



MATHEMATICAL-SEMANTIC MODEL OF CONVERSATIONAL MEANING: INTENTIONALITY, IMPLICATURE, AND PRAGMATIC SPACE IN ODIA

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ABSTRACT. Meaning constitutes the foundation of language, shaping both its structure and interpretation. Among its various dimensions, conversational meaning is central, arising not solely from lexical content but from the interaction of speaker intention, context, and pragmatic function. Unlike literal meaning, which is relatively stable and context-independent, conversational meaning is dynamic, indeterminate, and constructed through interpretive processes. Drawing on the theoretical contributions of H. P. Grice, J. L. Austin, and Dan Sperber and Deirdre Wilson, this study explores how meaning emerges at the interface of lexical semantics and contextual relevance. It distinguishes between direct conversational meaning, expressed through metaphor, metonymy, presupposition, and politeness strategies, and cognitive conversational meaning, which relies on inference, implicature, irony, and suggestion. The study identifies a theoretical gap: the lack of a formal model to explain how conversational meaning is systematically generated. To address this, it proposes a mathematical-semantic framework based on linear principles that maps lexical meaning onto contextual interpretations. Conversational meaning is modeled as a structured interaction among context, intention, and discourse structure. This approach integrates semantic and pragmatic dimensions, offering implications for linguistic theory, natural language processing, and cognitive science by enabling structured analysis of ambiguity and interpretive variation.

Keywords. Conversational meaning, decomposition of meaning, semantic space, semantic field, cognitive conversational meaning, pragmatic space.

© Applicable Nonlinear Analysis

1. INTRODUCTION

Meaning constitutes the foundational basis of language, functioning as the interface between linguistic expressions and the conceptual world they represent. It enables language to encode and convey reality in complex and nuanced ways, while simultaneously constraining both the structure and interpretation of utterances. Within linguistic theory, meaning is commonly understood to operate through two interrelated dimensions: lexical meaning and conversational meaning. Lexical meaning refers to the conventional, explicit semantic content encoded in linguistic forms. In contrast, conversational meaning (CM) arises from context-dependent interpretation shaped by speaker intention, situational factors, and pragmatic inference.

A central motivation for the present study lies in the observation that meaning is not a static property of linguistic expressions but an emergent phenomenon grounded in use. While utterances often convey multiple layers of meaning simultaneously, certain discourse practices—such as casual, phatic, or tease talk—reduce intentional load, thereby weakening or even suspending conversational meaning. This suggests that conversational meaning is not uniformly present across all utterances, but is contingent upon degrees of intentionality and cognitive engagement. Such variability raises important theoretical

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questions regarding the conditions under which conversational meaning emerges and the mechanisms through which it is constructed [29].

Furthermore, conversational meaning does not always presuppose fully propositional lexical content. Non-propositional elements—such as silence, discourse markers, interjections, or even semantically anomalous expressions—can generate rich interpretations when situated within an appropriate context. For instance, the expression

(1) *The yellow fog that rubs its back upon the window-panes.*

is lexically anomalous yet pragmatically interpretable within a literary framework, where it evokes an atmospheric or symbolic meaning. This demonstrates that conversational meaning can, in certain cases, override or supplement lexical meaning, highlighting the interpretive power of context and intention.

The relationship between lexical and conversational meaning is not asserted here as a literal algebraic identity. Rather, the paper investigates whether a linear representation can provide a useful approximation. If a and b are vectors in a common semantic representation space and f is a linear map, then

$$f(a + b) = f(a) + f(b).$$

In the example of “yellow fog,” the vector components may encode lexical features, while the map f may represent a context- and intention-sensitive transformation. The equation therefore expresses a modeling assumption, not a claim that metaphorical interpretation is intrinsically linear in every instance.

Here, linearity is mathematical and, more specifically, vectorial. A complex pragmatic meaning is modeled as a composition of simpler lexical, contextual, and intentional representations [13]. A simple lexical representation functions as an objective input, while the resulting interpretation is context-sensitive. Subjective meaning can be seen in different interpretations and in meaning-making, which, together, are called pragmatic or conversational meaning. This cognitive transformation of meaning as meaning sharing, shifting, creating, and altering is represented in the present study by a linear relationship between lexical meaning and interpretive meaning.

Despite extensive research in semantics and pragmatics, the relationship between lexical meaning and conversational meaning remains insufficiently formalized. Existing approaches—particularly probabilistic and logical models—have struggled to adequately capture the dynamic, context-sensitive, and cognitively mediated nature of meaning construction. Moreover, the boundary between semantics and pragmatics remains a site of theoretical ambiguity, especially when meaning cannot be inferred directly from linguistic form alone [32].

This paper addresses these gaps by proposing that the relationship between lexical meaning and conversational meaning can be represented by a linear mathematical model under explicit assumptions. Specifically, it advances the hypothesis that complex pragmatic meanings may be compositionally approximated from simpler lexical meanings through a transformation mediated by cognition and intentionality. In this framework, lexical meaning is treated as an objective input, which is transformed into subjective, context-dependent meaning through a vectorial cognitive process. Such a model provides a principled, computationally tractable account of meaning construction, conceptualized here as linear semantics.

The primary research problem, therefore, is to determine how conversational meaning is generated, how it may operate independently of lexical meaning, and why it exhibits variation across contexts and speakers. More specifically, this study seeks to answer the following questions:

[1] How is conversational meaning cognitively constructed?

- [2] In what sense can conversational meaning be independent of lexical meaning?
- [3] What accounts for variability in conversational meaning?
- [4] How can the relationship between lexical and conversational meaning be formally modeled within a linear mathematical framework?

In response to these questions, the paper develops a formal model in which intentionality functions as a scalar weight or, more generally, as a projection operator that transforms lexical meaning into conversational meaning. By treating meaning construction as a linear cognitive process, the study seeks to complement, rather than replace, nonlinear, probabilistic, and logical approaches to pragmatic interpretation.

The structure of the paper is as follows: Section 1 introduces the theoretical background, with Section 1.1 reviewing relevant literature and Section 1.2 presenting a classification of conversational meaning. Section 2 discusses the relevance of a mathematical model for meaning analysis. Section 3 outlines the underlying mathematical assumptions. Section 4 conceptualizes intention as scalar projection. Section 5 formalizes conversational meaning within the proposed framework. Section 6 applies the model to Odia data, and Section 7 concludes the study.

1.1. Literature review. In linguistic theory, meaning is broadly classified into two principal types: lexical meaning and conversational or pragmatic meaning. Lexical meaning refers to the conventional semantic content encoded in linguistic expressions, typically represented in dictionaries and grounded in relatively stable form–meaning relations. In contrast, conversational meaning arises through context-sensitive interpretation shaped by speaker intention, situational factors, and inferential processes. This distinction has been central to both semantic and pragmatic inquiry.

