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THE NATURE OF THE STRUCTURES OF APPLIED MATHEMATICS

CĂTĂLIN BĂRBOIANU

Introduction

The current orientation toward the structural model of science is still in full impetus, not only in metatheoretical analyses, but also in the constitution of science itself as the object of these analyses. Such an orientation has had as a motivation neither an alternative to the previous logical-empiricist and sentential models nor the domination of structuralism in the analytical philosophy of the last century. Rather, it is motivated by a set of epistemic criteria that became normative in the philosophy and evaluation of science in the last 40-50 years: a) Explanation (along with prediction) became the main function of science, and the epistemology and philosophy of the science of the last decades had as their central theme explanation and a theory of explanation. In the context of this focus, the explanatory contribution of the classical (set-theoretic) structures in science could not be neglected, even though it is the subject of intense ongoing debate. b) The constitutive use of classical and mathematical structures in sciences exhibits the potential of categorial unification, intertheoretic and interdisciplinary connectivity, and applicability. c) The structural fundament generates a predisposition not only to the advanced mathematization of sciences, but also to a metatheoretical justification for the use of mathematics. Mathematics not only stands as a method, but is also a constitutive part of science, due to the mathematical structures which can be connected with the investigated structures

through various methods, like direct relationing, correspondence, or interpretation.

A structural theory is one within which the relations between parts or objects prevails epistemically over the nature, individuality, and specificity of the latter. These relations are described and defined in a language compatible with formal logic, thereby allowing the classical logical operations between statements and the formation of classes of models of a theory. Such compatibility generates a structural extension of a logical type and a sort of continuity with the sentential model of theories. Adopting non-formal set theory as a universal language for the empirical sciences yields a continuity of language and of conceptual analysis used in the metatheoretical models and also provides the structural theories with a uniform sense – that is, a universality in which the notion of structure becomes essential, distinguishable at several levels, and having different natures. revealing four types of structures: 1) the logical structures of the scientific methods and 2) the set-theoretic relational structures (either conceptual or physical-empirical) that are created and extended through procedures specific to set theory and universal algebras, as well as 3) the mathematical entities/structures participating in scientific theories still in the form of structures (this time mathematical structures in Bourbaki sense), and even 4) the internal structure of a scientific theory itself[1]. The continuity and universality specific to the structural approach has the potential of apparently unproblematic moving to the metatheoretic investigation by linking the first-order concepts with those of a superior order through the same methods, and also the object of the theoretical investigation with the investigation itself, thus integrating them all into one structure.

A particular case of structural metatheoretical investigation, but central in the contemporary philosophy of science, is the philosophical problem of the applicability of mathematics in natural sciences. In this paper, I argue that in the structural

[1] In the sense of constructive, not of theoretical content.

metamodels of application and applicability of mathematics, the reductionist structural approach based on a set-theoretic concept of *relation* of a primary mathematical "type," cannot prevent putting in evidence structures of different natures and epistemologies. Moreover, some structures are incompatible with the classical ones, with respect to certain epistemic principles specific to the applicability of mathematics. This diversity of natures and this incompatibility render problematic the *justification* (at the metatheoretical level) of the use of mathematical modeling as a main method of scientific investigation. Such justification should be, along with representation, an essential function of any theoretical model of the applicability of mathematics.

In the first section, I present a conceptual analysis of Bourbaki mathematical structure with an eye toward the classical set-theoretic concept of structure. Such an analysis brings back into discussion the problem of the empirical or non-empirical, formal or non-formal nature of the concept and continues with a brief presentation of the contemporary structural models of application of mathematics, for which I identify a double nature (theoretical-applicative and metatheoretical). In the second section, I argue for the epistemic character of the suprastructure created through the structural metamodel, which integrates the source and target structures as well as their external relation. I then show that the epistemic nature of the suprastructure is incompatible with its set-theoretic homogeneity with respect to both nodes and relations, and this incompatibility does affect the justification function. Finally, I argue that if we give up the idea of suprastructure and keep the homogeneity of each of the two corresponding structures, the difference between their natures leads to a problem of truth, which in turn does affect the justification function of the metamodel.

I. Structural application and applicability of mathematics

A first semantic aspect of the common concept of application of mathematics in sciences is *import*. Application of mathematics

assumes a multifaceted import consisting of the methodologic import, the conceptual one, and also that of the necessary mathematical truths. During the history of science, such a general application has shaped three classical roles of mathematics, namely the constitutive role (for scientific theories), the descriptive role, and the inferential role. In this rough conceptual framework, the applicability of mathematics (as a property) would mean the possibility of performing these roles, but also the success of this practice. A refined definition of applicability of mathematics, subsumed to an adequate conceptual and theoretical framework, is currently a target of the contemporary philosophical accounts of applicability of mathematics.

I.1. The structures of pure mathematics, unity, and applicability of mathematics

In *The Architecture of Mathematics* [1950], N. Bourbaki does not aim at defining the concept of mathematical structure within a pre-established, perhaps formal, theoretical framework, nor at developing a theory of structures[2]. Rather, the description starts from an overview on mathematics as a discipline by asking whether the autonomous theories emerging and developing within mathematics – thus becoming separate (through their goals, methods, and even language) – do affect the unity of mathematics. Bourbaki's answer to this question (which was not new at all) is negative, and the argumentation is made around the concept of mathematical structure.

For Bourbaki, it is obvious that logical formalism is a system of logical rules adapted to the mathematician's need to build a theory as a concatenation of propositions derived from each other. This convenience cannot ground a unifying principle for

[2] Bourbaki describes the concept of mathematical structure of a certain type even before the cited work that is in Volume 1 of the *Elements*, in terms of set theory.

mathematics. In addition, the deductive reasoning through syllogistic enchainment, also specific to any non-mathematical discipline, is no more than a transforming mechanism applied to a set of premises, and as such it cannot serve for the characterization of those premises nor of the complexity of the various mathematical theories.

Even though logical formalism and axiomatic method seem to provide the linking element for the unity of mathematics, Bourbaki argues, these two cannot establish this unity, just as physics and biology, for instance, cannot be unified just on the basis of the experimental method or hypothetic-deductive method that they both use. What these methods cannot provide is an "intelligibility" of mathematics, which will be responsible also for the unity of this discipline; instead, the concept of mathematical structure would ensure, in Bourbaki's view, this unifying intelligibility.

