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APPROXIMATION: A PREVIEW

Summary. The objective of the present paper is twofold, first, to consider the terms of denoting imprecision functioning in philosophy and linguistics with the intention to endeavor of revealing a common component in their lexical meanings, second, to elaborate a Re-Translation algorithm of approximative, fuzzy, vague, and ambiguous items in the framework of functional semantics applying a more human-like way of thinking leaving a mathematical method to mathematicians.

Key words: approximation, ambiguity, vagueness, fuzziness, denotation, connotation, semantics.

Prelimenaries. According to the more traditional theories, natural language meaning can be characterized by its denotative and connotative aspects [15, p. 1–7]. Denotation is understood to constitute referential meaning as a system of relations between words or sentences of a language and the objects or processes they refer to. Connotation is defined to constitute structural meanings as a system by which words or sentences of a language are conceptually related to one another. The referential semantic theory is truth-functional and formally elaborated but fails to suggest a satisfactory interpretation of the vagueness of natural language meaning. Then comes structural semantics to consider vagueness somewhat fundamental of language but, based mainly upon intuitive introspection, its attempt is futile [20, p. 3–4]. Due to procedural approaches to cognition and language comprehension, frame semantics is gaining more success [19]. B. Rieger points out that the central notion of it is the interpretation of memory as a paradigm for the operational aspects of both, world system structures and language system structures [22, p. 4].

Approximation, ambiguity, polysemy, vagueness and fuzziness are the terms used in cognitive semantics referring to different instances of plurality of meaning. According to Paul Deane these phenomena "form a gradient between total semantic identity" (vagueness) "and total semantic distinctness" (ambiguity) [4, p. 327]. Therefore, polysemy is a case somewhere in between these two extremes. The borders between the categories of ambiguity, polysemy and vagueness are fuzzy. Accordingly, lexical examples can be assigned to more than one category. Joan Cutting in her book "Vague Language Explored" comes to the conclusion that much of what is said in natural language is vague, and members of almost any lexical category can be vague. The question that naturally arises is why vagueness is so ubiquitous in natural languages.

The objective of the present paper is twofold, first, to consider the terms of denoting imprecision functioning in philosophy and linguistics and endeavor to reveal a common component in their lexical meanings, second, to elaborate a Re-Translation algorithm of approximative, fuzzy, vague, and ambiguous items in the framework of functional semantics applying a more human-like way of thinking leaving a mathematical method to mathematicians.

State of the art. There is a permanent conflict between the speakers using approximate, vague, and fuzzy language means in their every day communication and the scholars in search of the precise methods of interpreting those means. Fortunately, the struggle stimulates the both parties – speakers resort to stylistic devices in their worldview cognition, and scholars, "due to the global quantitative accuracy", provide explanation using logic and mathematical analysis. Magne Setnes et al. suggest that they can be applied to fuzzy models in order to obtain models of varying complexity and qualitative properties depending on the purpose of the modeling exercise and a distinction is made between and three approaches: 1) iterative compatibility analysis; 2) similarity relations; 3) linguistic approximation. These approaches do not require additional knowledge or data acquisition. The user can fine tune the numerical accuracy and transparency in order to obtain a suitable model [27, p. 508 fl.]. But our aim is much more modest – to reveal the ways of the speaker's choice of selecting a marker of approximation (particle) expressed by an adverb that is re-translating or reflecting physical and non-physical features of the object by the speaker. In this respect we must admit Bertrand Russell remark "everything is vague to a degree you do not realize till you have tried to make it precise" [23, p. 84–92]. The notions of approximant and approximation were first introduced by Christopher Wadsworth [31, p. 488–521], which are used in order to better express the relation between equivalence of meaning in Dana Scott's models and the usual notions of conversion and reduction [21, p. 36]. The terms approximation and approximant are extensively frequent in philosophy for a variety of practices, descriptions and structures and with an intention to distinguish them, cf.: Shiyou Lian's term "imprecision" by words with imprecise meaning, like *tall* a strict and rigid standard for a certain height to be *tall* [14, p. 3–6]. He writes that "imprecise information refers mainly to the information expressed by. Approximations merely describe a target system inexactly and idealizations refer to new systems [see: 2, p. 65–76]. The key difference is referential: idealizations, says John D. Norton, carry a novel semantic import not carried by approximations. Accordingly, an approximation in philosophy is defined as an inexact description of a target system. [19, p. 208].