TABLE 1. Comparative features of lexical and conversational meaning

Type of meaning	Relation to truth	Composition	Function	Representational space	Nature	Source of interpretation
Lexical meaning	Contributes to conventional or truth-conditional content	Compositional under semantic rules	Encodes reference and sense	Provides the lexical-semantic representation	Structural and relatively conventional	Lexicon and grammar
Conversational meaning	Shaped by context and speaker intention	Combines linguistic, contextual, and situational factors	Performs pragmatic functions	Constructs a context-sensitive pragmatic representation	Dynamic and inferential	Context, discourse, and interlocutors

The study of conversational meaning has been significantly influenced by foundational contributions in the philosophy of language and pragmatics. J. L. Austin challenged the view that language is merely descriptive by proposing that utterances are performative actions. According to Speech Act Theory, the meaning of an utterance lies not only in what it denotes but also in what the speaker does with it—such as promising, ordering, or warning. Central to this account is the notion of illocutionary force, which captures the speaker’s intention as realized through linguistic convention [1].

Building on this framework, H. P. Grice introduced the theory of conversational implicature, which explains how speakers convey meanings that go beyond the literal content of their utterances. Grice’s Cooperative Principle and associated maxims—quantity, quality, relation, and manner—demonstrate

how interlocutors rely on shared assumptions and contextual reasoning to infer intended meanings. In this sense, conversational meaning is inherently implicit and arises through interpretive processes guided by rational cooperation [10, 11].

A further development is found in Relevance Theory, proposed by Dan Sperber and Deirdre Wilson, which reconceptualizes communication as a cognitive process driven by relevance. According to this model, every act of communication carries an expectation of optimal relevance, whereby the listener seeks to maximize cognitive effect while minimizing processing effort. Conversational meaning, therefore, emerges from the interaction between linguistic input and contextual assumptions within a cognitively constrained inferential system [31, 35, 38, 8].

Beyond these foundational theories, a wide range of scholars have contributed to the study of meaning across semantics and pragmatics. In semantics, John Lyons emphasizes the structural organization of meaning, while Ruth Kempson develops approaches that account for context-sensitive interpretation. Jerrold J. Katz proposes theories of semantic structure, and Cruse provides detailed accounts of lexical semantics, distinguishing between different layers of meaning. These approaches collectively highlight that even lexical meaning, though relatively stable, interacts with broader interpretive mechanisms [25, 19, 15, 16, 17, 5, 6].

In pragmatics and cognitive linguistics, scholars such as Stephen C. Levinson and George Lakoff further emphasize the role of inference, embodiment, and conceptual structure in meaning construction. These frameworks view conversational meaning as dynamic, negotiated, and deeply embedded in cognitive and social processes. Similarly, cross-cultural perspectives, such as those presented by Kunjuni Raja, reveal parallels between Western pragmatic theories and classical Indian approaches to meaning [24, 22, 23, 21].

Despite this extensive body of work, several fundamental challenges remain unresolved. First, conversational meaning is inherently underdetermined by linguistic form, making it difficult to specify how meaning encodes complex information about the world. Second, its partly uncoded nature complicates the relationship between literal and non-literal meaning, particularly in cases of ambiguity and multiple interpretations. Third, existing theories do not fully explain how speakers and listeners systematically resolve such ambiguities in real-time communication. These challenges point to a broader limitation: the absence of a unified formal framework capable of modeling the interaction between lexical meaning, contextual information, and speaker intention [8].

Traditional approaches to pragmatics, including Gricean implicature and Relevance Theory, provide powerful descriptive and inferential accounts of meaning construction. However, they remain largely qualitative and rely on heuristic principles rather than a single explicit formal mechanism. While such models successfully capture the interpretive flexibility of language, they do not by themselves offer a common numerical representation for measuring or computationally representing meaning.

Recent developments in formal pragmatics, such as game-theoretic, probabilistic, and Bayesian models, have attempted to address this limitation by introducing mathematical tools into the analysis of meaning. These models treat communication as a system of rational inference and decision-making, enabling more precise representations of pragmatic reasoning. Nevertheless, the present paper focuses on a different question: whether a linear representation can capture selected compositional and contextual aspects of meaning construction [26].

In this context, mathematical modeling offers a framework of quantifiable variables and explicit operations. It enables the representation of meaning as a function of lexical input, contextual parameters, and speaker intention, thereby introducing analytical rigor, computability, and predictive capacity. Within such a framework, conversational meaning can be conceptualized as emerging from structured interactions among these components, potentially within a vectorial or multidimensional semantic space.

The present study builds on these insights by proposing that contextual and intentional meanings constitute interrelated pragmatic spaces, each containing distinct subspaces that contribute to interpretation. It argues for developing a mathematical model that formalizes the relationship between lexical and conversational meaning via systematic transformations. Such an approach aims to move beyond descriptive accounts toward a formally grounded theory of selected aspects of meaning construction.

In summary, while existing semantic, pragmatic, and cognitive frameworks have significantly advanced our understanding of conversational meaning, they have not fully addressed the need for a unified representation of lexical, contextual, and intentional variables. The proposed approach seeks to fill this gap while acknowledging that the linear model is an idealization whose empirical adequacy must be tested.

1.2. Classification of conversational meaning. Conversational meaning manifests in various linguistic forms and follows diverse communicative strategies. Through these forms, speakers project meaning onto context, either directly or indirectly. Based on this distinction, conversational meaning can be broadly classified into two types: direct conversational meaning and cognitive or indirect conversational meaning. This distinction is analytical, not absolute, and is based on the degree of inferential load [36, 37].

1.2.1. Direct conversational meaning. Direct conversational meaning arises when the linguistic form of an utterance establishes an immediate relationship between its literal expression and the speaker's contextual or intentional meaning. This type of meaning is often conveyed through linguistic devices such as metonymy, oxymoron, myth, symbol, imagery, speech acts, politeness strategies, and proverbial expressions.

1.2.2. Cognitive conversational meaning. Cognitive conversational meaning diverges from direct forms by depending more heavily on inferential reasoning than on direct contextual mapping. This form includes conversational implicature, irony, suggestive meaning, and indirect speech. It requires the hearer to engage in cognitive processing to recover the speaker's intended meaning.

2. RELEVANCE OF MATHEMATICAL MODELING

A mathematical model grounded in formal reasoning offers a systematic approach to the analysis of conversational meaning. Such a model can facilitate the identification of semantic ambiguities, represent multiple possible interpretations of a single utterance, and describe how interpretive uncertainty is reduced in a particular context. By formalizing these processes, a mathematical model can provide a clearer account of speaker intention, communicative goals, and the experiential dimensions embedded in language use.

This study proposes a structured framework for modeling conversational meaning by representing the interaction among three key components:

- External context, including situational variables and environmental cues.
- Speaker intention, including pragmatic goals and communicative objectives.
- Discourse structure, including semantic relationships within and across utterances.

Here, the model is vectorial. It treats meaning as a point or direction in a multidimensional semantic-pragmatic space. Each utterance or conversational act corresponds to a vector whose coordinates represent quantifiable dimensions of lexical semantics, context, and intention:

- Lexical semantics (L): encoded, dictionary-based, or compositional meaning.
- Context (C): external and situational factors that influence interpretation.
- Intention (I): speaker-oriented pragmatic and cognitive goals.

