA), adjusted by weights and attitudes (optimistic/pessimistic).
8. **Metric calculation:** Evaluation of similarity and Euclidean distance between perspectives, polarization indices (maximum distances), indeterminacy centrality (weighted average of I) and plithogenic conflicts (differences in T or F).
9. **Visualization:** Representation of results using radar charts for each actor, heatmaps for conflicts/attributes, and sociograms showing alliances or tensions between actors.

3.3. Preliminary validation

- **Expert panel for content validity:** Formation of a mixed group (technicians, community members, academics) to review the relevance of attributes and scales.
- **Internal consistency (Kendall's W neutrosophic):** Calculation of the coefficient of concordance to evaluate the consistency of judgments within each group of actors.
- **Model sensitivity to weight variations:** Fit tests by modifying the weights of attributes and actors to analyze the robustness and response of the model to changes.

4. Case Study.

Case Study: Symbolic-Emotional Evaluation of the "Museum of Contemporary Avant-Garde Art " in a Historic Center

For this analysis, a hypothetical but plausible architectural intervention will be evaluated: the construction of a contemporary art museum with a minimalist and deconstructivist design in the heart of a protected historic center characterized by its Baroque and Neoclassical architecture.

The proposition to be evaluated, **X** , is: **"The architectural intervention of the 'Museum of Contemporary Avant-Garde Art ' in the Historic Center is beneficial and respectful of the environment."**

Three key subjects or actors with divergent perspectives will be identified to analyze the complexity of the socio-architectural conflict.

Step 1: Define the Subjects and Their Multi -Neutrosophic Perspectives

Each perspective is modeled as a multi -neutrosophic set, capturing the multiple facets of Truth (T), Indeterminacy (I), and Falsehood (F) that each actor attributes to proposition **X.**

Subject 1 (s_1): Cultural Heritage Committee (CPC)

This group prioritizes the preservation, historical coherence, and material authenticity of the environment.

- **Truths (T):** {0.9 (Historical Coherence), 0.3 (Cultural Appeal)} - They recognize that a new museum is a cultural attraction, but their main truth is historical coherence, which they see as threatened.
- **Uncertainties (I):** {0.8 (Long-Term Economic Impact)} - They are uncertain whether the promised economic benefits will materialize and offset the impact.
- **Falsehoods (F):** {1.0 (Disruptive Innovation), 0.95 (Respect for Context)} - They consider it completely false that disruptive innovation is respectful in this context.

$$Ps1(X) = \langle (0.9,0.3), (0.8), (1.0,0.95) \rangle$$

Subject 2 (s_2): Collective of Architects and Developers (CAD)

This actor defends the aesthetic innovation, progress, tourism potential, and profitability of the project.

- **Truths (T):** {1.0 (Aesthetic Innovation), 0.9 (Tourism Potential)} - Its certainty is based on the quality of the design and its ability to attract visitors.
- **Indeterminations (I):** {0.4 (Community Appropriation)} - They expect the community to adopt the space, but they are not sure that this will happen.
- **Falsehoods (F):** {0.9 (Morphological Continuity), 1.0 (Nostalgia)} - They deny the need for literal continuity and consider nostalgia to be a false argument.

$$Ps2(X) = \langle (1.0,0.9), (0.4), (0.9,1.0) \rangle$$

Subject 3 (s_3): Residents and Traditional Traders (RCT)

Their perspective focuses on neighborhood identity, daily life, the impact on their businesses and the risk of gentrification .

- **Truths (T):** {0.8 (Neighborhood Identity), 0.2 (Business Opportunity)} - They value their identity, but some see a small economic opportunity.
- **Uncertainties (I):** {0.7 (Future Safety), 0.6 (Change in People Flow)} - There is uncertainty about how the social dynamics and safety of the neighborhood will change.
- **Falsehoods (F):** {0.9 (Community Benefit), 1.0 (Gentrification)} - They strongly believe that the project will not benefit the local community and that gentrification is an inevitable consequence, making the "respectful" part of the proposition false.

$$Ps3(X) = \langle (0.8,0.2), (0.7,0.6), (0.9,1.0) \rangle$$

The following table summarizes the actors' perspectives:

Table 1. Neutrosophic multi-valued assessment of actors' perspectives

Subject	Actor	Sequence of Truths (T)	Sequence of Indeterminacies (I)	Sequence of Falsehoods (F)
s_1	CPC	{0.9, 0.3}	{0.8}	{1.0, 0.95}
s_2	CAD	{1.0, 0.9}	{0.4}	{0.9, 1.0}
s_3	RCT	{0.8, 0.2}	{0.7, 0.6}	{0.9, 1.0}

Step 2: Aggregation of Sequences into Three-Dimensional Vectors

In order to compare perspectives, we reduce each actor's sequences to a single aggregated three-dimensional vector.

