

# A RATIONAL APPROACH TO SOFT RATIONALITY

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**Abstract.** Vagueness is commonly presented as natural language imprecise meaning that is analyzed as borderline cases and formalized in various ways by ‘classical’ theories of vagueness. A different approach to vagueness is presented here, adopting Dascal’s notion of ‘soft rationality’ and interpreting it as the use of ‘similarity’ rather than ‘analysis’ for the understanding of natural language terms. Soft rationality is suggested as a theory of vagueness that remains within the realm of intensionality, rather than seeking a formalized extensional explanation to vagueness.

**Keywords:** Abstraction; hard rationality; logic; reason; similarity; soft rationality; understanding; vagueness.

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## 1. Soft Rationality

The notions of hard and soft rationality reorganize our conceptions of rationality and irrationality, separating logic from reason by suggesting that the extensions of reason and logic are not congruent.

The notion of ‘soft rationality’ seems to express some internal tension. Rationality is conceived as formal, exact and rigorous; it goes hand in hand with the metaphor of the notion ‘hard’. It suits ‘hard’ so well that the expression ‘hard rationality’ may sound as if it contains a redundant adjective. On the other hand, the pair ‘soft’ and ‘rationality’ seems odd; ‘soft’ is metaphorically conceived as vague, informal and blur — just the opposite of our conception of ‘rationality’.

Classical logic assumes the principle of bivalence. Motivations for use of non-classical logic are of two kinds (Haack, 1974, p. 2). One is a claim that classical logic fails to represent reality and thus rival logics are offered; a different motivation is that which accepts classical logic but recognizes a need for some supplements. Intuitionist logic, many-valued logic and fuzzy logic are examples of rivals to classical logic, while modal logic, epistemic logic and tense logic are supplements. Some of the rival logics are motivated by philosophical positions; among these are many-valued logics and fuzzy logic, which do not commit to the principle of bivalence.

In this paper, I claim that soft rationality, like non-classical rival logics, provide a tool for resolving vagueness. The tools are different: while non-classical logic suggests methods for overcoming non-sharp borderlines, soft rationality focuses on

vagueness of meaning of words of natural language by implementing mechanisms of similarity and abstraction.

I will first discuss vagueness and pay special attention to vagueness of the natural language, showing the traditional view that regards the paradox of the heap as the classical expression of vagueness, consequently leading to logic models for non-sharp borderline. I will then suggest soft rationality as an alternative approach to the same problem.

Marcelo Dascal has coined the notion of soft rationality. He suggests the following descriptions of hard and of soft rationalities (Dascal 2009, p. 40):

By 'hard' rationality I understand a conception of rationality that has standard logic and its application as its fundamental model. This conception views logical inconsistency as the paradigmatic expression of irrationality and regards certainty as the principal aim and sign of knowledge. Since mathematics is the most successful implementation of this ideal of rationality, hard rationality privileges what it takes to be the basic reasons of this success. Accordingly, it considers, as conditions of rational thinking and praxis or as their preferred manifestations, such parameters as: uncompromising obedience to the principle of contradiction; precise definitions formulated in terms of necessary and sufficient conditions; conclusive argumentation modeled upon deduction; formalization of this procedure by means of a symbolic notation; quantification and computability; axiomatization of domains of knowledge; and the like.

By 'soft' rationality I understand, broadly speaking, a conception of rationality that seeks to account for and develop the means to cope with the host of situations — theoretical as well as practical — where uncertainty and imprecision are the rule. Although acknowledging the applicability and usefulness of the high standards of hard rationality in certain fields, it rejects the identification as 'irrational' of all that falls short of them. It deals with the vast area of the reasonable', which lies between the hard rational and the irrational. The model underlying the idea of soft rationality is that of scales where reasons in favor and against (a position, a theory, a course of action, etc.) are put in the scales and weighed. But there is a deep difference between 'weighing' reasons and 'computing' them. For, except for a handful of cases, the weights of reasons are not precisely quantifiable and context-independent; hence, weighing them does not yield conclusive results whose negation would imply contradiction. Unlike deduction, weighing reasons in this 'balance of reasons', "inclines without necessitating" — in Leibniz's felicitous phrase. Even so, if the weighing is properly performed, the resulting inclination toward one of the plates provides reasonable guidance in decision-making. Soft rationality's logic is, thus, non-monotonic and cannot be reduced to standard deductive logic. It is the logic of presumptions that rationally justify conclusions without actually proving them, of the heuristics for problem-solving and for hypothesis generation, of pragmatic interpreta-

tion, of negotiation, and of countless other procedures we make use of in most spheres of our lives.