If L , C , and I are represented as vectors in a common vector space V , the meaning vector M may be represented conceptually as

$$M = \alpha L + \beta C + \gamma I,$$

where α , β , and γ are scalar weights representing the relative influence of lexical, contextual, and intentional dimensions. The resulting M is a composite meaning vector—the realized conversational meaning of the utterance. This formulation assumes meaning composition through vector addition and scalar weighting; it does not imply that every interpretation is exactly linear.

Such a model can complement existing theoretical constructs in pragmatics and semantics, including Grice's theory of implicature, theories of presupposition, and theories of entailment. Its contribution is to provide a common representational mechanism for describing their interaction in context.

A formalized mathematical model can also connect the traditionally distinct domains of lexical semantics and pragmatic meaning. This integration would contribute to a more comprehensive theoretical framework that encompasses both coded or literal and uncoded or contextual aspects of meaning construction.

Beyond its theoretical value, a mathematical model of conversational meaning has practical implications for cognitive science and artificial intelligence. By mapping the relationship between speaker cognition and the semantic structure of language, such a model can serve as an interface between human cognition and machine interpretation. It may support natural language processing systems in handling conversational meaning with greater accuracy and nuance, provided that the relevant representations and weights can be learned or estimated from data.

3. MATHEMATICAL ASSUMPTIONS

The theoretical foundation of this study is grounded in linear vector-space theory. The terms *semantic field* and *semantic space* are used in their linguistic and representational senses and should not be confused with the algebraic terms *field*, *group*, or *vector space*. Let $\mathbb{F}$ denote a scalar field, such as $\mathbb{R}$, and let V denote a vector space of semantic representations over $\mathbb{F}$.

A vector space represents a formal space in which meaning representations can be combined through vector addition and scaled through scalar multiplication. A linguistic unit is mapped into this space by a representation function. These operations may model the blending, modification, narrowing, or expansion of semantic content, but they do not by themselves establish a complete theory of natural-language meaning.

The intentional and contextual meanings conveyed in an utterance can be formally conceptualized as representations in a semantic space. A semantic space is understood as a representational space in which lexical, contextual, and intentional features can be combined. These operations are analogous to vector addition and scalar multiplication in vector-space theory.

A linguistic semantic field is defined by the relevant lexical and propositional relations in an utterance, whether at the level of a sentence, phrase, or construction. It is not, in general, an abelian group: words and constituents do not form a group merely because they can be combined, and changes in word order can alter grammaticality, information structure, or meaning. The vector-space operations introduced below belong to the mathematical representation of meaning, not directly to the language itself.

A semantic representation may be decomposed into multiple subrepresentations, each corresponding to a particular contextual interpretation. Within this framework, the pragmatic space can contain multiple subspaces or regions that reflect contextual and intentional nuances. These are modeling constructs rather than claims that every interpretation is literally a subspace in the strict algebraic sense.

Based on this theoretical model, the following six principles are proposed:

- Any utterance can be associated with a linguistic semantic field, denoted by $\mathcal{S}$.

- The semantic field can be decomposed into lexical, propositional, contextual, and intentional features.
- The resulting representations allow literal and pragmatic information to coexist.
- The pragmatic representation depends on external conditions, including speaker intention and context.
- External conditions can be modeled by scalar weights, vectors, or linear projection operators.
- The resulting pragmatic spaces may overlap, be approximately independent, or be dependent, depending on the chosen representation.

Illustrative example.

(2) *April is the cruelest month.*

In this example, the linguistic semantic field $\mathcal{S}$ encodes the sentence's conventional content. A contextual representation may include historical, cultural, or literary information that shapes its pragmatic interpretation. The pragmatic space allows the inference that the speaker characterizes April as cruel, not because of a literal attribute of the month, but because of personal or symbolic associations.

This theoretical framework provides the basis for a mathematical model of conversational meaning, incorporating both semantic fields and their projected pragmatic spaces. Figure 1 illustrates how lexical meaning can be situated within a three-dimensional pragmatic space.

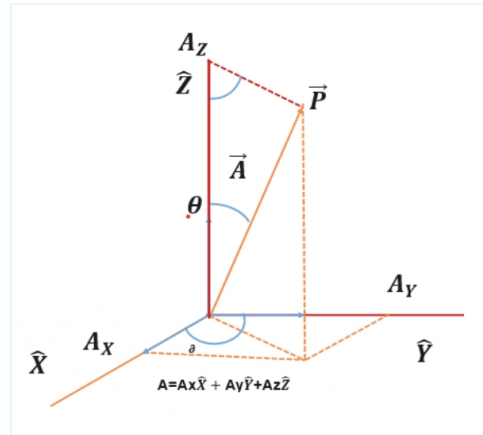


FIGURE 1. Three-dimensional pragmatic space

3.1. Mathematical representation of pragmatic spaces. Let $V = \mathbb{R}^3$ for illustrative purposes, with an orthonormal basis $\{\mathbf{e}_x, \mathbf{e}_y, \mathbf{e}_z\}$. A lexical representation $\mathbf{A} \in V$ can be written as

$$\mathbf{A} = A_x \mathbf{e}_x + A_y \mathbf{e}_y + A_z \mathbf{e}_z.$$

The use of an orthonormal basis is a modeling choice. It does not imply that the corresponding linguistic dimensions are theoretically independent.

For the utterance *April is the cruelest month*, the three coordinates may be interpreted as follows:

Illocutionary coordinate (X -axis): represents the speaker's intentional force, such as asserting, questioning, requesting, committing, or declaring. These categories are associated with the analysis of speech acts, although they need not be orthogonal dimensions in a linguistic theory [1, 30].

Locutionary coordinate (Y -axis): represents the linguistic form and conventional content of the utterance.

Perlocutionary coordinate (Z -axis): represents the anticipated or observed effect of the utterance on the listener, such as persuading, alarming, inspiring, or confusing.

Thus, vector $\mathbf{A}$, corresponding to a representation of the utterance, is projected across these coordinates. Each projection represents a distinct analytic layer of interpretation, enabling a formal description of how conversational meaning may arise from the interaction between literal content, speaker intention, and listener reception.

3.2. Mathematical representation. The components of the semantic representation corresponding to the utterance *April is the cruelest month* may be defined as follows:

- Lexical component (A_y): represents the immediate lexical interpretation of the utterance—its surface-level semantic content as encoded in the linguistic structure.
- Illocutionary component (A_x): captures the intentional meaning underlying the utterance. In a literary context, this may reflect an implicit commentary on seasonal experience or cultural memory.
- Perlocutionary component (A_z): encodes the anticipated or observed effect generated by the speaker's intention and the hearer's interpretation.

Accordingly, the semantic representation of the utterance may be written as

$$\mathbf{A} = A_x \mathbf{e}_x + A_y \mathbf{e}_y + A_z \mathbf{e}_z.$$

Here, A_x = projection associated with illocutionary force, A_y = locutionary or lexical content, and A_z = projection associated with perlocutionary effect.

This formulation captures a decomposition of linguistic meaning into lexical, intentional, and effect-related components. The speaker's intention and the contextual conditions determine the orientation and magnitude of each projection within the chosen representation.