That said, the concept of Bourbaki structure does not belong to a formal system and is not metamathematical but is generated from a complete perspective on the content of mathematics. The basic idea is to extract the smallest number of independent properties (of the *relations* between the elements of a set from a mathematical theory or domain) from which any other property can be derived, and to ascertain the applicability of these properties to the relations between the elements of other sets (including sets from other theories), provided that the nature of these elements does not in any way influence the *derivation* of that property. Ignoring the nature of the elements is crucial in defining the concept of mathematical structure, which thereby appears as a concept applied to the sets of elements of an unspecified nature. Mathematical structure is not given *a priori* but is defined on the basis of certain pre-established relations, for which specific conditions or properties are formulated explicitly as the axioms of that structure. Developing the axiomatic theory of a structure means deducing the logical consequences of that structure's axioms by excluding any hypothesis regarding the elements that stand in a relation (including their nature).

Next, Bourbaki identifies three primary types of mathematical structures (called 'mother-structures') by the nature of the relations established in the base set, namely, algebraic structures (corresponding to the relations in the form of laws of composition), order structures (corresponding to order relations), and topological structures (corresponding to the set-theoretic relations of topological type). These three types are recognizable in existent mathematical theories, in singular or multiple form. (There are structures whose sets of axioms are specific to more than one of the basic types; for example, the structures of algebraic topology).

In Bourbaki's view, this concept of mathematical structure and this typology (admittedly exhaustive) are the premises that enable the axiomatic method to validate the unity of mathematics, which can justifiably be called a *structural* unity, given its set-theoretic fundament with interconnectivity potential. Evidentiating a concept common to several mathematical theories (at the level of the relations defined within these theories and independent of the language and methodology of those theories) grants them – according to Bourbaki and his followers – an intelligibility that the axiomatic method and necessary truths cannot grant by themselves.

Written in a period when mathematized physics was at its peak and particle physics was in full advent of its discoveries "driven" by mathematical formalism, Bourbaki's work underscores the unexpected capacity of mathematical structures to adapt to the problems of physics and to contribute to its theoretical content. This contribution or constitutive applicability remains fruitful with the increasing complexity of the mathematical structures through formal procedures that assume emptying the empirical-intuitive content of the axioms of the mother-structures. This applicative nature of the structures appears as remarkable and unexpected. From a philosophical perspective, it seems that there is a preadaptation of mathematical structures to physical reality, which assumes an intimate relation of mathematics with empirical sciences, a relation that seems to be more "hidden" than accepted *a priori*. By anticipating the challenge, ten years hence, of Eugene Wigner [1960], known as the syntagma "unreasonable effectiveness

of mathematics," Bourbaki launched an indirect and unformulated challenge to philosophers of mathematics and science, limited to his concept of mathematical structure: The adaptability of mathematical structures to the theoretical content and problems of empirical sciences, admittedly unexplained, seems to contradict the *formal* procedure generating these structures, since this procedure relies on emptying notions and axioms of any empirical content or influence. On the other hand, mathematical structures became not only applicable, but constitutive to natural sciences, especially to physics, where a mathematized branch assumes not only a mathematical methodology, but also a theoretical framework founded on mathematical structures. Under these circumstances, Bourbaki asks whether the unity of mathematics is the outcome of formal logic or simply this scientific fertility. In other words, the unity of mathematics is not one of an inert structural skeleton but one of a more complex organism in evolution with the scientific environment that influences the organism through mutual exchanges. Are mathematical structures abstract, inert forms or do they have a certain "life" consigned by their applicability? Can we somehow have the certitude of this applicability in the future course of the evolution of science? Nowadays, these questions have been reformulated, decomposed, and refined within the problems of philosophy of applicability of mathematics, which has developed as a delimited field of philosophy of science beginning in the 1990s around the so-called 'miracle' of applied mathematics. The nature of the mathematical structure in relation with its participation in constitution and problems of empirical sciences has remained a subject of debate as enduring as ever, and this debate may shed some light on several issues related to scientific 'miracles' and the success of structural science.

I.1.1. The empirical component of mathematical structures

Intelligibility of structural mathematics to which Bourbaki refers increases when we assign an empirical influence or interpretation to the axioms of the structures.

This empirical component of the axioms, which is transmitted to the structure and then to the mathematical theory that employs that structure, is independent of any mathematical ontology and in no way is it subsumed into a Millian-type mathematical empiricism or an even weaker one. The same independence can be noted when we place the empirical component within an interdisciplinary framework, on the basis of the idea that human action of mathematical creation cannot be analyzed exclusively philosophically. It is worth mentioning the advances that have been made in the new field of perceptual mathematics (see especially [Lomas, 2002], [Teissier, 2005], [Ye, 2009] and [Mujumdar & Singh, 2016]), which, once articulated in a clearly crystallized theory, will pose serious problems to any debate either supporting or opposing mathematical empiricism, as long as the tools of that predicted theory are multi- or inter-disciplinary.

Of course, there are mathematical structures elaborated with no empirical influence, some of them even resulting from an axiomatic intellectual game. Even though they do not have an empirical origin, such structures could eventually find their applicability in a future mathematical theory based on originally empirical structures, or to an empirical science, thus acquiring indirectly an empirical component[3]. Moreover, if the idea of acquisition of the empirical component through internal or external[4] applicability is rejected, Bourbaki's canonical typology of the structures still ensures the empirical component, through the fact that those basic structures are present within the complex

[3] So many times during the history of science, a structure or mathematical theory created independently of any empirical-scientific problem finally found its successful application in science, and this fact is also one of the premises of E. Wigner [1960] in qualifying the successful general application of mathematics as "unreasonable." On the other hand, even one of the pretended solutions to Wigner's problem (called in the literature "empirical-origin solution") invokes interconnectivity of the mathematical concepts, among which those having an empirical origin create the link between the two universes of different natures – mathematical and empirical. For a succinct description of this solution and a well-organized presentation of the classical solutions proposed for solving Wigner's problem, see [Bangu, 2012, p. 135-143].