Hard rationality is synonymous to classical logic. Soft rationality as here described is neither classical, nor non-classical logic, as clearly said — it is not a deductive reasoning. The claim is that it uses logic of presumptions: conclusions are justified without proving them. In the current paper I use the notion of soft rationality as one that expresses an alternative method for dealing with vagueness of natural language. Dascal's intention is much wider than mine; he uses soft rationality not only for natural languages' vagueness, but for many aspects of pragmatics in general. I adopt his description of soft rationality, as cited above, in a narrower aspect of resolving vagueness that is found everywhere in any natural language.

Vagueness is a prominent characteristic of natural languages. Adjectives are vague; 'nice', 'smart', 'red', 'dark', 'tall' and 'bald' are paradigmatically vague. Vagueness is found not only in adjectives; adverbs and universals that function as nouns are also vague: a 'bird', for instance, characterizes better a hoopoe than an ostrich but we refer to both as birds. An interesting phenomenon of natural languages is that vagueness is not an obstacle that stands in the way of understanding each other; quite the contrary, it allows for rich conversations and plurality of interpretations, which do not lead to confusion about meaning. Confusion of meaning is usually related to ambiguity and other context dependent utterances, not to vagueness.

Nevertheless, vagueness has received a wide attention of linguists, psycholinguists and logicians. Some indeterminacy of words, due to vagueness, as understood by logicians, found remedy in non-classical logic. The next section briefly refers to the logical approach of vagueness.

## 2. Vagueness

Vagueness is indeterminacy, not due to lack of information; the indeterminacy holds even when the available information is wholly given. Borderlines represent a transition, non-sharp borderlines exemplify indeterminacy. This explains why borderline analysis became a focal point for the attempt to fix vagueness (Williamson 1994, Keefe & Smith 1996, Keefe 2000, Shapiro 2006). A sharp borderline for a predicate is one which clearly distinguishes between the applicative and the non-applicative scopes of the predicate, when there is no transition phase. The best illustration of non-sharp borderlines is metamorphosis: a tadpole converts to a frog, passing through stages in which it is not a tadpole anymore, yet still not a frog, and alternatively it may be viewed as being at the same time a tadpole and a frog. Other illustrations may be found in the 20<sup>th</sup> century Dutch artist M. C. Escher drawings which show, for instance, fish converting gradually into birds. What is being meta-

morphosed is not the word ‘tadpole’ (or ‘fish’) but the object itself. However, our concern is not with cases of metamorphosis but with nouns or adjectives whose indeterminacy may come about when we attempt to apply them on some objects; the objects themselves do not undergo a change. The adjective ‘tall’ is a good example: If John is seven feet tall; we all agree that he is tall, but is Mark who is 5’10”, tall? And if he is, would we say that Ken, who is 5’1”, is also tall? And if not, where is the borderline? Is there a sharp one? Is it reasonable to consider someone who is 5’4” as not tall, and someone who is just a little bit higher than 5’4” as tall? This last case is illustrated by the classical paradox of the heap. The structure of this paradox is as follows (Keefe & Smith 1996, pp. 9–10): A predicate  $F$  is set for a sequence of objects  $x_i$ ; assume (1)  $Fx_1$ , then assume that small increments preserve the predication, therefore (2) For all  $i$ , if  $Fx_i$  then  $Fx_{i+1}$ . Now for some large  $i = n$  the conclusion will be (3)  $Fx_n$ . When this is applied to a heap, we start with something that we all agree that is a heap and remove grains one by one, until almost all grains are removed from what was the original heap. Still by (1) and (2) the result is a heap. The heap paradox may be considered a reason for having non sharp borderlines.

A non-sharp borderline positions objects in a ‘gray’ area, which can be conceived as a gap, i.e. for an object ‘ $k$ ’ and a predicate  $F$ ,  $\neg(Fk \vee \neg Fk)$ ,  $k$  is not  $F$  but it is also not the negation of  $F$ , Mark is not tall but he is also not short. Another approach to the non-sharp borderline is of a glut:  $k$  is at the same time  $F$  and not  $F$ :  $(Fk \wedge \neg Fk)$ . The first approach violates the law of excluded middle and the second one violates the principle of bivalence.<sup>1</sup>

Some of the non-classical logics can serve in handling the vagueness problem as here presented. Fuzzy logic is the natural way of presenting non-sharp borderlines. Three-valued logic is a good representation of the three possibilities,  $Fk$ ,  $\neg Fk$  and the transition case, where a gap and a glut are distinguished by differently defining the designation subset of the possible states.<sup>2</sup>

A non-sharp borderline is not entirely described by three zones and thus by three-valued logics, a higher resolution identifies what is known as ‘higher order vagueness’, which expresses more intermediate states (Shapiro 2006, p. 125 ff). A many-valued logic can incorporate this as well; it may require a five-valued logic or a higher-valued logic, if necessary.