4. INTENTION AS SCALAR PROJECTION

According to Franz Brentano, intentionality is the “directedness” of a mental state toward an object, whether physical or abstract. In this framework, intentionality is understood as a purpose-driven psychological state in which the content of the intention is represented in the mind. It plays a role in conscious and unconscious cognitive processes involved in speaking, listening, writing, and reading.

Within this context, intention is fundamental in selecting lexical items and communicative strategies, assigning value to utterances, and shaping the goals and purposes of interaction. A speaker's motivational orientation significantly influences the choice of linguistic codes and communicative style. Common intentional goals may include expressing respect, exerting authority or power, delivering suggestions or motivation, and avoiding face-threatening acts.

In the construction of conversational meaning, the contextual object of communication is mediated by the speaker's intention. This study adopts an Intentionality Hypothesis, proposing that intentionality functions as a scalar projection in the simplified model. More generally, intention may be represented by a vector or a linear operator. The scalar version is used here for clarity and tractability.

4.1. Types of intention. Within the framework of conversational meaning, intentions may be classified into two analytical types:

Subjective intention: refers to the direct mental representation of the speaker's perceptions, beliefs, and cognitive states. It reflects the speaker's internal perspective and conceptualization of meaning.

Objective intention: denotes the influence of external contextual factors—such as social norms, situational demands, or cultural expectations—on the speaker's communicative intention.

These two dimensions of intention jointly shape the interpretation of coded meanings in discourse. They contribute to the generation of multiple conversational spaces, which can be modeled as projections within a semantic representation, capturing the interaction between internal cognition and external context.

4.2. Mapping intentionality to conversational meaning. Conversational meaning is fundamentally shaped by the speaker's intention, which functions as a pre-linguistic internal mental state that precedes a communicative act. Intentions differ from desires in that they are not merely expressions of wishes or preferences; rather, they represent deliberate and goal-oriented psychological states concerning what the speaker intends to do or communicate.

Consider the following example:

(3) *The world today is not the world of 2001.*

This utterance yields multiple interpretations, depending on the contextual framing and the interpreter's cognitive orientation. Possible interpretations include:

- (E_1) The world has undergone significant changes.
- (E_2) The speaker has experienced personal transformation.
- (E_3) Countries such as India have evolved politically or socially.
- (E_4) The speaker is now more open to forming relationships.
- (E_5) The economic downturn has ended.
- (E_6) Global tolerance for terrorism has diminished.
- (E_7) Crises related to natural disasters have stabilized.

The examples above, therefore, illustrate a hypothesis rather than a reported empirical finding. They underscore the role of contextual knowledge and disciplinary background in shaping both the speaker's intended meaning and the listener's inferred interpretation. Meaning construction is dynamically influenced by interlocutors' cognitive, cultural, and epistemic backgrounds.

4.3. Context-modifying intentions of the speaker. External context plays a significant role in shaping the speaker's intention. Motivated by contextual influences, speakers may communicate accurate information, misinformation, or disinformation. These contextual influences can be broadly categorized into five types:

- Historical context (H).
- Social context (S).
- Political context (P).
- Economic context (E).
- Linguistic context (L).

4.4. Linear mapping between context and speaker intentionality. The speaker's intentional state is not independent of context; rather, it is dynamically modulated by multiple contextual factors. Let the context vector be

$$\mathbf{c} = (H, S, P, E, L)^T,$$

and let

$$\mathbf{w} = (w_H, w_S, w_P, w_E, w_L)^T$$

be a vector of context weights. A scalar contextual modulation can then be written as

$$\mu(\mathbf{c}) = \mathbf{w}^T \mathbf{c} = w_H H + w_S S + w_P P + w_E E + w_L L.$$

If ι denotes the original scalar representation of intention, the contextually modified intention is

$$\iota' = \iota \mu(\mathbf{c}).$$

This equation is a simplified linear model. In a richer model, ι could be a vector and the modulation could be represented by a matrix.

For example:

- When historical context (H) exerts a dominant influence, the speaker may incorporate mythological or legendary references into discourse.

- Under the influence of social context (S), the speaker may utilize expressions of power, social positioning, or various illocutionary acts.
- In politically charged environments (P), intentionality may be shaped by rhetorical strategies that align with political ideologies.
- When economic factors (E) are prominent, speakers may employ idiomatic expressions, commercial metaphors, or financial jargon.
- Under the influence of linguistic context (L), the speaker may use figurative devices such as metonymy, oxymoron, irony, implicature, and other forms of indirect speech acts.

This model emphasizes that intentionality is not a static or purely internal construct; rather, it is a context-sensitive function that interacts dynamically with socio-historical, economic, and linguistic domains to construct conversational meaning.

5. FORMALIZATION OF CONVERSATIONAL MEANING

5.1. Semantic field and pragmatic space. A *pragmatic space* is modeled as a contextualized representation within the linguistic semantic field of an utterance.

Semantic field (S). A semantic field, in linguistic terminology, is a set of words or expressions related by a common conceptual domain. It is not an algebraic field and does not automatically satisfy the axioms of an abelian group or vector space. In the present model, the semantic field is mapped into a mathematical representation space V .

Let

$$\phi : S \times C \times \mathcal{I} \longrightarrow V$$

be a representation function, where C is a space of contexts, and $\mathcal{I}$ is a space of intentional states. The output $\phi(s, c, i)$ is a pragmatic representation of a semantic field element s under context c and intention i .

The bare proposition of an utterance can therefore be interpreted as a semantic core, while its contextual and intentional extensions are represented in V . This distinction avoids identifying subject-predicate composition with commutative addition. In natural language, word order is generally meaningful, and syntactic rearrangement does not preserve meaning in every case.

Consider the following schematic examples:

- (4.A) John ate the beans.
- (4.B) The beans, John ate.
- (4.C) It was the beans that John ate.
- (4.D) The beans—John ate them.
- (4.E) John ate them, the beans.

Under suitable discourse conditions, these sentences convey the same basic proposition: John ate the beans. They do not, however, have identical grammatical structures, presuppositions, information structures, or pragmatic effects. They can therefore be represented by related points in a semantic-pragmatic space rather than by elements of an abelian sentence group.

5.2. Semantic space as pragmatic space. A semantic space is modeled here as a vector space or, more generally, as a subset of a vector space. Let V be a vector space over $\mathbb{F}$, and let X and Y denote representations of two linguistic components. If both representations belong to V , then vector addition satisfies

$$X + Y = Y + X.$$

This is a property of the mathematical representation, not a claim that the corresponding linguistic constituents may be freely reordered without changing grammaticality or interpretation.

Illustrative examples:

- (5) [Ram (NP) [eats mango (VP)]].
- (6) [Mango (object) [Ram (NP) eats (V) ...]].
- (7) *[Eats mango [Ram]].

Sentences 5 and 6 can be associated with the same propositional core despite differing syntactic structures. Sentence 7 is not standard English syntax, but it may be treated as a schematic representation of a predicate–argument relation. Their structural differences, therefore, belong to the linguistic analysis, whereas vector addition belongs to the chosen representation.