$\boldsymbol{V} = \langle \boldsymbol{T}_{\text{av}}\, \boldsymbol{G}, \boldsymbol{I}_{\text{av}}\, \boldsymbol{G}, \boldsymbol{F}_{\text{av}}\, \boldsymbol{G} \rangle$ using the arithmetic mean as the aggregation function.

Calculation of the Aggregate Vector for s_1 (CPC):

- $T1 = \frac{0.9+0.3}{2} = 0.600000$
- $I1 = 0.8/1 = 0.800000$
- $F1 = \frac{1.0+0.95}{2} = 0.975000$
- $\boldsymbol{V1} = \langle \mathbf{0.600000}, \mathbf{0.800000}, \mathbf{0.975000} \rangle$

Calculation of the Aggregate Vector for s_2 (CAD):

- $T2 = (1.0 + 0.9)/2 = 0.950000$
- $I2 = 0.4/1 = 0.400000$
- $F2 = (0.9 + 1.0)/2 = 0.950000$
- $\boldsymbol{V2} = \langle \mathbf{0.950000}, \mathbf{0.400000}, \mathbf{0.950000} \rangle$

Calculation of the Aggregate Vector for s_3 (RCT):

- $T3 = (0.8 + 0.2)/2 = 0.500000$
- $I3 = (0.7 + 0.6)/2 = 0.650000$
- $F3 = (0.9 + 1.0)/2 = 0.950000$
- $\boldsymbol{V3} = \langle \mathbf{0.500000}, \mathbf{0.650000}, \mathbf{0.950000} \rangle$

The table below shows the aggregate vectors for each actor:

Table 2. Aggregate neutrosophic vectors of actors' perspectives

Subject	Actor	T (Aggregate Truth)	I (Aggregate Indeterminacy)	F (Added Falsehood)
$\mathbf{V_1}$	CPC	0.600000	0.800000	0.975000
$\mathbf{V_2}$	CAD	0.950000	0.400000	0.950000
$\mathbf{V_3}$	RCT	0.500000	0.650000	0.950000

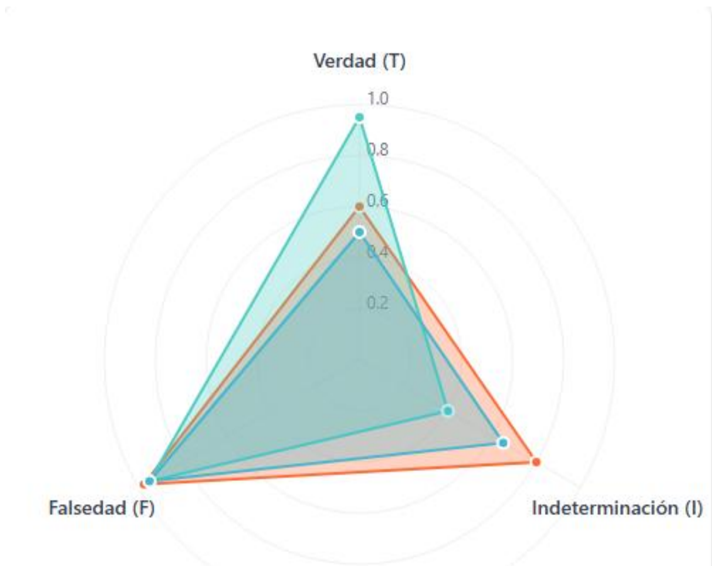

Figure 1: *Aggregate neutrosophic perspectives of the three actors in space (T, I, F).*

Step 3: Calculating Euclidean Distances between Vectors

Euclidean distance is used to measure the geometric separation between each pair of perspectives in three-dimensional space (T, I, F).

Distance between s_1 (CPC) and s_2 (CAD):

- $d12 = (T1 - T2)2 + (I1 - I2)2 + (F1 - F2)2$
- $d12 = (0.600000 - 0.950000)2 + (0.800000 - 0.400000)2 + (0.975000 - 0.950000)2$
- $d12 = (-0.350000)2 + (0.400000)2 + (0.025000)2$
- $d12 = 0.122500 + 0.160000 + 0.000625$
- $d12 = 0.283125$
- $\boldsymbol{d12 \approx 0.532094916}$

Distance between s_1 (CPC) and s_3 (RCT):

- $d13 = (T1 - T3)2 + (I1 - I3)2 + (F1 - F3)2$
- $d13 = (0.600000 - 0.500000)2 + (0.800000 - 0.650000)2 + (0.975000 - 0.950000)2$
- $d13 = (0.100000)2 + (0.150000)2 + (0.025000)2$
- $d13 = 0.010000 + 0.022500 + 0.000625$
- $d13 = 0.033125$
- $\boldsymbol{d13 \approx 0.182002747}$

Distance between s_2 (CAD) and s_3 (RCT):

- $d23 = (T2 - T3)2 + (I2 - I3)2 + (F2 - F3)2$
- $d23 = (0.950000 - 0.500000)2 + (0.400000 - 0.650000)2 + (0.950000 - 0.950000)2$
- $d23 = (0.450000)2 + (-0.250000)2 + (0.000000)2$
- $d23 = 0.202500 + 0.062500 + 0.000000$
- $d23 = 0.265000$
- $\boldsymbol{d23 \approx 0.514781507}$

Step 4: Calculating the Normalized Similarity Function

To convert the distances into an intuitive similarity score between 0 and 1, we normalize the distance using the diagonal of the unit cube as the maximum possible distance.