[4] With respect to mathematics.

structures, and each type of mother-structure reflects an obvious empirical influence at the level of representations, actions, phenomena, or objects as follows: the laws of composition reflect counting, collecting, adding, multiplying, composing, etc.; order axioms reflect quantitative and magnitude order, comparison, hierarchy, etc.; topological axioms reflect spatial surrounding and vicinity, isolation, proximity, form, limit, and continuity.

Generally, the structures of elementary mathematics reflect human experience, and this fact became paradigmatic. Mathematics starts from the experience of human activities[5] by creating its primary structures through the abstractization of this experience and extending them through logical formalism and the axiomatic method.

I.1.2. Mathematical structure: formal or non-formal?

The empirical component of the typological concept of mathematical structure (Bourbaki) seems to "alter" the formal nature of the concept described through the necessity of the logical-formal treatment. Even though the extension of the concept as an equivalence class or category seems to free it from this empirical component, question remains open as to whether its nature is formal, non-formal, or somehow mixed. On this theme, we could draw a parallel with the Fregean view on the semantic applicability of mathematics, which is based on second-order predicative logic: For Frege, mathematical statements are not statements about physical objects, but about conceptual extensions of concepts (such as classes, properties, etc.) regarding those objects. Mathematics does not state laws of nature, but rather, laws of the laws of nature; mathematics cannot be applied to an empirical context, but to a thought about an empirical context. Meanwhile, the logic of mathematical propositions remains formal, even if we can assign to them indirect references[6]. By ignoring the

[5] Refer also to the empirical Babylonian mathematics, in studies of history of mathematics.

[6] For an overview of Frege's work on the nature of mathematics and its entities, focused less on the aspects of his logicist construction and more

logicist specificities of the Fregean model and its platonist orientation but keeping the analogy, we can say that mathematical structures such as classes and extensions have a mere formal nature; however, this characterization can be easily rejected if considering Bourbaki's terminology, containing both formal and non-formal terms such as 'axiomatic *method*' as a structure-generating tool.

In a critical interpretation elaborated around the concept of the Bourbaki structure, L. Corry [1992] advocates for the dual formal and non-formal character of the concept. Corry claims that the so-called structural character of contemporary mathematics reflects clearly a way of *doing* mathematics, which can be described in non-formal terms despite attempts at creating a formal theory within which the non-formal idea of a mathematical structure is elucidated in a mathematical way.

Even though, as Corry argues, the dual formal/non-formal nature of the mathematical structure does not pose methodological and epistemic problems to the practice of pure mathematics, once we pass the border into the domain of applied mathematics, the unresolved issue of the exact nature of a mathematical structure raises fundamental problems to the philosophical accounts dealing with the applicability of mathematics.

I.2. The structures of applied mathematics: mathematical, classical, epistemic, pure, or mixed

In structural sciences and standard applications of mathematics[7] in sciences and everyday life, the rationale of description, representation, interpretation, and inference lies in the notion of structure. This primary concept of structure does not belong to any complex

on the problems of ontology, philosophy of applicability, and language of mathematics, see [Dummett, 1991].

7 I shall call *standard* application of mathematics an application submitting to the scheme of the structural model of application of mathematics, based on the structural analogy via morphisms of structures, in the sense of Bueno and Colyvan's [2011] inferential conception of applied mathematics.

formal system but is described as a network of objects/nodes/ positions connected through relations. These objects have an atomic status, and the relations between them are conventional or criterial associations. The epistemic prevalence of one set of relations or set of objects over the other within the structure defines the type of structuralist or respectively non-structuralist perspective from which the structure is considered, but this aspect counts only at the level of philosophy of science and not as concerns science itself and its outcomes, which have been confirmed regardless of the theoretical nature or ontology of science's objects or entities.

Thus, the primary concept of structure reverts to the primary concept of *relation* as an ordered association of some given objects, in a trivial set-theoretic sense – namely an ensemble $S = \langle D, R \rangle$, with D non-empty set and $R = (R_n)_n$ a family of sets of ordered n-tuples of elements from D ($R_n \subset D^n$). This primary concept – I shall hereinafter call it *classical structure*, corresponding to the sense of static structure of Resnik [1997, p. 202-209] – grounds science and structural knowledge, and it is difficult to say whether its set-theoretic nature (under non-axiomatized set theory) is sufficient to justify the attribute of 'mathematical', as long as it seems to be more of a mental-psychological concept. The brain neurophysiology of humans as well as other species includes *association* as a basic process, either as random association (imagination and convention) or on the basis of criteria established through observation and perception (pattern recognition, using previous knowledge, etc.). This fact raises the question of whether the nature of the relations within a classical structure (and implicitly the nature of that structure) is mathematical (set-theoretical) or mental; in the latter case, the association through the symbolism of the parentheses would have only the role of a merely conventional "transcription." On one hand, the question is important when we consider the problem of applicability (including the constitutive one) of mathematics in structural science, for this general process means connecting and mutually

integrating structures from domains of different natures, which apparently implies the necessity of a common nature of those structures. On the other hand, the question loses its import when acknowledging that we haven't at our disposal a defined concept of "mathematical relation" – we know only that is constitutive to the notion of mathematical structure. Therefore, it is legitimate to ask whether the classical structures can be identified with the mathematical ones, with the reservation of a problematic acceptance of the same set-theoretic nature for the primary concept of relation in both concepts.

The literature on classical structures is developed more regarding structuralism, structural realism, and ontology of structures[8] and less toward the epistemology of structure with respect to structural mathematized science. As concerns the roles of mathematics in structural science and the way mathematics plays these roles successfully, the epistemological aspect prevails over the rest, because the structures are used in a functional mode, becoming tools or methods of acquiring knowledge. In what follows, I argue that the two distinguished types of structures – mathematical and classical (set-theoretic) – have different epistemologies when participating in mathematical modeling within empirical sciences, even under the hypothesis of a shared set-theoretic nature. As a preamble, I shall present in brief the structural model of the standard application of mathematics, focusing on the nature of the structures involved.

I.2.1. The primary structural model of application of mathematics

Pincock [2004] renders central the idea that application of mathematics assumes an *analogy* between mathematical structures and certain structures of the physical universe obtained through idealization; the concept of structural analogy is represented by

[8] See, for instance, influential works such as [Piaget, 1968], [Shapiro, 1997, p. 71-108], [Ladyman, 2007], [French, 2014], [Arenhart & Bueno, 2015].

the set-theoretic notion of homomorphism or isomorphism[9], as a structure-preserving application between two different domains[10].