Consider also:

- (8) Ram does not eat mango.
- (9) Mango does not eat Ram.
- (10) Mango [Ram does not eat].

Sentence 10 is grammatical but expresses a meaning that is a different proposition from sentence 8. Sentence 9 is marked as ungrammatical in the intended reading. These examples do not show a violation of vector-space axioms; they show that linguistic composition is sensitive to syntax, lexical selection, negation, and argument structure.

From this analysis, we may propose the following representational assumption:

$$\text{utterance } S \longmapsto \text{semantic representation } m(S) \in V.$$

In discourse, the utterance extends beyond its semantic core to encompass pragmatic variation and speaker intention. This transformation can be written as

$$m(S, c, i) = \phi(S, c, i),$$

where c and i account for contextual and intentional variation.

5.3. Semantic space as a vector module over a scalar field. A semantic representation space can be formally conceptualized as a vector space. Let V be a vector space over the scalar field $\mathbb{F}$. It is equipped with vector addition and scalar multiplication and satisfies the standard vector-space axioms, including commutative addition, an additive identity, additive inverses, and compatibility of scalar multiplication with addition.

In the context of linguistic meaning, a representation $m(S) \in V$ may be augmented with contextual and intentional components. Intentionality acts as a scalar weight in the simplified model, while a richer model could represent it by a vector or a linear operator.

For instance, consider the sentence:

- (11) *The world today is not the world of 2001.*

While this sentence has a relatively stable semantic core, its utterance meaning can manifest through a range of context-dependent interpretations:

- (E_1) Today's world has changed.
- (E_2) I am not the same person.
- (E_3) Countries such as India are no longer what they were in 2001.
- (E_4) I am now open to forming a friendship.
- (E_5) The economic slowdown is over.
- (E_6) Terrorism is no longer tolerated.
- (E_7) The earthquake situation has been resolved.
- (E_n) ...

Let $v_1, \dots, v_n \in V$ represent these possible interpretations. A context-sensitive conversational meaning can then be represented as a weighted combination

$$m = \sum_{i=1}^n \lambda_i v_i,$$

where the coefficients λ_i encode the relevance or activation of each interpretation. The coefficients need not be probabilities unless an additional probabilistic normalization is imposed.

Thus, while the sentence maintains a relatively stable semantic core, its pragmatic realization yields a family of possible representations, each shaped by context and intention. Scalar multiplication corresponds to the application of an intentional weight to a representation, not to the creation of a new algebraic field.

5.4. Scalar intentionality. Intentionality is a fundamental component of human cognition, rooted in our understanding of mind and agency. It refers to the capacity to form intentions, typically oriented toward future actions. According to Bratman, intentionality also plays an important role in coordinated and cooperative interaction between speaker and listener [3].

In the context of linguistic meaning, a semantic representation satisfies the following modeling assumptions:

- Linguistic components can be composed into a semantic representation.
- Different surface realizations may preserve a related propositional core under suitable conditions.
- Scalar multiplication can represent the influence of speaker intentionality on a semantic representation.

These assumptions constitute a minimal mathematical framework for understanding selected aspects of meaning construction in discourse. They are not claims that natural-language meanings form a vector space without further empirical and formal specification.

For example, if X represents a subject-related component and Y represents a predicate-related component, their representation may be written as

$$m(X, Y) = X + Y.$$

If ι represents intentional weighting, the context-sensitive representation may be written as

$$m_\iota(X, Y) = \iota m(X, Y).$$

More generally, if $v_1, \dots, v_n$ are basis or feature vectors, then $\sum_{i=1}^n a_i v_i$ is a semantic representation, and an intentional transformation may be defined by a linear map $T_\iota : V \rightarrow V$:

$$T_\iota \left(\sum_{i=1}^n a_i v_i \right) = \sum_{i=1}^n a_i T_\iota(v_i).$$

A representation of a set of interpretations may therefore be written as

$$V_{\text{int}} = \text{span}\{v_1, v_2, \dots, v_n\}.$$

Here, the vectors v_i represent features or interpretation directions, while their coefficients represent the degree to which those directions are activated. The magnitude and direction of a vector are properties of the representation chosen for the model; they are not directly observable linguistic quantities without an operational definition.

5.5. Semantic subspace. When several interpretations are represented in a vector space, their linear span is a subspace. The interpretations themselves are vectors or points; they are not automatically subspaces.

A subset U of V is a subspace of V if and only if it contains the zero vector and is closed under vector addition and scalar multiplication. If $v_1, \dots, v_n \in V$, then

$$\text{span}\{v_1, \dots, v_n\} = \left\{ \sum_{i=1}^n a_i v_i : a_i \in \mathbb{F} \right\}$$

is a subspace of V .

The three basic properties are:

- The zero vector $\mathbf{0}$ belongs to the span.
- The span is closed under addition:

$$\left(\sum_{i=1}^n a_i v_i \right) + \left(\sum_{i=1}^n b_i v_i \right) = \sum_{i=1}^n (a_i + b_i) v_i.$$

- The span is closed under scalar multiplication:

$$c \left(\sum_{i=1}^n a_i v_i \right) = \sum_{i=1}^n (ca_i) v_i.$$

Thus, the span of $v_1, \dots, v_n$ is a subspace of V . If the set of relevant interpretation vectors is finite, the resulting span is finite-dimensional, although the full space of possible interpretations may be much larger.

5.6. Linearity in semantic space. Linearity concerns how representations combine under addition and scalar multiplication. It does not follow merely from the fact that several interpretations exist. Some interpretation vectors may be linearly independent, while others may be linearly dependent.

5.6.1. Linearly independent interpretations. A list $v_1, \dots, v_n$ of vectors in V is linearly independent if the only coefficients $a_1, \dots, a_n \in \mathbb{F}$ satisfying

$$a_1 v_1 + \dots + a_n v_n = \mathbf{0}$$

are

$$a_1 = \dots = a_n = 0.$$

In the present application, linearly independent vectors represent distinct directions in the chosen feature space that cannot be reconstructed exactly from one another. Distinct interpretations are not necessarily linearly independent; independence must be assessed relative to the representation.

5.6.2. Linearly dependent interpretations. A list $v_1, \dots, v_n$ of vectors in V is linearly dependent if there exist coefficients $a_1, \dots, a_n \in \mathbb{F}$, not all zero, such that

$$a_1 v_1 + \dots + a_n v_n = \mathbf{0}.$$

For example, the following expressions may be close in meaning in a particular context:

- (12.1) John likes Mary.
- (12.2) John knows Mary.
- (12.3) John loves Mary.
- (12.4) John helps Mary.
- (12.5) John cares for Mary.

These verbs are not all synonyms, and semantic similarity alone does not prove linear dependence. If their representations contain overlapping features, they may be correlated or approximately dependent. Exact linear dependence requires the equation above to hold in the chosen representation.

5.7. Basis and dimension of semantic space. A basis of a vector space V is a list of vectors that is linearly independent and spans V . Thus, a basis has two defining properties: linear independence and spanning.

