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COGNITIVE CATEGORIZATION OF UNITS OF MEASUREMENT: FROM OBJECTIVE REALITY TO DISCURSIVE REALIZATION IN ENGLISH AND UZBEK

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ABOUT ARTICLE

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Abstract: This article presents an integrative cognitive-discursive interpretation of units of measurement in English and Uzbek. It distinguishes measurement as a universal cognitive operation from the measurement unit as a socially standardized and linguistically verbalized form of quantitative experience. The theoretical framework combines prototype theory, cognitive grammar, frame semantics, embodied cognition, and cognitive approaches to language and knowledge. English units such as inch, foot, yard, mile, and meter are compared with Uzbek qarich, qadam, gaz, tanob, metr, and kilogramm. Conceptual-semantic, comparative, and discourse-oriented analysis shows that measurement vocabulary may develop metaphorical, evaluative, and cultural meanings beyond direct quantification. The principal result is an authorial conceptual model: Objective Reality → Perceptual Perception → Cognitive Comparison → Categorization → Standardization → Conceptualization → Verbalization → Discursive Realization. The model explains the interaction of universal cognitive mechanisms with culture-specific standards and discourse practices.

Introduction. The linguistic study of measurement occupies an unusual position between the study of objective quantity and the study of culturally organized meaning. A meter,

mile, qarich, or tanob appears at first sight to be a straightforward name for a quantitative relation. Yet this apparent simplicity is deceptive. The moment a unit enters language, it becomes part of a symbolic system and is exposed to categorization, historical memory, cultural convention, metaphorical extension, pragmatic evaluation, and discourse-specific interpretation. Cognitive linguistics is particularly well suited to explaining this complexity because it treats meaning not as an autonomous package attached to a linguistic form but as the result of conceptualization grounded in human experience [3; 6]. From this perspective, units of measurement are theoretically valuable precisely because they reveal how a seemingly objective parameter is reorganized as humanly meaningful knowledge. This experiential view is also consistent with broader accounts of linguistic categorization and conceptual structure, which treat meaning as grounded in patterns of use, construal, and embodied experience [7; 8].

Several influential theories illuminate parts of this process. Rosch's work on categorization emphasizes the experiential formation of categories rather than purely logical classification [1]. Lakoff's prototype theory explains why categories are structured around more and less representative members rather than rigidly bounded sets [2]. Langacker's cognitive grammar treats a linguistic unit as a symbolic pairing of form and conceptual content and thereby explains why a measurement expression can construe the same quantitative relation in different ways [3]. Fillmore's frame semantics demonstrates that lexical meaning evokes encyclopedic knowledge and culturally familiar situations rather than isolated dictionary features [4]. Kubryakova's account of language and knowledge further supports the view that linguistic units objectify conceptual structures produced by cognition [5].

These approaches are methodologically complementary rather than exhaustive. Prototype theory explains graded category structure; cognitive grammar models symbolic form–meaning construal; frame semantics reveals encyclopedic activation; and cognitive approaches to knowledge explain conceptual objectification. None of them, however, independently traces the full path from perceptual differentiation to socially stabilized measurement expression and discourse use. The present article therefore treats measurement units as multi-level cognitive-discursive formations.

The aim of the article is to formulate and justify a conceptual model of how a measurement unit emerges and functions linguistically and to test its explanatory value through English-Uzbek comparison. The objectives are to distinguish measurement as a universal cognitive operation from the measurement unit as a culturally standardized linguistic representation; to synthesize prototype theory, cognitive grammar, frame semantics, and cognitive approaches to knowledge; to identify the stages connecting objective quantitative

relations with linguistic and discursive realization; and to reveal universal and nationally specific patterns. The study is theoretical and qualitative in orientation.

Materials and methods

The study adopts a qualitative comparative design centered on conceptual-semantic analysis. Representative English and Uzbek units are treated as diagnostic cases rather than as a numerical corpus for frequency measurement. The analysis moves from literal measurement meanings to extended discourse meanings and combines conceptual-semantic interpretation, contrastive analysis, and discourse-sensitive qualitative reading [8; 12].