A widely accepted approach that does not call for non-classical logics is supervaluationism. This method, originally established for other purposes, was adopted for borderline cases by Kit Fine (Fine 1975) and it is well explained (although rejected) by Timothy Williamson (Williamson 1994, pp. 142–53).

The challenge of vagueness as a borderline problem has many applications and natural language is just one of them. In the following sections I will present vagueness of natural language as a particular problem, which stretches beyond the borderline issue.

### 3. Abstraction and soft rationality

Fuzzy borderlines present a problem for extensional semantics. The challenge might be resolved by some of the non-classical logics. Supervaluation is a widely considered approach to the problem from within the framework of classical logics. But is a fuzzy borderline the sole expression of natural language vagueness?

Borderline vagueness assumes that there are three well distinct zones: A zone in which the case is clear — the object is characterized by the predicate, let us call it the central zone; another zone in which the case is clear — the object is *not* characterized by the predicate, let us call it the outer zone; and the borderline zone where we have either a gap or a glut — this will be the transition zone. Higher level vagueness, which identifies a transition between central and transition zones and between transition and outer zone may add higher resolution and additional transition zones.

Borderline vagueness neglects possible differences within the central zone. Let us return to the ‘tall’ case: John is 7’ tall and he is assigned the predicate ‘tall’; Mark is 5’10” and he too is assigned the predicate ‘tall’, but there are 14 inches of difference between the height of these two people, and this makes a significant difference between what the meaning of John being ‘tall’ is and of Mark being ‘tall’ is. If Mark is described to somebody who does not know him and is supposed to meet him, the fact that he is tall might not be mentioned, this is not the case with John. A more difficult case is that of the predicate ‘nice’; there is no one clear character that classifies something as nice. The center zone is populated with a variety of items, which for different reasons were assigned the predicate ‘nice’. The logical approach to vagueness assumes that the difficulties have all been justifiably converted into the three zone model, and what needs attention is the transition zone. But vagueness is not arranged in such a sterile form, there is vagueness within the center zone and the amount of this vagueness might be significant. A formal language is not vague; for a proposition to be expressed within a formal language, all vagueness has to be resolved beforehand; this occurs in the formalization phase. Borderline resolution is needed where the borderline is fuzzy enough so that vagueness cannot be easily removed and higher level formalization is required. The assumption is that meaning is an outcome of an analysis of the language into basic un-analyzable concepts; all ‘tall’ people share the same un-analyzable concept of ‘tall’.

‘Analysis’ as a method of definition of concepts within natural language is questionable in what follows; does extensional semantics capture the meaning of natural language or does intensional semantics add something which is filtered out by extensional semantics? I claim that although there is a difference between ‘tall’ of a 7’ tall person and ‘tall’ of a 5’10” tall person, *understanding* of the adjective ‘tall’ still justifies the extensional semantics approach. ‘Understanding’ is not explained by

extensional semantics; nevertheless, it is the process that justifies the extensional semantics equalizing all members of the central zone. In what follows, ‘understanding’ will be explained.

In exegesis to section 65 of Wittgenstein’s *Philosophical Investigations*, which starts the discussion of ‘family resemblance’, Baker and Hacker write (Baker & Hacker 1980, pp. 344–5): “In a rigorous science any lack of precision in the definition of the key theoretical terms would lead to uncertainty and inaccuracy in what could be explained by the hypotheses. But in philosophy a rigorous demarcation of such concepts as language, propositions, objects, property, etc., is otiose precisely because, in this sense of ‘explain’, philosophy explains nothing. It should not be seen as a system of hypotheses from which deductions are to be made.” This distinction of philosophy from sciences resides in the center of Wittgenstein’s objection to determinacy of sense in natural language by an analytical method (merkmal-definition). It is ‘understanding’ and ‘explanation’ of concept-words and of propositions in natural language, that express something wider than and not bounded to analysis.