If conversational interpretations of a sentence form a finite-dimensional representation space V , then that space has a basis and a well-defined dimension. A vector $v \in V$ can be written uniquely in the form

$$v = a_1 v_1 + \cdots + a_k v_k,$$

where $v_1, \dots, v_k$ is a basis of V and $a_1, \dots, a_k \in \mathbb{F}$.

The dimension of a finite-dimensional vector space is the length of any basis and does not depend on the particular basis chosen. The number of observed interpretations need not equal the dimension: several interpretations may share a direction, and a single interpretation may involve several basis directions.

A semantic representation may be finite-dimensional for computational purposes even if the underlying space of possible contexts and interpretations is effectively very large or infinite. This is an approximation that requires validation against data.

If U is a subspace of a finite-dimensional space V , then $\dim U \leq \dim V$, with equality possible when $U = V$. The subspace dimension is not necessarily strictly smaller.

Finally, the lexical meaning of a sentence is represented by a semantic core $s \in \mathcal{S}$, and this core is mapped into a semantic space V whose contextual and intentional projections produce conversational interpretations. The subspaces of V may be linearly independent or dependent, depending on the chosen representation and the relations among the interpretations.

6. CONVERSATIONAL MEANING IN ODIA: A SEMANTIC-PRAGMATIC PERSPECTIVE

Odia is one of the classical languages of India and serves as the official language of the eastern Indian state of Odisha. A rich cultural and literary tradition characterizes the language, and it exhibits a range of conversational strategies. In Odia, conversational meaning is significantly shaped by the speaker's intentionality, which governs how utterances are interpreted within context.

6.1. Direct conversational meaning.

6.1.1. Speech acts.

A. (13) Assertive speech acts.

Rām kahilā pruthibira samasta loka sikhita hebā uchit.

Ram tell-PST world-GEN all people educated be-INF should

“Ram said that all people in the world should be educated.”

In assertive speech acts, the speaker presents, reports, or commits to a proposition. The same form may also function as advice or a warning, depending on context. The speaker's intentionality is inferred from the lexical field and the discourse situation, including verbs such as *kahiba* (to say), *upadesadeba* (to suggest), *pramanakariba* (to prove), *chetabanideba* (to warn), *nibarankariba* (to prevent), and *suchi-takariba* (to inform). The utterance above is a directive act.

B. (14) Directive speech acts.

Balarām mote pachārilā samaya kete.
 Balarām me-DAT ask-PST time what
 “Balarām asked me what time it was.”

In directive speech acts, the speaker attempts to get the hearer to perform an action or provide information. These intentions may be expressed through orders, commands, requests, recommendations, or questions. Relevant lexical items include *pachariba* (to ask), *deba* (to give), *jogaideba* (to provide), *kariba* (to do), *nia* (to take), and *pariba* (can). Here, the utterance is interrogative, but it has a directive act.

C. (15) Declarative speech acts.

Kāli āmara nuā ghara pachistā hebā.
 Tomorrow we-GEN new house inauguration be-FUT
 “Tomorrow our new house will be inaugurated.”

The example above is grammatically declarative and functions primarily as an announcement or prediction. It should not automatically be classified as a declaration in Searle’s technical sense, because a declaration changes a social or institutional state of affairs only when uttered by an authorized speaker in an appropriate context. Genuine declarations include naming, inaugurating, announcing, disclosing, and sentencing.

D. (16) Commissive speech acts.

Kānda banda kale icecream debi.
 cry-stop-COND icecream give-FUT.2SG
 “If you stop crying, I will give you an icecream.”

The example is more naturally interpreted as a conditional prediction or directive than as a commissive, unless the discourse context makes the speaker responsible for the future action. Commissive speech acts reflect the speaker’s commitment to a future course of action and may include promising, offering, threatening, or undertaking an obligation.

E. (17) Expressive speech acts.

Dhanyabāda, tume bahuta bhala kāma karicha.
 thanks you.2SG very good work do-LNK-aux.PFV-PRS.2SG
 “Thank you; you have done very good work.”

Expressive speech acts convey the speaker’s psychological attitude toward a presupposed state of affairs. The pragmatic space is constructed through emotional or evaluative expressions, including praise, pardon, forgiveness, congratulations, and gratitude.

6.1.2. (18) Politeness in conversational meaning.

Mu jānipare tume kebe āsila.
 I know-can you.2SG when come-PST.2SG
 “Can you tell me when you came?”

Politeness is a contextual pragmatic dimension. The example may function as an indirect question, and its politeness value depends on prosody, social relations, and the surrounding discourse. The sense of inquiry is part of the utterance’s conventional content, whereas the degree of deference or face management is pragmatic.

6.1.3. (19) *Pragmatic space of power.*

Mu dekhibi tume kemiti ehā karucha.

I see-FUT.1SG you.2SG how this do-aux-PRS.2SG

“I will see how you do this!”

This sentence may express a threat to the hearer. Its lexical meaning concerns observing or checking someone’s work, but the contextual meaning can express authority or anger. The threat is therefore not supplied by the lexical content alone; it is inferred from the conventional relationship and the interactional context.

The modulation functions of politeness and anger can be represented in the simplified model by linear transformations. If m is the semantic representation of an utterance, then

$$m_P = \mathcal{T}_P(m) = w_P m$$

represents a politeness-weighted representation, and $m_A = \mathcal{T}_A(m) = w_A m$ represents an anger- or power-weighted representation. Here w_P and w_A are context-sensitive scalar weights. A more general model could replace these scalars with linear operators.

If

$$m = \sum_{k=1}^n c_k v_k,$$

then linearity gives

$$m_P = \sum_{k=1}^n c_k w_P v_k, \quad m_A = \sum_{k=1}^n c_k w_A v_k.$$

The vectors m_P and m_A represent pragmatic regions or directions associated with politeness and anger over the same semantic core.

6.1.4. *Myth.* A myth is a story based on the beliefs and mindsets of a community. It can offer special insights into the truth of life. This context of truth can function as a pragmatic space in conversational meaning and may be interpreted through lexical meaning.

(20) *Bhīma bala Kuntī-ku jaṇā.*

Bhīma’s strength Kunti-ACC know-PRS.PASS.1SG

“His mother can assess her son’s strength.”

In the context of the Mahabharata, Bhīma may represent the son of any mother. The lexical meaning is that Kunti, as Bhīma’s mother, knows what her son can do. The conversational meaning may be that every mother knows her son’s strength. This meaning can be extended metaphorically to a master knowing a subordinate’s capability or a teacher knowing a student’s ability. These interpretations are context-dependent projections of the semantic representation.

6.1.5. *Legend.* A legend is a historical or quasi-historical narrative that creates a pragmatic context from the lexical meaning of an utterance. When a speaker wants to express a meaning in a political or social context, such a narrative may be invoked.

(21) *Puare jibu-na bārasaha badheire jibu.*

son-LOC go-2SG-Q/COND twelve hundred carpenter-LOC go-FUT.2SG

“Would you side with your son or with the community of twelve hundred artisans?”

Here, the utterance refers to a historical narrative about the Konark Sun Temple in Odisha. According to the narrative, a leader is indecisive about whether to prioritize the community or his son. The lexical meaning of the sentence asks about a choice, while its conversational meaning can concern priority, loyalty, or public responsibility. The modulation function for historical context may be written as

$$\mathcal{T}_H(m) = w_H m.$$

The resulting vector m_H represents a historical pragmatic space over the semantic representation of the utterance.