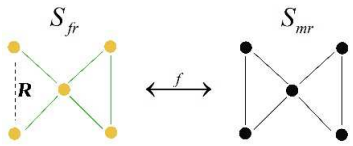

Fig. 1. The primary structural model of application of mathematics

The motivation for such representation consists, on one hand of strengthening the uniform semantics of the mixed[11] statements of applied mathematics, and on the other hand, of inducing a minimal inferential character to the mathematical modeling, which is ultimately a means of acquiring new knowledge in the empirical domain. This inferential character was missing in the 'internal relation' models'[12], among which Frege's semantic applicability had solved the problem of the uniform semantics in a simple and unobjectionable way.

The homo/isomorphic function f is an external relation between the two domains (assumed to exist *a priori*) which forms the correspondence between the nodes of the structures. The two structures – the physical (S_{fr}) and the mathematical one (S_{mr}) – are constituted through a process of extraction from a larger

9 Depending on each particular application.

10 Although Pincock is granted as the author of the theoretic model based on structural morphism, there are references to this model in previous works, such as Baker [2003], Balaguer [1998, p. 109-112] or Leng [2002].

11 Containing both physical and mathematical terms.

12 The typology of theoretical models of the application of mathematics by the nature of the relation established between the physical and mathematical domains also belongs to Pincock [2004]. An 'internal relation' is actually an identity criterion: An internal relation is a relation in which an object must stand in order to be that object. The immediate example is set membership, which stands as a relation between a set and any of its elements. A relation that is not internal is external. Frege's model of semantic applicability, as well as its set-theoretic analog developed by Pincock [2004], is an 'internal relation' model.

structure: the physical structure puts in evidence only the physical objects and relations (connections) between them that are *relevant* for the application (descriptively, but also making possible an analogy with a mathematical structure *conveniently* chosen); the mathematical structure consists of those theoretical parts from within pure mathematics whose results (derivations) will be effectively engaged in the application. The first extraction is what we call the *idealization* of the empirical context, which in fact is a double idealization – that of the extraction/isolation from a larger system and structure, then that through which physical objects are granted the status of nodes of the set-theoretic structure by canceling their physical complexity.

A set-theoretic reduction is also operated in the mathematical domain because initially the structures being prepared for engagement in modeling are those in the classical sense of a Bourbaki structure. The three types of mother-structures, described through sets of axioms free of empirical content and linked through the axiomatic method, can be described set-theoretically as relational structures[13] in an unproblematic way. Such a reduction is not an idealization (of the type of the physical one), but rather an equalizing, because the lack of empirical content of the structure's nodes ensures their atomic status, and the relations of the structure are *defined* or *derived* mathematically.

In such a theoretical model, application of mathematics works by inferring an unknown connection (relation) R in the physical structure on the basis of the homo/isomorphic character of function f. In the mathematical structure S_{mr}, all relations are known, either as definitions or logical derivations. If nodes $f(x)$ and $f(y)$ stand in a relation in S_{mr}, then x and y stand in a relation R in S_{fr}, which was not known before the application. The inferred relation R is then interpreted in the mixed language of the empirical context, thus contributing to its description.

[13] Even if algebraic structures involve operative relations.

Pincock does not develop further a theory of an *external* relation between the mathematical and empirical domains and does not advance a formalism of the corresponding structures or of the structural extraction. The structural formalism is approached by Bueno and Colyvan [2011] in their theoretical model called 'inferential conception of applied mathematics' (ICAM).

I.2.2. The inferential conception of applied mathematics

Even though it is an extension of the Pincock's primary 'external relation' model, ICAM is not merely structural exhibiting some pragmatic context-dependent characteristics of the process of applying mathematics. The core principle of ICAM is that the fundamental role of applied mathematics is inferential (even though the functions of a mathematical model may be multiple), and this role ultimately depends on the ability of the model to establish *inferential* relations between the empirical phenomena and mathematical structures. In terms of Bueno and Colyvan, ICAM consists of a three-step scheme:

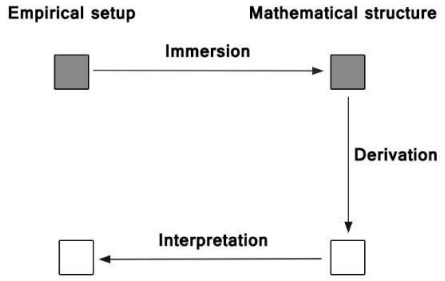

Fig. 2. ICAM scheme

1. (Immersion) establishing a homo/isomorphic function from the empirical context to a convenient mathematical structure through which to link the relevant aspects of the empirical situation to the appropriate mathematical context[14].

[14] This function is not unique, and choosing the right one is a contextual problem in the charge of the mathematician, depending on the particularities of the application.

2. (Derivation) Deriving the consequences through mathematical formalism within a specific mathematical theory, by using the mathematical structures chosen at the immersion step.
3. (Interpretation) Interpreting the consequences obtained at the derivation step in terms of the empirical context by establishing a homo/isomorphic function from the mathematical structure to the initial empirical context[15].

In this theoretical framework, the primary structural model is present at both the immersion and interpretation steps. The aspects of surplus of structure – both in physical and mathematical domains – remaining outside the process of mathematical modeling[16] are assimilated through the introduction of the notions of partial structures, then through partial homomorphism/ isomorphism[17]. The partial nature of relations and structures reflects formally the incompleteness of our knowledge about the investigated physical domain and has an epistemic character rather than an ontological one. The distinction between the immersion and interpretation steps allows different external functions to operate independently within the model; these functions represent the possibilities of revising the structural arrangement, of refining the idealizations, and even of formulating new problems related to the original problem, including new empirical discoveries. These processes actually take place in the applied-mathematics practice.

The entire structural approach of the application of mathematics to an empirical context, from the primary model to ICAM (also known as 'mapping accounts'), is based on the idea of

[15] This function is not necessarily the inverse of the immersion function, although in many concrete situations it can be.

[16] The former, through the idealization of the physical system, and the latter within the derivation step, which assumes the selection of the convenient mathematical structure from the larger mathematical context.