The analytical material includes internationally standardized units and historically embedded traditional units. In English, meter is considered alongside yard, foot, inch, and mile; in Uzbek, metr and kilogramm are considered alongside qarich, qadam, gaz, and tanob. These examples are illustrative rather than exhaustive. They are selected because they expose two different dimensions of the category: contemporary standardized measurement and culturally marked traditional measurement. The study also considers the English idiomatic expression to go the extra mile and the Uzbek expression bir qarich yer / бир қарич ер, where the measurement component no longer functions only as a literal numerical specification. Such examples are especially informative because they show the transition from metrological content to conceptual and discursive meaning. The contemporary standardized units are interpreted against the institutional logic of the International System of Units, whereas the Uzbek traditional forms are checked against established lexicographic description [13; 14].

The theoretical framework combines complementary perspectives: Rosch [1] on experience-based categorization, Lakoff [2] on prototype structure, Langacker [3] on symbolic form–meaning pairings, Fillmore [4] on encyclopedic frames, Kubryakova [5] on the linguistic objectification of knowledge, and Evans and Green [6] as a synthesis of the cognitive-linguistic paradigm. Each theory is retained for its specific explanatory contribution within the broader sequence of measurement formation.

Table 1. Explanatory contribution of the theoretical approaches used in the study

Approach	Primary explanatory focus	Strength for measurement analysis	Analytical limitation when used alone
Rosch: categorization	Experience-based category formation	Explains how recurrent comparison produces stable categories	Does not by itself explain linguistic form or discourse realization

Approach	Primary explanatory focus	Strength for measurement analysis	Analytical limitation when used alone
Lakoff: prototype theory	Central and peripheral category structure	Explains graded membership and cognitive salience of units	Does not fully model standardization or linguistic verbalization
Langacker: cognitive grammar	Symbolic form–meaning pairing and construal	Explains why a unit carries conceptual content beyond denotation	Gives limited attention to historical-cultural standardization
Fillmore: frame semantics	Encyclopedic knowledge activated by lexical items	Explains cultural scenarios and non-literal discourse uses	Does not specify the full developmental chain from perception to standard
Kubryakova: language and knowledge	Linguistic objectification of conceptual knowledge	Links cognition, conceptual structures, and linguistic representation	Requires combination with a more explicit model of discourse dynamics

Results and discussion

1. Measurement as a Cognitive Operation: From Perception to Comparison

The proposed model begins before the appearance of any named unit. This point is essential. If analysis begins with meter, mile, qarich, or tanob as already existing lexical items, it misses the cognitive conditions that make such items necessary. Human beings first encounter a world of continuously varying properties: objects differ in extension, weight, volume, duration, and distance. Perception registers these differences, but perception alone does not yet constitute measurement. Measurement becomes possible when recurrent perceptual experience is organized through comparison. The fundamental operation is therefore relational: one object is longer than another, one path is farther, one load is heavier, one event occurs earlier, or one interval lasts longer. The embodied basis of such discrimination has been widely discussed in cognitive approaches that connect perceptual experience with conceptual structure [9; 11].

This priority of comparison has important theoretical consequences. It shifts measurement from a narrowly mathematical procedure to a general cognitive mechanism for establishing ordered relations. Formal numerical systems refine this mechanism, but they do not create it from nothing. Before a community can agree that a distance is one meter, it must already possess the ability to discriminate distance and to compare spatial extents. Before a speaker can say that a field is measured in tanob, the field must be cognitively available as an entity whose spatial or agrarian extent can be compared with an accepted reference. The standardized unit is thus a later cultural solution to an earlier cognitive problem.