6.1.6. *Presupposition*. Presupposition is a background assumption that remains available when an utterance is evaluated in conversation. It contributes covert content against which the truth or appropriateness of an utterance is assessed [24].

(22) *Hasitara bhāi jane dākatara.*
 Hasit-GEN brother one doctor
 Literally: “Hasit’s brother is a doctor.”

The sentence conventionally suggests that Hasit has a brother. This presupposition is distinct from the asserted content that the brother is a doctor. It does not, by itself, entail that Hasit has another brother.

6.1.7. *Entailment*. Entailment is a relation in which the truth of one proposition guarantees the truth of another proposition under the relevant meanings and background assumptions. For example:

(23.A) *Mu Oḍiā aṭe.*
 I Odia be-PRS.1SG
 “I am Odia.”

(23.B) *Mu Bhāratīya aṭe.*
 I Indian be-PRS.1SG
 “I am Indian.”

Given the background assumption that Odia identity refers to belonging to the Odia linguistic or regional community within India, (23.A) contextually supports (23.B). The relation is therefore best described as an entailment or implication licensed by background knowledge, rather than as a purely formal consequence of the two strings alone. The distinction is that entailment concerns truth-conditional necessity, whereas presupposition concerns background assumptions.

6.1.8. *Image*. An image is a mental or sensory representation created through words. The speaker uses it to express an intentional meaning that can function as a pragmatic space. In many cases, an image expresses different meanings in different contexts.

(24) *Gātā khāi godāuchi.*
 village-CLF eat chase-PROG-AUX.PRS.3SG
 “The village is utterly deserted.”

The lexical meaning evokes an image of a village, while the interpretive meaning—that the village is utterly deserted—is constructed through contextual association.

6.1.9. *Symbolism*. A symbol is a word or phrase that represents an associated concept in a particular linguistic or cultural context.

(25) *Tā ākhi-re himsā-ra kharā.*
 he.GEN eye-LOC violence-GEN sunshine
 “There is a light of intolerance in his eyes.”

Here, light symbolizes intolerance or hostility. The speaker intends to express an additional meaning that is inferred from the lexical content and the cultural context.

6.1.10. *Oxymoron*. An oxymoron is a rhetorical figure in which apparently contradictory words are combined to produce a meaningful expression. Such a construction can highlight irony, paradox, or the complexity of an idea.

(26) *Ete thaṇḍā je mo deharu jhāḷa bāhārigalā.*
 so much cold that my body-ABL sweat come.out-LNK-go-PST.3SG
 “I broke into a sweat from the harsh cold.”

The expression produces a paradoxical effect by combining cold with sweating. Similar to presupposition and entailment, the use of idiomatic expressions, symbols, imagery, oxymorons, and metonymy constitutes a communicative strategy. These devices enable the speaker to encode contextual meanings that emerge from lived experience and commentary on particular situations.

In such cases, the modulation function of intention is grounded in the speaker’s linguistic competence. Formally, this may be represented as

$$\mathcal{T}_L(m) = w_L m,$$

where w_L denotes the influence of linguistic context. The resulting representation is a pragmatic space associated with the linguistic construction of meaning.

6.2. Indirect conversational meaning.

Implicature.

6.2.1. Space of conversational implicature in Odia.

(27.A) *Rāmes, tume Mithira janmadinaku jiba ki?*
 Rames you.2SG Mithi-GEN birthday-ALL go-FUT.2SG-Q
 “Rames, will you go to Mithi’s birthday?”

(27.B) *Mote āji kāma karibāku paḍiba.*
 I.DAT today work do-INF-ALL fall-FUT.1SG
 “I will have to do the work today.”

The speaker will probably not attend the birthday party.

In the conversation, the response in (27.B) conveys a conversational meaning that diverges from its literal lexical meaning. This meaning emerges when the two utterances are interpreted jointly within their shared context. Although there is no direct lexical relation between the utterances, the response gives rise to an indirect meaning known as an implicature [10, 11].

To model this interaction, let $\mathbf{a}$ be the lexical representation of utterance (27.A) and $\mathbf{b}$ the lexical representation of utterance (27.B) in an inner-product space. Assume $\mathbf{a} \neq \mathbf{0}$. The component of $\mathbf{b}$ orthogonal to $\mathbf{a}$ is

$$\mathbf{i}_{B|A} = \mathbf{b} - \text{proj}_{\mathbf{a}}(\mathbf{b}),$$

where

$$\text{proj}_{\mathbf{a}}(\mathbf{b}) = \frac{\langle \mathbf{b}, \mathbf{a} \rangle}{\langle \mathbf{a}, \mathbf{a} \rangle} \mathbf{a}.$$

The magnitude of the orthogonal component is

$$\|\mathbf{i}_{B|A}\| = \|\mathbf{b}\| |\sin \theta|,$$

where θ is the angle between $\mathbf{a}$ and $\mathbf{b}$. In this idealized representation, the orthogonal component measures the part of the response not aligned with the lexical content of the question. It should not be identified with implicature without an additional empirical mapping between vector components and inferred meanings.

This formulation also accounts for asymmetry in interpretation. The representation $\mathbf{i}_{B|A}$ captures the response relative to the question, whereas $\mathbf{i}_{A|B}$ may yield a different contextual interpretation. The

asymmetry follows from the order of contextual conditioning, even though the inner product itself is symmetric.

6.2.2. Irony.

(28) *Emanta bhūim chākhundā buṇile uṭhaināhi.*

such land chakhunda.seed sow-COND sprout-NEG.PRS.3SG

“What a wonderful gift of land you have given, where even humble grass would not grow.”

Irony occurs when an utterance is intentionally used in a context whose inferred orientation differs sharply from its literal orientation. In the example above, the overt expression is positive, while the contextual meaning is negative: the land is barren. The hearer infers the intended meaning through this opposition, thereby creating a pragmatic space distinct from the literal representation.

Let $\mathbf{a}$ represent the lexical meaning and $\mathbf{b}$ the relevant contextual representation. Their cosine similarity is

$$\cos \theta = \frac{\langle \mathbf{a}, \mathbf{b} \rangle}{\|\mathbf{a}\| \|\mathbf{b}\|}, \quad \mathbf{a} \neq \mathbf{0}, \mathbf{b} \neq \mathbf{0}.$$

When $\cos \theta < 0$, the vectors point in opposing directions in the chosen representation. In this model, the negative value signals semantic opposition, while $|\cos \theta|$ measures its strength. This is a formal analogy, not a sufficient definition of irony.

6.2.3. Suggestive meaning.

(29) *Bulu goṭe kokisā āḷa.*

Bulu one fox person

“Bulu is a fox.”

The literal lexical meaning of this sentence is false if Bulu is a human being and “fox” denotes a non-human animal. In context, however, the predicate “fox” may impose metaphorical attributes—such as cunning, cleverness, and wariness—upon the human subject. The intention of the speaker is not to assert species identity but to suggest that Bulu possesses traits stereotypically associated with a fox.