[17] This formalism of partial structures and morphisms was developed before the work of Bueno and Colyvan [2011], in [French & Ladyman, 1998, p. 51-73], [Bueno, French, & Ladyman, 2002] and [da Costa & French, 2003].

a formalized analogy between a domain of mathematical structures and a domain of conventional-relational, so-called physical, structures This analogy is identified through the particularities of the application, but also through the established analogy itself, as part of the actual application process. Such collaboration and interdependence between the source and target domains and their external relation (the morphism function) allow the structural model to represent theoretically not only the application of mathematics, but apparently also (to a certain degree) its applicability.

I.2.3. Functions and nature of the structural metamodel of application and applicability of mathematics

There are at least two general targets of investigation of the problems of applicability of mathematics, for it is not only the success of applied mathematics that stands as an object of the research, but also the general use itself of mathematics as a method of scientific investigation. As an epistemic-intellectual responsibility, this use needs to be justified in the given conditions, *i.e.*, differences of ontological, epistemological, and logical natures between the source and target domains, as well as the existence of the unsuccessful applications. Thus, any theoretical model developed for solving the problem of applicability (including the structural ones) should have two essential functions: representation (of the processes of application of mathematics) and justification (of the application), – in other words, establishing a general applicability of mathematics independent of any circumstantial factors of a practical-theoretical or methodological nature.

At the beginning of the last decade, philosophy of mathematics was still dominated by debates regarding the explanatory role of mathematics versus its representational role, explanation being the central theme of philosophy of science and epistemology. This "explicative" trend has also influenced to some degree the motivation for the creation of the structural models of application

and applicability of mathematics (especially ICAM), whose authors adapted to this trend with an eye on Wigner's problem. Thus, we can view a structural model of application and applicability of mathematics from two perspectives, revealing its two different natures: on one hand, a general model of reasoning based on pure mathematics and applicable to any applied-mathematics problem, reverting through instantiation to the classical concept of mathematical model dependent upon the particularity of the application (the theoretic-applicative nature); on the other hand, a universal model representing every possible application, the general process of applying mathematics by using its structures, but also the structural correspondence between the two domains, that are established through the application as well as that assumed *a priori* (the metatheoretic nature). In the theoretic-applicative model, explanation (as an important function specific to a dominant category of applications) remains at the first level, that of the instance of application, In the metatheoretical model, explanation also appears at the second level in the form of (metatheoretical) justification of the general use of the mathematical method. By specifying the two natures of the structural model, we can see that the theoretic-applicative model represents the application of mathematics while the metatheoretical model represents application *and* applicability of mathematics.

The justification for applying the mathematical method as a function necessary to an adequate theoretical model of applicability of mathematics manifests itself through the metatheoretical nature of the structural model.

II. Different natures of structures in the structural models

In section I.1.2, we revisited the debate on the nature of the mathematical structures themselves as being formal or non-formal with respect to the empirical content incorporated through the constitution of the primary types of Bourbaki structures. In the current section, I shall extend this discussion to the *suprastructure*

that is created with the finalization of a mathematical application representable through the structural model.

In the primary model, as well as in the ICAM scheme, we deal with processes of *constitution* of the structures: on one hand, the constitution of the structure from the empirical context through the associations as relations of the objects conveniently establishes a further analogy with the mathematical structure or structures participating in the inference; on the other hand, the correspondence established between the source and target structures creates in turn a structure completing the two existing structures and thus creates a suprastructure. Since functions and their compositions are representable set-theoretically, the suprastructure thus created is also of a classical set-theoretic type and includes the participating mathematical structures.

The question arising is whether, when qualifying the nature of these structures, we should consider only the set-theoretical aspect, or to consider also the intentional aspect, which is justified by the goal- and user-dependence of the mathematical model. Regarding intentionality, there is a conventional character of the structural arrangement in the target (empirical) domain – the physical objects do not stand in defined relations, as is the case with mathematical structures, but they are put in relations through a mere conventional association (as *n*-tuples), motivated through criteria of convenience[18]. A conventionalism can be also assigned to the mathematical structure at the level of creation of its axioms, but this one is of a very different nature – by having a justification based more on relevance than convenience. This latter conventionalism could be also dissolved if we consider it against the necessity of the integration of the mathematical structure into an existing logical system (the mathematical theory within which the created structure will function). In conclusion, the only difference in nature of the mathematical structure and the classical

[18] Moreover, the structural arrangement of the target domain may be modified as the result of testing the mathematical model (even the ICAM scheme allows this change), which strengthens the conventional character of the arrangement.

structures participating at the structural mathematical modeling could result from the different conventionalism of the two types of structures at the intentional level. If this distinction is accepted, we call the classical structures of the empirical domain and the suprastructure created through the theoretical model of application *epistemic* structures since they are constituted with the goal of acquiring knowledge in the form of partial relations inferred through means of the mathematical model. In this sense, mathematical structures will have an epistemology different from that of the classical ones, and this epistemology is "located" at the level of the *relations* of the structure.

We have a difference in nature of the nodes of the structures also. The structures created in the empirical context assume sets of *physical* objects, so that we are forced to accept the concept of a set (as mathematical or set-theoretic notion) having physical objects as elements. The entire structural scheme of application of mathematics relies tacitly on this principle, which for M. Steiner [1998, p. 22] and Pincock [2004] is unproblematic[19]. The necessity of keeping the set-theoretic nature of a set with physical objects despite its physical content is created by the presence and functionality of the structural morphism, which is the core concept on the basis of which the model works and is defined in set-theoretic terms.

In another paper [[name deleted to maintain the integrity of the reviewing process], 2017, p. 80-87], I argued that such a concept does not meet the two criteria widely acknowledged as adequate for a concept of set – namely, individuality (a set must be a set of terms, objects, elements, as individuals) and plurality (a set must be characterized by a diversity of individuals, not only in a logical-numerical sense, but also as an identity criterion). As concerns individuality, I have shown that the unavoidable systemic interaction of the physical objects in sufficiently large

[19] The principle of a set of physical objects is also essential for the 'internal relation' account sketched also by Pincock [2004], in which applicability is reduced to the set membership relation.

systems poses problems to the constitutive differentiation of the objects. In other words, delimiting the physical object for individualization can be done only spatiotemporally, while the set, as a mathematical concept engaged in the practice of pure mathematics, is non-temporal. Temporality can affect the plurality of a set as well as the systemic relationing/interaction. Thus, a set can be only a set of atomic references of those physical objects, and individualization through reference – an intentional and conventional process – can be done only in case of the elements of "pure" sets, through the mathematical definition. In addition, for sets containing both physical and mathematical objects, I have argued [name deleted to maintain the integrity of the reviewing process, p. 87-90] that the diversity (as non-identity, not non-individuality) of their elements cannot be tested for the sets that are described predicatively.