The distinction also clarifies a common conceptual confusion: measurement and measurement unit are not synonymous. Measurement is an intellectual operation through which a quantitative relation is established. A measurement unit is a socially stabilized instrument for expressing the result of that operation. The first is universal in the sense that humans across communities compare quantitative properties; the second is culturally variable because communities may select different standards and encode them differently. This difference becomes especially visible when English and Uzbek systems are compared.

2. Categorization, Prototypes, and the Internal Structure of Measurement Vocabulary

Once recurring quantitative relations have been cognitively recognized, they can be organized into categories. Prototype theory offers a useful account of how this organization may operate. Lakoff [2] argues that human categories are typically not rigid sets defined by necessary and sufficient features; they are structured around cognitively salient representatives, while peripheral members may be less typical or more context-dependent. Applied to measurement vocabulary, this suggests that speakers do not necessarily process every unit as an equal item in a neutral list. Some units function as cognitively central representatives of contemporary measurement practice, whereas others remain historically marked, regionally salient, or culturally symbolic. This graded organization of categories is further compatible with linguistic treatments of prototype effects and category extension [7].

Uzbek offers a parallel but culturally distinct configuration. International forms such as *metr* and *kilogramm* occupy a central place in contemporary institutional measurement, while *qarich*, *qadam*, *gaz*, and *tanob* remain important as elements of historical knowledge, cultural memory, phraseology, and discourse. Their present status is not adequately described by labeling them obsolete. A traditional unit may be peripheral in modern metrological practice while remaining central in cultural interpretation. In other words, prototypicality depends on the domain of use. What is peripheral in an official technical register may be highly salient in historical, literary, folkloric, or evaluative discourse. Their continued semantic availability is also reflected in Uzbek lexicographic tradition, where culturally embedded measures remain part of the recorded lexical stock [13].

3. Standardization as the Cultural Mediation of Universal Cognition

If comparison and categorization are cognitively general, standardization is the stage at which communal history becomes decisive. A community must stabilize a reference if measurement results are to be reproducible, communicable, and socially useful. Standardization transforms a flexible comparative practice into a conventional system. It is therefore neither purely cognitive nor purely linguistic. It is a socio-cultural mechanism that

mediates between cognition and language by selecting, fixing, and institutionalizing reference values. In modern metrology, the SI provides the clearest institutional example of such stabilization, because shared reference standards enable reproducibility across scientific, educational, industrial, and administrative domains [14].

This stage explains why languages can share the same cognitive need while developing different lexical inventories. The concept of distance is not specifically English or Uzbek, but the conventional history of expressing distance differs across communities. English historically institutionalized inch, foot, yard, and mile, while Uzbek linguistic culture used qarich, qadam, gaz, tanob and other measures within particular economic and social practices. Later international metric standardization introduced or strengthened forms such as meter/metr and kilogram/kilogramm. The resulting lexicons preserve traces of more than one historical layer.

4. Conceptualization and Verbalization: The Symbolic Status of the Measurement Unit

Langacker's cognitive grammar provides the theoretical bridge from standardized quantitative reference to linguistic meaning. In this framework, a linguistic unit is a symbolic structure that links a phonological form with conceptual content [3]. Meaning is not independent of cognition; it reflects a particular construal of experience. A measurement lexeme should therefore not be analyzed as a label attached to a pre-existing quantity without mediation. Its semantic value includes how that quantity is conceptualized within a linguistic community and how it is profiled in a particular expression. From the standpoint of lexical semantics, the relevant issue is therefore not merely reference to quantity but the conventional organization of conceptual content within a linguistic sign [12].

Consider the English lexeme mile. In The village is five miles away, the unit participates in a relatively literal spatial construal. It helps locate one entity relative to another by specifying distance. In to go the extra mile, however, the same lexical material is integrated into a conventional expression in which physical distance is backgrounded and the notion of additional effort becomes foregrounded. The semantic extension is not arbitrary. It recruits a familiar spatial schema—continuing beyond an expected distance—to conceptualize behavioral commitment. The measurement unit remains historically visible inside the expression, but its discourse function has become evaluative and metaphorical. The extension from spatial distance to additional effort is compatible with cognitive accounts of metaphor and conceptual integration, in which a familiar source-domain structure is recruited for abstract evaluation [10].