- Maximum distance:$dmax = 12 + 12 + 12 = 3 \approx 1.73205081$
- Similarity Formula:$Sim(sa, sb) = 1 - (dab/dmax)$

Similarity between s_1 (CPC) and s_2 (CAD):

- $Sim(s1, s2) = 1 - (0.532094916/1.73205081)$
- $Sim(s1, s2) = 1 - 0.30720619$
- $\boldsymbol{Sim(s1, s2) \approx 0.692794}$

Similarity between s_1 (CPC) and s_3 (RCT):

- $Sim(s1, s3) = 1 - (0.182002747/1.73205081)$
- $Sim(s1, s3) = 1 - 0.10507941$
- $\boldsymbol{Sim(s1, s3) \approx 0.894921}$

Similarity between s_2 (CAD) and s_3 (RCT):

- $Sim(s2, s3) = 1 - (0.514781507/1.73205081)$
- $Sim(s2, s3) = 1 - 0.29721016$
- $\boldsymbol{Sim(s2, s3) \approx 0.702790}$

The following table summarizes the calculated similarity scores:

Table 3. Neutrosophic similarity and affinity levels among actors

Pair of Actors	Euclidean distance (d)	Similarity (Sim)	Affinity Level
CPC vs. CAD	0.532095	0.692794	Low (High Conflict)
CPC vs. RCT	0.182003	0.894921	High (Potential Alliance)
CAD vs. RCT	0.514782	0.702790	Low (High Conflict)

5. Discussion

The quantitative results obtained through the NTM offer a deep and nuanced view of the conflict, going beyond a simple qualitative description.

The most significant finding is the **high similarity (0.895)** between the Heritage Committee (CPC) and the Residents and Merchants (RCT). At first glance, their interests might seem distinct (historic preservation vs. everyday life), but the model reveals a deep structural affinity. Both groups share a **high aggregate Falsehood** (F1=0.975, F3=0.950), indicating a shared and outright rejection of the proposition that the museum is "beneficial and respectful." This convergence in rejection is the basis of a powerful **natural alliance** against the project.

On the other hand, the **low similarities** between the Architects' Collective (CAD) and the CPC (0.693) and the RCTs (0.703) quantify the **polarization** of the debate. The CAD operates from a truth logic centered on innovation (T2=0.950), which is in direct opposition to the truth logics of the CPC (centered on history, T1=0.600) and the RCTs (centered on identity, T3=0.500). This is not just a disagreement, it is a clash of value systems.

A crucial aspect that the model highlights is the **CPC's high degree of uncertainty** (I1=0.800). This value suggests that, despite its strong rejection (False), the committee is in a state of paralysis or uncertainty regarding certain aspects, such as the economic impact. This uncertainty makes it a **key player in the negotiation** . If the developers were able to present solid evidence that reduces this uncertainty, they could modulate the committee's position, although its fundamental opposition (F) remains.

6. Conclusions

This case study has demonstrated the capacity of the Neutrosophic Technarrative Model (NTM) to operationalize the analysis of multiperspectivism in architectural conflicts. By transforming complex narratives into quantifiable data, the model offers an accurate diagnosis of the relational dynamics between the actors involved.

The key findings of this analysis are:

1. **Conflict Quantification:** The model has successfully mapped the structure of the conflict, identifying a strong polarization between the project promoters (CAD) and the defenders of the status quo (CPC and RCT).

2. **Identification of Hidden Alliances:** A potentially very strong strategic alliance has been revealed between the Heritage Committee and the Residents/Merchants, based on a shared rejection of the project. This quantitative affinity (Sim≈0.895) legitimizes and strengthens their joint opposition.
3. **Detection of Intervention Points:** The high degree of uncertainty within the Heritage Committee (I1=0.800) is identified as the most vulnerable point and, therefore, the most strategic for potential mediation. Addressing this stakeholder's doubts could be the only way to resolve the conflict.

Ultimately, NTM has established itself as a powerful analytical tool for urban planners, architects, and mediators. It not only predicts where conflicts will arise, but also explains *why* , revealing the underlying logical and emotional structures. Its application allows for the design of more informed dialogue processes and directs negotiation efforts toward the points of greatest potential impact, fostering more inclusive and socially sustainable architectural decisions.

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