We shall compare the given philosophical explanation with that of David Tuggy's who offers a classical definition of vagueness and characterises it as a linguistic phenomenon, where "two or more meanings associated with a given phonological form are <…> united as non-distinguished subcases of a single, more general meaning" that means that vagueness involves "a lexeme with a single but nonspecific meaning" [29, p. 167–168].Vagueness is also defined as the possession of borderline cases, for instance, *"tall"* is vague because a man who is 1.8 meters in height is neither clearly tall nor clearly non-tall. No amount of conceptual analysis or empirical investigation can settle whether a 1.8 meter man is tall. Let's consider two contexts of *tall* : 1) "my son is tall for his age"; 2) "a tall schoolboys look as a pygmy beside the NBA players" (Stanford Encyclopedia of Philosophy). This vagueness refers to a lack of clarity in meaning and the dynamic approach developed

here is compatible with Bosch's idea that vagueness is a case of "incomplete definition", for instance, *Go down the road a ways and then turn right is vague* because *"a ways"* does not precisely explain *how far one should go down the road*. The dynamic approach developed here is compatible with Bosch's idea that vagueness is a case of "incomplete definition" [1, p. 190]. Ambiguity is a term used to describe phenomena that have more than only one meaning. These meanings are distinct from each other and have no close schema in common. That is why a single expression may lead to multiple interpretations. In natural language many words, strings of words and sentences are ambiguous, simply because of the fact that numerous words cover several distinct meanings, or specific structural elements give rise to different readings. That means that "an expression or utterance is ambiguous if it can be interpreted in more than one way" [15, p. 39]. Ambiguity is when there is more than one clear meaning, and it is difficult to choose which meaning was intended. Let's take two examples: 1) *Paul went to the bank is ambiguous because bank could mean a river bank, a heap or store (a bank of blood, food bank, a bank of fog a financial institution*; 2) *He was dropped could mean he was dropped out from university or he was dropped from the roof* (see: *drop a brick, drop a line* "write a short letter"). Words are only vague indirectly, by virtue of having a sense that is vague. In contrast, an ambiguous word bears its ambiguity directly – simply in virtue of having multiple meanings. Ambiguity and vagueness also contrast with respect to the speaker's discretion. If a word is ambiguous, the speaker can resolve the ambiguity without departing from literal usage, for instance, s/he can declare that s/he meant *"child"* to express the concept of *an immature offspring* "a person from the time of birth to the time when they become an adult". If a word is vague, the speaker cannot resolve the borderline case. For instance, the speaker cannot make "child" literally mean anyone under eighteen just by intending it. David Tuggy stresses that difference between ambiguity and vagueness is "a matter whether two or more meanings associated with the given phonological form are distinct (ambiguous), or united as non-distinguished subcases of a single, more general meaning (vague). From his point of view, ambiguity corresponds to separation, and vagueness, to unity of different meanings [29, p. 168].

As Charles Sanders Peirce said, "Logicians have too much neglected the study of vagueness, not suspecting the important part it plays in mathematical thought" [20, p. 35–36; 29, p. 488–521] and added that "vagueness is no more to be done away with in the world of logic than friction in mechanics." His sentence "Everything is vague to a degree you do not realize till you have tried to make it precise." has become idiomatic for the linguists researching the meaning of the word in the language system and discourse structure. Karem Zadeh drew the following distinction: fuzzy relates to un-sharpness of class boundaries, while vagueness relates to insufficient specificity [33, p. 318–325]. As an illustration, "I'll be back in a few minutes" is fuzzy, but not vague. While "I'll be back sometime" is both fuzzy and vague. Usually, what is vague is fuzzy, but not vice-versa. Every natural language is both vague and ambiguous. However, both features seem eliminable in professional languages (discourses). Karem Sadegh-Zadeh specifies vagueness is a ubiquitous phenomenon in medicine which is different than ambiguity [33, p. 36–42]. "Vague" and "ambiguous" are pejorative terms. And they deserve their bad reputations. Vague has also a sense which is synonymous with abnormal generality. If the words represent the concepts then the words with imprecise information represent imprecise concepts, for instance, *tall height and short height or rich man* and *poor man*.