Despite the above arguments, accepting the principle of a set of physical objects at the conceptual level cannot prevent an immediate differentiation of the epistemological nature of the types of structures participating in the structural model: The structures of the empirical domain will have objects with empirical content as their nodes, which eventually interact with each other in systems outside the structure, while the structures from the mathematical domain will have nodes with an atomic status, but with no empirical content. The fact that elements of "purely" mathematical sets may participate in mathematical theories outside the structure is not an analogue of the systemic interaction from the physical domain because in the mathematical case, such participation does not render problematic the meeting of the criteria of individuality and plurality.

If we still accept the principle of having a set with physical objects of a set-theoretic nature, by overviewing the whole suprastructure created through the process of mathematical modelling, integrating both the empirical and mathematical structures by means of the external function (a set, in turn), we shall put in evidence so-called "pure" sets (having only mathematical objects as elements), so-called "physical" sets (having only physical objects as elements), and so-called

"mixed" sets. This differentiation induces non-homogeneity of the nature of the constituent substructures, and of the suprastructure itself, with respect to their nodes.

II.1. The nature of constituent structures and the justification function of the structural metamodel

In what follows, I shall argue that this non-homogeneity of the suprastructure (with respect to either nodes or connections) created in the structural metamodel of application of mathematics does render problematic the existence and/or consistency of a metamodel's justification function.

By establishing the external function of homo/isomorphic correspondence between the source and target structures (whether postulated, built, or with proven existence) a suprastructure is created on the basis of the set-theoretic nature of the whole representation. This suprastructure does exist as a set-theoretic object, since the corresponding structures are sets, while external function is also a set (of pairs of nodes). However, this set-theoretic object also has an epistemic nature. On one hand, its components (source and target structures and external function) are constructed with the goal of acquiring new knowledge (the relation inferred on the basis of the homo/isomorphic character of the correspondence). On the other hand, the created suprastructure itself is an epistemic object, at a metatheoretical level (as an outcome/result of the metamodel), and also at the level of the global practice of applied mathematics. Indeed, once a mathematical application has been confirmed as successful, the correspondences and interpretations made within this application will be used in other new applications as acquired confirmed knowledge. Thus, we cannot ignore either the set-theoretic nature of the suprastructure (as long as the model was founded with the concepts of set theory) or its epistemic nature (closely related to the constitutive elements, as well as to the goal of the theoretical model).

However, it is just this dual nature that poses problems, in my view, to the justification function of such a theoretical model, which, besides representation, should provide a theoretical motivation for application and applicability of mathematics.

In the mathematical domain, the set-theoretic structure extracted for application has been obtained through a reduction of the Bourbaki structures participating in the relevant mathematical theory. This reduction is entirely justified, being actually a mathematical *equalization* with a structure whose relations are mathematically defined and whose nodes have an atomic status. But the Bourbaki structure has an epistemology different from its set-theoretic equivalent (this is why I initially referred to these mathematical structures as 'epistemic'). The existence of an empirical content at the intentional level of the creation of the mother-structures is one reason, since this empirical content vanishes with the set-theoretic reduction. The axiomatic method participates in the definition of the *types* of Bourbaki structures and in turn eradicates the empirical content of the axioms; however, it is just the logical functionality based on the content elimination that ensures the 'intelligibility' and unity of mathematics as a network of structures. Therefore, the epistemic suprastructure created by the structural metamodel, which integrates the set-theoretic mathematical structure and not the "original" Bourbaki one, will not carry the entire specificity of the mathematical method, despite the set-theoretic equalization. Such an epistemic inadequacy does affect the justification function of the metamodel which, without that component, seems to be one of reasoning through analogy and not necessarily through mathematical reasoning.

With regard to the nodes of the structures, the set-theoretic suprastructure will have both physical and mathematical objects as nodes, which qualifies it as a mixed set and structure. The set of physical objects, when accepted, would affect the suprastructure at the conceptual-constitutive level, and this poses a problem; besides that problem, the existence of mixed sets (either as subsets of the total set, or set-theoretic representations of certain

connections between a physical and a mathematical node) presents an additional, special problem. Indeed, not having the certainty of the diversity of the individuals within a set, we will not have any guarantee for the existence of some connections already engaged in the suprastructure – that is, an identity between two elements will dissolve a possible connection between them within a certain relation. Let us observe that the only connections holding nodes of both natures (physical and mathematical) are[20] the connections belonging to the binary relation of correspondence f, namely $(x, f(x))$. In this form, these ordered pairs express the choices made for creating the theoretical conditions of the modeling, that is, the structural correspondence. Although conventional, these choices are also based on previous knowledge. (Some choices, already operated in confirmed previous applications, will be maintained as credible.) Thus, as a connection, $(x, f(x))$ has an epistemic nature which reflects the particularity of the method used to acquire knowledge. Once we express this connection set-theoretically, in the denotation $\{x, \{x, f(x)\}$, since set $\{x, f(x)\}$ is mixed, that set becomes susceptible to failing a test of diversity. Were such a thing to happen, connection $(x, f(x))$ would become senseless or vanish, and the entire epistemic construction based on an external relation between the two domains would collapse[21]. Thus, the metamodel is again affected in its justification function, for its central method itself (the structural morphism thorough conventional correspondence) is unsure or unsafe. One more time, the set-theoretic nature and the epistemic nature of the suprastructure become incompatible with respect to the metatheoretical justification.

Finally, at the level of the relations/connections in the suprastructure, let us observe that that constitutive conventionalism, which I mentioned at the beginning of section 2, is of three types: 1) In the physical structure (including the unknown connections

[20] I refer to those connections present in the suprastructure of the theoretic-applicative model of a represented arbitrary application, because other connections between the nodes of this suprastructure might exist outside the model, belonging to relations from other applications.