A comparable process can be observed in Uzbek *bir qarich yer* / *бир қарич ер*. Depending on context, *qarich* may refer to a concrete traditional span-based measure, but in literary or publicistic discourse the expression may conceptualize a very small amount of land or space. The quantitative meaning is not eliminated; it is schematized and recruited to express minimality, value, attachment, or intensity. This illustrates an important principle: verbalization creates a stable linguistic sign, but the sign remains available for further conceptual operations. Once conventionalized, measurement vocabulary can become raw material for metaphor, evaluation, and culturally specific imagery. The term verbalization is preferred here because the conceptual content may be expressed not only by a single lexical item but also by a phrase, numerative construction, phraseological unit, or discourse-specific combination; the stage therefore concerns linguistic expression in a broader sense [5; 12].

5. Frame Semantics and Discursive Realization

Frame semantics expands the analysis from lexical conceptualization to contextual activation. Fillmore [4] argues that understanding a lexical item requires access to a structured body of background knowledge. A word evokes a frame that includes typical participants, situations, objects, relations, and cultural expectations. Measurement units fit this account particularly well because their interpretation often depends on knowing not only a numerical value but also the practices in which that value is conventionally used.

Discursive realization is the final stage of the proposed sequence because discourse selects which part of this conceptual network becomes relevant in an actual communicative event. The same unit can have different profiles in scientific, administrative, historical, literary, journalistic, and conversational discourse. In a technical document, precision and standard equivalence may dominate. In a historical novel, cultural authenticity may be more important than immediate conversion. In figurative discourse, the numerical value can recede while a scalar, evaluative, or symbolic meaning comes to the foreground.

The shift from literal to extended use should not be treated as a departure from the 'real' meaning of a unit. Cognitive semantics suggests instead that such uses are motivated by conceptual links. The expression to go the extra mile relies on the embodied experience of path and distance to structure effort. *Bir qarich yer* / *бир қарич ер* recruits a small span as a cognitive model of minimal spatial extent. The discourse meaning emerges because speakers can map a familiar measurement schema onto a communicative purpose. What changes is not the existence of the measurement concept but the way it is construed. Such semantic extension is systematic rather than accidental, because embodied schemas and conventional

metaphorical mappings make quantitative structures available for evaluative and symbolic interpretation [8; 10].

6. Comparative English-Uzbek Perspective: Universal Mechanisms and Cultural Asymmetry

The comparison between English and Uzbek supports a two-level interpretation. At the universal level, both languages verbalize recurrent quantitative domains such as length, mass, distance, area, and volume. Their speakers rely on the same basic cognitive operations of discrimination, comparison, categorization, and conventional reference. At the culture-specific level, however, languages differ in which reference standards became historically salient, how long they remained productive, which institutional domains preserved them, and what figurative or cultural associations they accumulated. The universal need to encode recurrent semantic domains does not imply identical histories of verbal expression; cross-linguistic semantics repeatedly demonstrates that languages conventionalize shared human experience in different ways [8].

Uzbek similarly combines modern international terminology with traditional measures, although the distribution is different. Metr and kilogramm are central in formal and contemporary measurement practices, while qarich, qadam, gaz, and tanob carry stronger historical and cultural markedness. Their value lies not only in reconstructing past metrology but also in revealing how bodily experience, agrarian life, and social organization were conceptualized through language. A term such as tanob can thus serve as evidence of a historically specific measurement practice and as a lexical trigger for a broader cultural frame.