B. Rieger stresses that the increasing amount of strong empirical evidence piling up in favour of some re-adjustment, a (meta-theoretical) modification appears to be overdue. John Sowa says that fuzziness is characteristic of the way people use natural languages [22, p. 76–77 fl.]. Over the centuries, philosophers, linguists, and logicians independently discovered and commented on many aspects of fuzziness, but without a common foundation for organizing and relating their discoveries. In their historical survey, D. Dubois, W. Ostasiewicz, and H. Prade cited numerous examples like: *Looking back in time*, where intuitions about fuzziness were expressed and more or less formalized [5, p. 25]. It is also surprising to see how long it took before such a simple, although powerful, idea of graded membership, could be cast into a proper, widely accepted mathematical model, due to the far-ranged vision, the tenacity, and the numerous seminal papers of Lotfi Zadeh [33, p. 318 fl.]

Fuzzy set theory is a discipline founded in 1964/65 by the electrical engineer Lofti A. Zade (Berkelry) [see also: 33, p. 107–113]. Using bivalent logic requires that every statements be capable of possessing determine truth value and be true or false. It is known that all terms, for instance, medical are vague [26, p. 3–8]. Karem Sadegh-Zadeh showed the way out of this maize and adopted a fuzzy theory approach to postulate a novel theory for some medical concepts like "health", "illness", "disease" in his "Handbook of Analytical Philosophy of Medicine" [24]. G. Lakoff says that hedges can be also involved to express fuzziness and defined them as "words whose meaning implicitly involves fuzziness-words whose job is to make things fuzzier or less fuzzy" [11, p. 183 fl.] and he discussed words and phrases manifesting hedging power *(like rather, very, in a manner of speaking)* setting some boundaries in how to interpret linguistic items as hedges. G. Lakoff also discussed the fact that hedges "interact with felicity conditions for utterances and with rules of conversation" [11, p. 213, see also: 7, p. 15 fl.; 9], thus setting the coordinates for interpreting hedges as manifestations conditioned by pragmatic factors [see also: 18, p. 30–33].

Still the Oxford English Dictionary gives the definition of *approximation* as "coming or getting near to identity in quantity, quality, or degree; an approach to a correct estimate or conception of anything;" of *vagueness* as "lack of distinctness or preciseness; indefiniteness;" and of *fuzziness* as "indistinct, imprecise, vague" that reveals a correlation of the four notions. These phenomena have a common component of *contensive imprecision or indefiniteness* which takes us back to the general opposition of definite vs. indefinite in language.

In case of L2 the major difficulty is to retrieve a correlative unit which must mirror ethnic-cultural feature of L1. There can be two directions in modeling semantic sets" [cf.: 11, p. 345–381] linear, i.e. gradability direction – moving of quality towards or away to the centre; and vertical, i.e. scalarity direction – moving either upward (increase) or downward (decrease) [15, p. 310–327]. Robert van Rooij focuses his attention on contextuallist' approaches that want to account for the Sorites paradox, because these approaches are most popular within linguistics [30, p. 123].

Investigation. Addressing the problem of linguistic approximation, ambiguity, vagueness and fuzziness is no easy task for linguistics and any social sciences. There is a steady interest in data driven approaches to the acquisition of imprecise (approximate, vague, ambiguous fuzzy) systems from Plato to contemporary semanticists. John Sowa stresses that with such a vast range of topics, no language with a finite vocabulary can have a one-to-one mapping of words to every aspect of every topic. [28, p.645-652]. Vagueness is not only inevitable, it is necessary

for language to be robust, flexible, and extensible. D. Dubois et al. cited the logician, philosopher, and scientist Charles S Peirce as "one of the first scholars in the modern age" to point out the importance of vagueness. He wrote a succinct summary of the issues: "It is easy to speak with precision upon a general theme. Only, one must commonly surrender all ambition to be certain. It is equally easy to be certain. One has only to be sufficiently vague. It is not so difficult to be pretty precise and fairly certain at once about a very narrow subject." [5; 20; see also: 31, p. 488–521].