[21] The metamodel degenerates in this case into an 'internal relation' one.

inferred through modeling), structuring as idealization is made through the predicative-type linguistic description (in mixed language), and the relations are the result of associations operated on the basis of those predications, which are bearers of empirical knowledge, but they do not justify in any way the set-theoretic reduction; we may call this conventionalism as *atomist-idealizationant*. 2) In the mathematical (classical set-theoretic) structure, all relations are defined in mathematical language, being consistent with the deductions and definitions of mathematical theories as logical systems; the conventionalism of the relations is related only to the reduction of the Bourbaki structures; we may call it *logical* conventionality. 3) The binary relations of the external correspondence represent within the metamodel only the theoretic method that was used[22], and so we may call this conventionality *methodological*.

It is obvious that the three types of constitutional conventionality of the structures are different, and moreover, seem to be suitable for a hierarchization by the epistemic degree of set-theoretic reduction and conventional association. However, such an order translates set-theoretically as a second-order relation of the created suprastructure, which is not represented in the metamodel. Staying only with the nature of the conventionality, the detected differences revert to a difference in the epistemologies of the connections between the nodes of the suprastructure. The set-theoretic approach inevitably imposes a homogeneity of the atomic components (nodes and connections). We have already discussed the problem of the epistemic homogeneity of the nodes. Why would an epistemic homogeneity of the connections be necessary to a justification function of the metamodel? Because the justification of the method of mathematical modeling assumes that the constructed metamodel will reflect the *particularities* of this method, and these particularities revert just to the different natures of the conventionality of the structural arrangement,

[22] Even though I mentioned before that that correspondence of the nodes is not entirely arbitrary, being also guided by previous knowledge, this knowledge is not represented in the structural metamodel.

which is described by the nodal connections[23]. The merely set-theoretic approach cancels these particularities of the method, which are supposed to contribute to the justification of the use of the method. Let us notice that set-theoretic homogeneity does not pose problems for the representation, but only for the application of mathematics (if application of mathematics means only a procedure of reasoning through structural analogy) and not for applicability of mathematics, which cannot be described exclusively set-theoretically. Instead, the justification function of such a structural metamodel is affected by the double nature of the suprastructure it creates – set-theoretic and epistemic.

Avoiding this problem would be possible only if we drop the idea of structural integration of the two structures – source and target – through the structural morphism. By keeping the two structures separated, we would at least gain homogeneity within each of them (of their nodes, but also of their relations), and we would eliminate the problem of mixed sets. However, as I will argue further, this position would reveal another problem, that of the truth.

II.1.1. The problem of truth bearers and transfer of the truth value

To the question of whether truth should be involved in the structural models of application and applicability of mathematics, I give a positive answer which I support with two arguments. The first argument is the existence of *prediction* as a particular goal of

[23] Obviously, we have the freedom to create a mathematical representation of these differences – if possible – and to define a more complex concept of connection. For example, the notion of graph has been generalized (from applicative-theoretical necessity) to that of weighted graph, in which the edges are assigned numbers. However, the current analysis has as its object the metamodel in its current set-theoretic primary form. If one comes to a similar generalization for the connections, the structural morphism should be redefined, too, as a stronger morphism, to preserve also certain relations between the added elements.

mathematical models. There is a wide category of predictive models, whose goal (prediction) is formulated in terms of a phenomenon occurring, of the behavior of a system, or following a trajectory, etc. The second argument is the mere use of the mathematical truths from the source domain. The primary motivation for the creation and use of a mathematical model is the epistemic support we gain from mathematical necessity, which we cannot deal with directly in the target domain, which is governed by contingency. Even if we do not consider mathematical necessity as a truth[24] on the basis of which we build another truth, the motivation of the "guaranteed" epistemic support grants any belief or proposition obtained as result of the modeling the quality of being a classical truth bearer[25].

By accepting the idea of the truth of mathematical propositions and the equivalence that the set-theoretic reduction of the Bourbaki structures (seen as sets of axioms) creates, we may say – with a certain reserve – that conventional relations established in the mathematical domain are truth bearers. The same cannot be said about the relations from the target domain, the empirical one, where both the known and unknown relations are not defined, but *interpreted* (through criteria of relevance and convenience); before this interpretation, the relations have the status of a simple set-theoretic-type conventional association; it is problematic to state that a relation that is a set is a truth bearer. If in the target structure, the relation inferred through modeling (unknown prior to application) is not a truth bearer, then the final outcome of the application (after its interpretation in the empirical context) cannot be assigned a truth value. Even though interpretation through referents of the sentence is admitted as a truth condition in classical theories of truth, the interpretation of the abstract relation in a sentential form cannot stand for a truth condition because the interpretation remains in the abstract non-

[24] By adopting the classical view in which the only mathematical truth is that of the analyticity of the proof, and axioms have the same status as that of the proven result, namely non-truth-bearer (see [Hempel, 1945])

[25] But not necessarily true, in the sense of a confirmational truth

empirical realm of language[26]. One can object to this problem by saying that regardless of the way we obtain it, the final outcome of the modeling, including interpretation, is a mixed sentence, which is a traditional truth bearer. However, the issue stands not only in the existence of truth bearers in *both* domains, but also in the continuity of the process of transfer of the truth value from the source to the target domain, and this continuity is interrupted before interpretation of the conventional relations in the empirical context, as I argue above.

The difference in nature of the two truths of the modeling, namely the necessary (used) and the contingent (inferred) – assuming these do exist – apparently correlated with the quality of truth bearer or non-bearer of the corresponding entities in the two domains, does not support the opposition of the possible objection above, but potentiates it. Admitting the inferential quality of the modeling, the inference of a contingent truth from a necessary truth raises the epistemic problem of a metatheoretical explanation for the cases of empirical information of the inferred truth, an explanation which cannot be obtained outside the theoretical framework that establishes the nature and properties of the external relation between the two domains. However, this limitation is problematic, as long as truth is confirmed empirically.

Besides the difference in nature of the two truths, let us observe that the truth value can be transferred from the source domain to the target one only through the external homo/ isomorphic relation, which is the epistemic base of the inference through the modeling. Once the pure mathematical nature of this external relation is acknowledged, all its immediate or derived properties must be related to the definition of homomorphism, which is limited to the set-theoretic relational aspects, while truth has no constitutive or derived relation with this definition. Then comes the question: On the basis of what argument do we consider homomorphism as preserving not only structures, but also the truth values assigned in one of the domains?