The comparison also reveals structural asymmetry in metaphorical potential. It would be misleading to assume that every English unit has a direct Uzbek figurative equivalent or vice versa. Idiomatic meaning is conventionalized within a particular language. To go the extra mile is conceptually intelligible through the general metaphor of effort as movement along a path, but its lexical realization is specifically English. *Bir qarich yer / бир қарич ер* draws on a traditional Uzbek measurement image whose cultural resonance cannot be captured by a mechanical word-for-word conversion. Translation and intercultural interpretation therefore require attention to conceptual function rather than only numerical equivalence. From a translation perspective, this asymmetry confirms that formal numerical correspondence and functional semantic equivalence must be distinguished [15].

Table 2. Illustrative English and Uzbek measurement units in cognitive-discursive comparison

Domain / status	English example	Uzbek example	Cognitive-cultural profile	Possible discourse function
Modern standardized length	meter	metr	Institutionally standardized, internationally shared quantitative reference	Scientific, educational, administrative, technical precision
Traditional / body-linked length	foot, inch	qarich, qadam	Embodied reference and historically conventionalized comparison	Everyday description, historical setting, cultural imagery
Traditional linear measure	yard	gaz	Historically specific conventional reference with culture-dependent use	Historical discourse, traditional practice, translation challenges
Distance / spatial extent	mile	qadam (context-dependent)	Path and movement schemas; different degrees of contemporary standardization	Localization, evaluation, metaphorical extension
Land / area tradition	—	tanob	Agrarian, land-use, taxation, and historical social frames	Historical-cultural reference, narrative authenticity
Figurative extension	to go the extra mile	bir qarich yer / бир қарич ер	Quantitative schema recruited for evaluative or symbolic meaning	Effort, minimality, attachment, emphasis

7. The Authorial Conceptual Model: An Integrative Cognitive-Discursive Framework

The preceding analysis suggests that the formation of a measurement unit can be represented as a structured cognitive-discursive process rather than as a direct transition from physical quantity to word. Existing theories explain important segments of this process, but none of them alone traces the entire sequence. The conceptual model proposed here therefore integrates perceptual, cognitive, cultural, conceptual, lexical, and discourse levels in one model. Its purpose is analytical and heuristic: it identifies analytically distinct stages that can guide further comparative and corpus-based research, while recognizing that real historical development may involve feedback, overlap, and reanalysis.

The model begins with Objective Reality, understood as the existence of quantitatively variable properties in the world. Perceptual Perception refers to the human registration of those differences through sensory and embodied experience. Cognitive Comparison establishes relational contrasts such as larger–smaller, farther–nearer, heavier–lighter, and earlier–later. Categorization organizes recurrent contrasts into cognitively stable domains. Standardization introduces socially shared reference points that make comparison reproducible and communicable. Conceptualization integrates the stabilized quantitative relation into broader knowledge structures. Verbalization associates that conceptual structure with a conventional

linguistic form. Finally, Discursive Realization activates and reshapes the verbalized unit in a specific communicative context.

The model also accommodates diachronic change. A unit may move from central practical use to peripheral cultural use while remaining verbalized. Standardization can be replaced without deleting conceptual memory. For example, the rise of the metric system may reduce the official role of a traditional unit, but the older form can survive in phraseology, historical discourse, literary imagery, or culturally specific descriptions. Discursive realization can in turn feed back into conceptualization by conventionalizing new figurative meanings. Thus the linear figure below represents the primary explanatory sequence, while the actual life of a lexical unit can include recursive development.