Wittgenstein refers specifically to borderline cases (Wittgenstein 2005, p. 196e (248v)): “Is a sharp photograph always and for all purposes better than an out-of-focus blurry one? What if someone were to say: ‘An out-of-focus picture really isn’t a picture at all?!’”, He goes further attacking the effort to refer to ‘definition’ as expressing meaning (2005, p. 196e): “Let’s imagine that in this sentence of a story ‘The ground was all covered with grass and herbs’, the words ‘grass’ and ‘herbs’ are replaced by definitions. It is clear that these definitions will be long and complicated expressions; and now the question is whether we really mean by this sentence what is now contained in the immeasurably more complicated one. Would we say — I believe — that we hadn’t even thought of all of that.”

In *Philosophical Investigations*, Wittgenstein returns to the example of a defocused picture and says (Wittgenstein 1953, p. 29e (71)): “One might say that the concept ‘game’ is a concept with blurred edges. — But is a blurred concept a concept at all? . . . Is it even always an advantage to replace an indistinct picture by a sharp one? Isn’t the indistinct one often exactly what we need?”

Wittgenstein thinks that the uniqueness and efficiency of natural language is its being vague, thus the effort to determine the borderline blur cases is wrong. He suggests examples that show how natural language acts (1953 (72)): “*Seeing what is common*. Suppose I show someone various multicoloured pictures, and say: ‘The colour you see in all these is called ‘yellow ochre’, — This is a definition, and the other will get to understand it by looking for and seeing what is common to the pictures. . . .’ Wittgenstein rejects analysis as a method of understanding natural language concepts; he says that ‘understanding’ is achieved not by definition but by ‘seeing’, by experience.

‘Family resemblance’ (Wittgenstein 1953, pp. 27–30 (65–74)) is used by Wittgen-

stein as critique of definition by analysis — the *merkmal*-definition method. It exemplifies the case of ‘game’ which is used for a diverse set of things, although they do not have even one characteristic in common. Family resemblance shows that analysis is not a sufficient method for understanding concepts. The suggestion to use experience — ‘look’, does not explain how we understand concepts; like family resemblance, it is just a demonstration that ‘understanding’ is achieved by experience, not necessarily by analysis.

It seems that Wittgenstein had no intention to explain ‘understanding’; his main effort was to show that analysis is not a necessary nor a sufficient method for ‘understanding’. Nevertheless, there is a hook in ‘family resemblance’, resemblance is ‘similarity’ and similarity is, in my view, a key item in finding out how ‘understanding’ occurs.

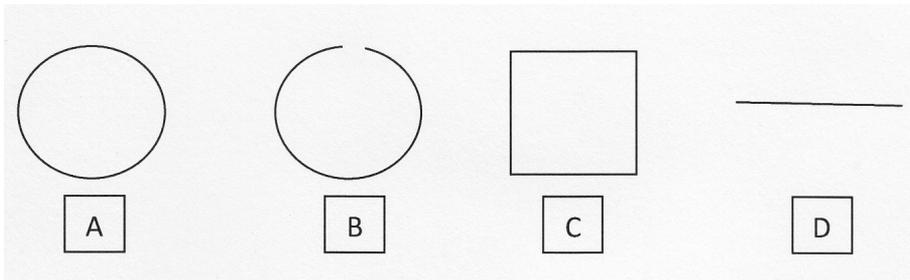
‘Understanding’ refers to propositions and to concepts. Understanding a proposition is what makes judgment possible. One understands a proposition if he can make a judgment whether the proposition is true or false. However, we are not concerned here with propositions but with concepts. Understanding something occurs when an idealization of that something is mentally established so that a relation between it and the ideal concept of it is conceived. The relation is not of identity, it is a level of similarity. Identity of A and B means that all predicates of A are the same as the predicates of B; similarity is when there are some predicates, or even just a single predicate which is shared by A and B. Even that single predicate may have flavors, and not be identical in the concept and in the conceptualized thing.

We can establish the concept based on exposure to a single object and we can update our concept with each additional object that we are exposed to; in other words, the concept represents similarity among a collection of objects. As the concept is established based on non identical objects, the resulting concept is not identical to any of the particular objects.