One of our goals is to investigate the function of approximate particles (approximators) primarily in the language system. The English definition of "approximately" (from approximate (adj.) + -ly 1) "close to particular number or time although"; 2) "not exactly that" number or time, close to; 3) around; 4) roughly or in the region of (Cambridge Advanced Learner's Dictionary; Webster's Dictionary, Oxford English Dictionary).

In Modern English the "Approximately" Semantic Domain distinguishes the following semantic groups: 1) approximately: *circa, just about, generally, relatively, roughly, about, around, ballpark figure, bordering on, circa, close to, closely, comparatively*, etc.; 2) almost: *essentially, relatively, approximately,* etc.; 3) round: *nearby, roughly, approximately*, etc.; 4) generally: *mainly, ordinarily, approximately*, etc.; 5) just: *barely, hardly, approximately,* etc.; 6) most: *exceedingly, too, approximately,* etc.; 7) nearly: *practically, roughly, approximately*, etc.; 8) practically: *basically, essentially, approximately*, etc.; 9) relatively: *close, almost, approximately,* etc.; 10) roughly: *generally, around, approximately*, etc.; 11) thereabout: *nearly, roughly, approximately*, etc.; 12) comparatively, *relatively, similarly, approximately*, etc.; 13) essentially: *typically,: actually, approximately*, etc. [see: 6, p. 501–519]. Thus the lexeme "approximately" is the nucleus of its Semantic Domain and at the same time is the dominant verbaliser of the concept "approximation". The semantic domain has 13 differential features: *almost, around, generally, just, most, nearly, practically, relatively, roughly, thereabout, comparatively, essentially* which have their own lexical semantic groups. The lexeme "approximately" takes the central position in given groups. Logically, the conceptual system reveals a taxonomy with 13 subconcepts. Our investigation started with the Definitional Analysis and proceeded with the Componential Analysis being crowned by the Semantic Domain analysis (Lexical-Semantic Field) [see: 21]. Due to the recent, more procedural approaches to cognition and language comprehension, the former distinction of referential and structural meaning was embedded in what became to be known as frame semantics [see: 19]. The central notion of it is that of memory which serves as a paradigm for the operational aspects of both, world system structures and language system structures. [26, p. 645–652]. When words are used to express novel experiences, they acquire or, I'd rather say, reveal new meanings or senses. But words seldom occur in isolation. They normally occur in larger patterns in which the senses of multiple words shift in a systematic way.

Findings and perspectives. In the process of reading and analyzing publications on the on the issue we come across on the close interdependence of approximation, ambiguity, vagueness and fuzziness. A further definitional analysis helped to untie the Gordian knot, though an objective description must be based on the discourse analysis.

One of our goals will be to investigate the function of imprecise particles in the context of discourse typology – educational, political and social contexts to further reveal their pragmatic and ethno-cultural components.

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Михайленко В. В. Вступ до апроксимації

Анотація. Метою статті є, по-перше, аналіз визначення «неточного» у філософії та лінгвістиці для встановлення спільного складника, по-друге, пошук алгоритму інтерпретації приблизного, нечіткого, неоднозначного значення в рамках функціональної семантики.

Ключові слова: апроксимація, неоднозначність, невизначеність, нечіткість, денотат, конотат, семантика.

Михайленко В. В. Введение в аппроксимацию

Аннотация. Цель статьи – это, во-первых, анализ определения «неточного» в философии и лингвистике для установления общей составляющей, во-вторых, поиск интерпретаций приблизительного, нечеткого, неоднозначного значения в рамках функциональной семантики для разработки алгоритма.

Ключевые слова: аппроксимация, неоднозначность, неопределенность, нечеткость, денотат, коннотат, семантика.