Let $\mathbf{a}$ be the semantic vector representing the referent Bulu in the relevant discourse context, and let $\mathbf{b}$ be the vector representing the lexical meaning of “fox” in a trait-based feature space. A weighted inner product can be defined by

$$\langle \mathbf{a}, \mathbf{b} \rangle_c = \sum_{i=1}^n c_i a_i b_i, \quad c_i > 0,$$

where c_i weights the relative importance of each semantic dimension. Because the literal meanings belong to different ontological categories, the comparison should be carried out in a relevant feature subspace $\mathcal{H}$ corresponding to human-character attributes. The suggestive component is then modeled as

$$\mathbf{s} = \text{proj}_{\mathcal{H}}(\mathbf{b}).$$

In this framework:

- The weighted inner product measures semantic compatibility between selected features.
- Projection into a relevant subspace filters the literal representation and highlights metaphorically relevant traits.
- Intentionality helps determine which subspace is selected for projection, thereby shaping conversational meaning.

Overall, the mathematical model treats conversational meaning as a linear mapping

$$f : V_{\text{lex}} \longrightarrow V_{\text{prag}}$$

from a lexical-semantic representation space to a pragmatic representation space determined by speaker intention and context. If f is linear, its action is determined by its values on a basis of V_{lex} . The empirical task is to determine whether such a representation predicts human interpretations adequately.

7. CONCLUSION

This study demonstrates that conversational meaning is intentional and contextual, manifesting through diverse linguistic forms, including metonymy, oxymoronic irony, presupposition, symbolism, imagery, and other figurative devices. The interpretation of conversational meaning is central to deriving knowledge about the physical and social world, which in turn shapes interlocutors' cognitive states. Since cognitive states are expressed through intentional communication, a systematic account of conversational meaning must consider both linguistic structure and contextual inference.

To address this issue, the paper proposes a mathematical model grounded in linear vector-space representations. The model distinguishes between coded meaning, which supplies lexical and propositional content, and conversational meaning, which is shaped by context, intention, discourse structure, and listener inference. Intentionality functions as a mediating scalar weight in the simplified model and may be generalized to a vector or linear operator in future work.

The model can be summarized by the representation

$$M = \alpha L + \beta C + \gamma I,$$

where L , C , and I must be represented in a common space and α , β , and γ are context-sensitive weights. A contextual transformation can then be written as

$$M_{\text{prag}} = T_{C,I}(M_{\text{lex}}).$$

These equations express a formal modeling proposal rather than a universal law of meaning construction.

The analysis indicates that the bare, decontextualized meaning of an utterance has limited communicative value. Conversational meaning emerges from lexical or propositional content but is reshaped by contextual, social, and cognitive factors. In the notation of this paper, a lexical semantic field $\mathcal{S}$ is mapped into a family of contextual representations:

$$\phi : \mathcal{S} \times \mathcal{C} \times \mathcal{I} \longrightarrow V.$$

The output $\phi(s, c, i)$ is the conversational interpretation of semantic content s under context c and intention i .

Two operations are especially important in the proposed framework:

- (1) **Decomposition of meaning:** pragmatic representations decompose lexical meaning into features associated with speech acts, politeness, social power, presupposition, and other contextual dimensions.
- (2) **Combination and projection of semantic representations:** conversational meaning is generated by weighted combinations, inner products, and projections, as illustrated by implicature, irony, and indirect suggestion.

The model has several limitations. It does not establish that natural-language meaning is intrinsically linear, and it does not by itself specify how vectors, weights, or subspaces should be learned. It also does not replace probabilistic, logical, cognitive, or interactional theories of pragmatics. Its value lies in providing an explicit representational language with which those theories may be compared and extended.

7.1. **Future scope.** Future research may develop the framework in the following directions:

- Construct annotated Odia datasets containing literal meanings, contextual interpretations, speaker intentions, and hearer judgments.
- Estimate the weights associated with lexical, contextual, and intentional dimensions from observed conversations.
- Compare scalar, vector, matrix, probabilistic, and nonlinear transformations of semantic representations.
- Test whether the proposed projections predict human judgments of implicature, irony, politeness, metaphor, and power.
- Examine how cultural knowledge and discourse history alter the geometry of the proposed pragmatic space.
- Integrate the model with natural language processing systems and evaluate its performance against existing semantic and pragmatic representations.

NOTES ON TERMINOLOGY

- [1] *Semantic field.* A semantic field, or lexical field, denotes a set of words that share a common meaning or belong to a specific conceptual domain. The relationship among the words is determined by semantic connection rather than grammatical function [34, 5].
- [2] *Semantic space.* A semantic space refers to a conceptual or cognitive framework in which words, phrases, or linguistic units are arranged according to their meanings and interrelationships. Such spaces may be modeled in multidimensional form, either mathematically or cognitively [9, 12, 27].
- [3] *Conversational meaning.* Conversational meaning encompasses the meaning conveyed in communicative interaction beyond the literal interpretation of words. Contextual factors shape it, including the speaker's communicative intent, shared background knowledge, and social norms [10, 24].
- [4] *Axioms.* An axiom is a foundational proposition accepted within a formal system without proof. In the present article, standard vector-space axioms apply to the mathematical representation space, not directly to natural-language expressions.
- [5] *Decomposition of meaning.* Decomposition of meaning refers to the analytical process of breaking down a word or phrase into constituent semantic features or components [12].
- [6] *Lexical meaning.* Lexical meaning denotes the conventional meaning of a word in relation to objects, concepts, or entities in the real or imagined world, independently of some contextual modifications [25, 6].
- [7] *Odia language.* Odia is an Indo-Aryan language spoken predominantly in the Indian state of Odisha. It is recognized as one of the classical languages of India and has a rich literary heritage.
- [8] *Irony.* Irony is a rhetorical device in which there is a marked discrepancy between what is expressed and what is intended, or between what is expected and what occurs [28].
- [9] *Conversational implicature.* Conversational implicature refers to inferred meaning that extends beyond the explicit content of an utterance and relies on contextual reasoning and cooperative assumptions [10, 11].
- [10] *Effective meaning or tatparya.* *Tatparya*, or effective meaning, denotes the intended meaning of an utterance as derived after ambiguity is resolved through contextual interpretation [21].
- [11] *Semantic subspaces.* Semantic subspaces are structured subdivisions within a broader representational domain in which vectors share selected semantic properties while differing along more specific dimensions.
- [12] *Coded meaning.* Coded meaning arises from pre-established rules, conventions, or codes shared within a speech community [14].

- [13] *Uncoded meaning*. Uncoded meaning refers to meaning derived from context, situational cues, or interlocutors' shared experiences without relying solely on fixed linguistic or cultural codes.
- [14] *Speech acts*. A speech act is an action performed through spoken or written language. Following Austin and Searle, speech acts may be discussed in terms of assertives, directives, declarations, commissives, and expressives, although the classification of a particular utterance depends on context [1, 30].

STATEMENTS AND DECLARATIONS

The author declares that there is no conflict of interest. No new data were generated for this theoretical study.

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