Conceptualizing can be understood as generalization. This is another way of expressing a kind of averaging. But as we have seen, concepts are not just an average of a collection of objects, objects may be different from each other in many aspects and yet there is a similarity between them; this is well exemplified by ‘family resemblance’. Conceptualizing as generalization is a special case of a much wider conceptualizing, which is conceptualizing by abstraction. Abstraction is an act of formalizing, extracting the form of the object. Abstraction of objects allows for identification of hidden similarities. Wittgenstein provided the notion of ‘family resemblance’ as a metaphor for not having anything in common in the entire collection; pairs of common features establish the glue that groups them all together. He specifically rejects the possibility that there is something in common (Wittgenstein 1953, p. 28e (67)) “But if someone wishes to say: ‘There is something in common to all these constructions — namely the disjunction of all their common properties’ — I

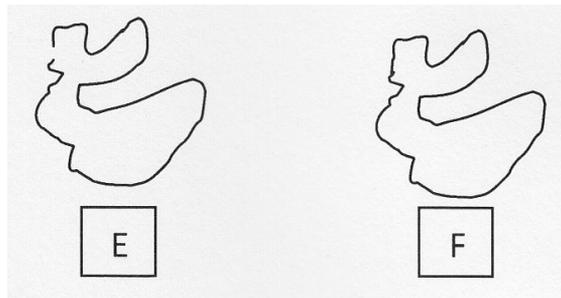
should reply: Now you are only playing with words.”. Wittgenstein further attacks the inclination for generality (Wittgenstein 1960, p. 17) “This craving for generality is the resultant of a number of tendencies connected with particular philosophical confusions. There is a tendency to look for something in common to all the entities which we commonly subsume under a general term. We are inclined to think that there must be something in common to all games. . .” then he rejects this attitude by presenting the concept of ‘family resemblance’. Some of the critiques of Wittgenstein claim that family resemblance among family members, e.g. a Churchillian face is due to a common code within their DNA. I think that in some sense they are right, Wittgenstein rejected generality as mentioned above, but he did not provide another explanation for different things to become members of the same collection — bear the same predicate: ‘game’. The answer, which Wittgenstein did not provide, lies, in my view, in abstraction, which extracts common aspects from forms of different objects. This can be clarified by referring to abstraction in mathematics.

Given the following four objects: A circle (designated as A), a broken circle where a tiny section is missing (designated as B), a rectangle (designated as C) and a segment of a straight line (designated as D):



If we are asked about the similarity among these shapes, my guess is that A and B will be selected as most similar and D being most dissimilar to any of the other three. This is a result of generalization. In topology, homeomorphism is defined as the existence of a mapping of every point of one shape to a point on another shape and the reverse mapping from the second shape, to the very same points of the first shape. Homeomorphism is the ‘strongest’ kind of similarity which topology defines for continuous sets. In the above four shapes, there is homeomorphism between A and C and between B and D, but there is no homeomorphism between A and B. In other words, from a topological perspective, there is similarity between A and C and between B and D, but there is no similarity between B and A: B and D are open shapes and A and C are closed, and from a topological aspect, openness and closeness are more important similarity factors than the intuitive similarity perceived by the shape. Topology grades the shape as almost insignificant when it comes to

comparing objects, it is justified if we think of the shapes as flexible thin metal wires — we can easily convert B to D and A to C, but converting A to B requires cutting the wire and converting B to A requires welding. Having understood this topological approach we will easily classify shape E to be similar to B and D, while F is classified as similar to A and C. E and F are dissimilar!



This explains the similarity that is identified in family resemblance — Form, i.e.<sup>3</sup> DNA code, is the common link among all that do not show any possibility of being generalized to some average concept. Abstraction is not generalization, hence, contrary to what Bambrough (1966) thinks, family resemblance is not a solution to the problem of universals.

Vagueness of natural language is not only a matter of fuzzy borderlines; words are not predefined as in formal languages, they get their meaning by continuous use, and the meaning undergoes continuous changes within a community which speaks the language, and with additional personal fluctuations among different members of the community.

Abstraction is a process of establishing a concept, but as more objects contribute to the concept, it becomes less similar to each of them, this raises the question how does the concept continue representing the whole variety of objects that contributed to its establishment?

This difficulty is due to our attempt to analyze. When analyzing, we breakdown two concepts, find the composing elements of each of the two, and in case we find common elements, pronounce a relation between them. When three concepts are analyzed, the common elements must be shared by all three concepts so that a relation exists among the three. Logicians' effort to resolve the borderline problem stems from the tendency to analyze. Identification of the non-sharp borders as the vagueness problem is a result of analysis. Analysis looks for all that composes an object, and the effort is aimed at the less noticeable elements. Salient elements are identified with a much lesser effort. This chase after the less significant elements is caused by a desire for accuracy, and the assumption that small differences make change. Analysis is a search for differences. It categorizes as different any two things that

are not identical. It should therefore be completely understood why many-valued logic is considered by some as a proper way of handling vagueness. 3-valued logic provides us with an intermediate, either gap or glut, that provides a method of assigning a borderline case to an in between state, and if second order vagueness is considered, the way is open for a 5-valued logic. Supervaluationism is a step in the direction of somewhat softening the process.