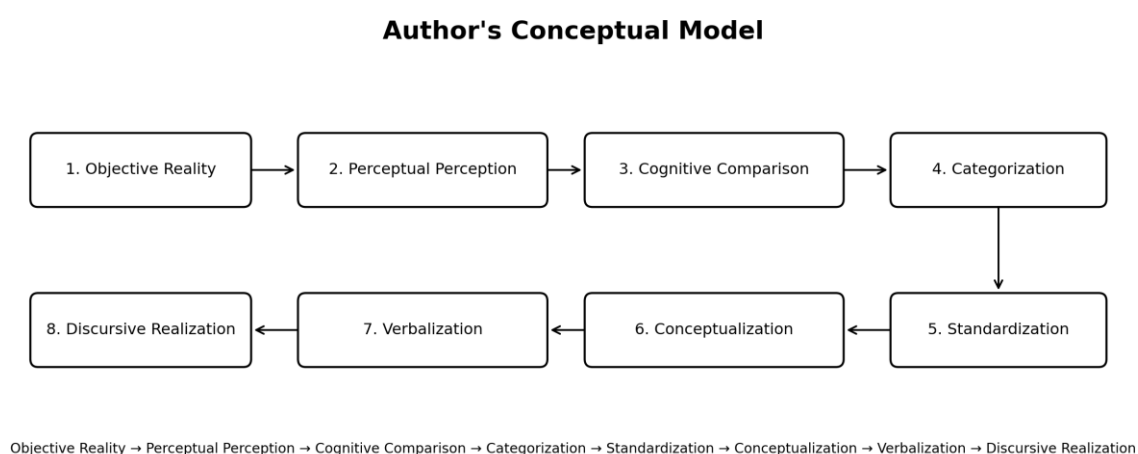


Figure 1. Author's Conceptual Model: Objective Reality → Perceptual Perception → Cognitive Comparison → Categorization → Standardization → Conceptualization → Verbalization → Discursive Realization.

8. Discussion: Theoretical Value and Research Implications

The chief theoretical advantage of the model is its separation of processes that are often conflated. Perception is not categorization; categorization is not standardization; standardization is not verbalization; and verbalization is not discourse meaning. This distinction allows different research traditions to focus on different stages: historical linguistics on standardization, cognitive semantics on construal and metaphor, discourse analysis on frame activation, and translation studies on numerical, conceptual, cultural, or pragmatic equivalence. The model thus connects symbolic construal [3], frame activation [4], and lexical-semantic organization [12] without reducing them to a single process.

The framework is also relevant to translation. Numerical conversion addresses only one layer of equivalence. In technical translation, standardized value may dominate; in literary or historical translation, replacing a culturally marked unit with a neutral metric form can erase setting and symbolic resonance, while preserving the source form without support may hinder comprehension. The translator must therefore determine whether standardized value, conceptual frame, cultural association, or discourse effect is functionally dominant in context. This multilayered view is consistent with translation-oriented approaches that distinguish formal expression, contextual meaning, and communicative function [15].

The model nevertheless has limitations. It is a theoretical construct derived from theoretical synthesis and qualitative comparison rather than a completed psycholinguistic or corpus-validated processing model. The proposed sequence should therefore be tested against diachronic evidence, corpus patterns, histories of verbalization, and speaker judgments. Some stages may overlap, and recurrent discourse can reshape conceptualization and lexical meaning; future research should examine these feedback relations rather than impose a strictly unidirectional chronology.

Conclusion. The cognitive-linguistic analysis of measurement units requires a broader explanatory perspective than either metrological definition or lexical classification alone can provide. Units such as meter, mile, inch, qarich, qadam, gaz, and tanob do not merely label objective quantities. They represent the linguistic endpoint of a process in which quantitative differences are perceived, compared, categorized, socially standardized, conceptually organized, verbalized, and then adapted to the needs of discourse. This process explains why measurement vocabulary can be simultaneously precise and culturally meaningful.

Accordingly, the article proposes the following conceptual sequence: Objective Reality → Perceptual Perception → Cognitive Comparison → Categorization → Standardization → Conceptualization → Verbalization → Discursive Realization. Its central claim is that a measurement unit is not the starting point of quantitative cognition but a culturally and linguistically stabilized result of that cognition. Once verbalized, however, the unit acquires a further life in discourse, where literal quantitative meaning may be retained, backgrounded, metaphorically extended, or culturally reinterpreted. The English expression to go the extra mile and Uzbek bir qarich yer / бир қарич ер demonstrate this discursive mobility particularly clearly.

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