Similarity starts by recognizing the existence of similarity among different things. Similarity is mandatory for intensional semantics. No two people have the same identical intension of a concept, but as Wittgenstein, earlier cited, said: “seeing what is common”, the different intensionalities have something in common. This is why natural language is possible. The common concept is the result of abstraction. It is sufficient to have something in common, even if it is not salient, to draw a link among all that share this common something. We have seen in topology that a common character does not have to be a salient one, the same goes for meaning of words in a natural language.

This relation which is common but not salient is not resolved in analysis, because it is not something that is considered as a building block of any of the features of the object, this is a relation among items which does not exist within an object. Take for example ‘tall’, this is not a character of an object or a person, this is a relation, therefore analysis of a single object will not reveal it, but it can be identified within the collection of items. Abstraction is the process that extracts the relation, not from a single object but from the whole collection of objects.

The distinction of soft rationality from hard rationality is the distinction between the desire for sharp borderlines and the rejection of dichotomies as expressing reality. Soft rationality seeks to cope with situations where “uncertainty and imprecision are the rule”.<sup>4</sup> “It deals with the vast area of the reasonable, which lies between the hard rational and the irrational”.<sup>5</sup> It is, in my view, not appropriate to interpret soft rationality as dealing with the transition zone, the fuzzy area, as this, by its nature, is undefined (it is either a gap or a glut); soft rationality assumes a non flat central zone, there are variations within it. Soft rationality not only rejects sharp borderlines, it suggests a mechanism of balance of reason which is achieved by putting together different reasons and seeking a balance among them all; but this is exactly the idea of similarity via abstraction. Balance of reason is balancing among different characteristics; finding the balance is conceptualizing, with the balance being a state at which a concept represents a variety of entities that do not have in common even one characteristic. Soft rationality is, therefore, the recognition that vagueness is not only a borderline problem but one that exists among entities in the center zone; soft rationality’s suggestion of balance of reason, may — at least in context of natural language vagueness — be understood as similarity achieved by abstraction.

Finally I would like to comment on the contribution of abstraction to the logician elaboration to sharpen the borderline. Abstraction is what allows the logician to view the central zone as a flat one, but this flattening has also an effect, mainly on removing higher level vagueness, or, in other words, sharpening the borderline by identifying some of the borderline objects as having similarity to the abstract concept.<sup>6</sup>

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**Resumo.** A vagueza é comumente representada pela adoção de significados imprecisos na linguagem natural. Ela é analisada como um caso limítrofe e formalizada de diversas maneiras pelas suas teorias “clássicas”. Este trabalho propõe uma abordagem diferente do

tema através da adoção do conceito de Racionalidade Soft (*Soft Rationality*), elaborado por Marcelo Dascal, e da sua interpretação como o uso da “semelhança” ao invés da “análise” para a compreensão dos termos da linguagem natural. Aqui será feita a sugestão de que a Racionalidade *Soft* (branda), enquanto teoria sobre a vagueza, permanece no domínio da ‘intensionalidade’ ao invés de buscar uma explicação formalizada e ‘extensional’ para o tema.

**Palavras-chave:** Vagueza; abstração; racionalidade ‘dura’; lógica; semelhança; racionalidade ‘soft’; compreensão.

## Notes

<sup>1</sup> For distinction between the two, see Haack 1974, pp. 65–8.

<sup>2</sup> For a three valued logic with possible valuations: 0, *i*, 1, a designation of only {1} represents a gap and a designation of {1, *i*} represents a glut. See Priest 2001, pp. 122–8 for the distinction between the cases of  $K_3$  and LP.

<sup>3</sup> DNA as common character that explains family resemblance is a known critic of Wittgenstein. My use of DNA is not to object Wittgenstein’s view against generality and analysis.

<sup>4</sup> See quote of Dascal’s description of ‘soft rationality’ above.

<sup>5</sup> Same reference as previous footnote.

<sup>6</sup> I want to express my thanks to Marcelo Dascal, my supervisor in my research of ‘vagueness’ for many useful comments that helped me in composing this article. I also thank Juliana de Albuquerque for translation of the abstract and keywords to Portuguese.