[26] See also *Fig. 3*.

In conclusion, as concerns the transfer of the truth value from one domain to another, the continuity of the process of transfer seems interrupted in two places: once in the main interpretation step of the ICAM scheme (an inacceptable transfer in the formal system of the homomorphism), and once again in the interpretation in the empirical context of the relation inferred in the target structure (the absence of the quality of truth bearer of the conventional relation). The problematic processes in light of the above arguments are illustrated in the next scheme.

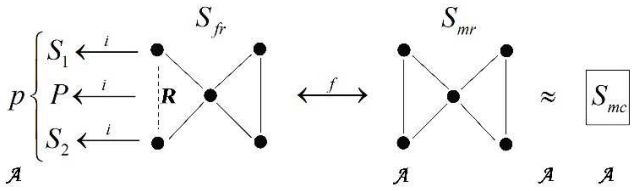

Fig. 3. Localization of truth bearers and the transfer of the truth value in the mapping account

In Figure 3, S_{mc} is the mathematical Bourbaki substructure necessary for application; S_{mr} is the relational conventional structure equivalent ($\approx$) to S_{mc}; f is the structural homo/isomorphism; S_{fr} is the relational physical structure; R is the unknown relation inferred through the model (corresponding to a known relation from S_{mr}); i is the process of sentential interpretation of relation R, assigning the subjects S_1 and S_2 to its *relata* and predicate P to the relation R (as connections); sentence $p: S_1S_2P$ is the mixed statement of the result of the double interpretation (in the physical structure and in the formulated empirical context). Marks A represent the localization of the truth bearers (traditional and non-traditional) both at the level of abstract entities (relations, propositions and sentences) and that of the processes ($\approx$) that allow an unproblematic transfer of the truth value. According to this scheme, the transfer of the truth value is interrupted before each of the two interpretations, in processes f and i.

In conclusion, even if we maintain the source and target structures as separate, not integrating them into a suprastructure, the different natures of the structures generate a new problem, that of the truth, which obviously participates in the justification function of the metamodel.

III. Conclusions

A theoretical metamodel of application and applicability of mathematics cannot ignore a justification function of its own. The set-theoretic structural approach, despite its potential of representation, cannot contribute sufficiently to a strong justification function. In this paper, I have argued that the difference in nature of the structures involved in the structural metamodels of application and applicability of mathematics poses a constitutive-type problem for the justification function. The functionality of the theoretical model assumes a commitment to the existence of a suprastructure that integrates the source and target structures as well as their external relation, and this suprastructure has also an epistemic nature. But this epistemic nature is incompatible with the set-theoretic homogeneity, with respect to both nodes and relations. If we drop the idea of suprastructure, by keeping the homogeneity of each of the corresponding structures, their different natures pose a problem of truth bearers and of the transfer of the truth value from the mathematical to the physical domain.

Eliminating these objections toward a metamodel with a valid and functional justification function seems possible only through extreme changes in theoretical and conceptual nature, which might extend even to the primary concept of *relation*. Such changes also challenge the general *representation* of the application of mathematics, bringing into discussion other available types of reasoning besides that of structural analogy.

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A CRITIQUE ON MCGINN COUNTERARGUMENTS ON RUSSELL'S THEORY OF EXISTENCE

PAULA POMPILIA TOMI

The aim of this paper is to present a critique of McGinn's arguments against the Russellian approach of existence. According to McGinn, existence should be considered a proper predicate. In this case, formally it cannot be equated with the existential quantifier. For a better understanding of the orthodox view (*i.e.* Russell's approach), a short presentation of it is needed. Hence, I am going to briefly present Russell's main ideas about existence. If McGinn rejects that existence can and should be expressed using the existential quantifier, Russell argues for the opposite. The next step consists in a brief presentation of the counterarguments McGinn provides for the orthodox approach. In the last section of the paper I am going to present some critiques for some of the counterarguments McGinn provides. Some of them seem to be quite strong, but others fail to reach their aim.

However, I should add that I do not agree at all with the equivalence between existence and the existential quantifier. But, if one wants to reject such an account it has to have pretty strong counterarguments. McGinn's ones do not seem to be as strong as he wished them to be.

I. A short presentation of the orthodox approach[1]

McGinn (McGinn, 2000) is arguing for a theory that takes existence as a property of objects; thus, existence is considered a predicate.

[1] In this presentation I followed McGinn's one (McGinn, 2000, pp. 17-21) Russell's presentation can be found in (Russell, 2010, pp. 61-76, 110-115)

His approach is coming against the one that finds existence rather a second-order property; this means, a property of a property. The rival view is supported by Russell.

According to Russell's account, existence is not attributed to certain objects, because it is not a property of objects. Existence suggests that some specific property is instantiated. In this situation, if someone says 'Lions exist', he means that the property of being a lion (lionhood) is instantiated. Hence, if something exists, is not understood as an attribution of a specific property (*i.e.* existence) to a specific object. It is rather understood that a certain property has an instance.

It can be understood that an existing object means nothing more or less that a specific property has instances. The concept of existence is linked to the one of instance and possibility. Thus, saying that 'Lions exist' means that the sentence 'x is a lion' is possible.

McGinn identifies three main sub-theses in the Russellian argument (McGinn, 2000, p. 19). There is an ontological thesis, a semantic or logical one and a definitional one. The first of them has both a negative and a positive part. The negative part is that existence is not a property that individuals instantiate. On the other hand, the positive one is that for something to exist means for some property to have instances. The semantic part consists in the fact that statements of existence are higher-order statements involving reference to a specific property, predicate or propositional function. Finally, the third sub-thesis defines existence through terms as 'propositional function' (or 'property instantiation') and 'sometimes true' (or 'possible'). This definition is meant to be non-circular. According to this last claim, McGinn considers that:

> 'In a perfect language the word *(i.e. existence)* need never occur, its job always being done by 'sometimes true' and its adjuncts.' (McGinn, 2000, p. 20)

This orthodox approach – as McGinn is calling it – puts an identity between the existential quantifier and existence. In other words, the existential quantifier has ontological import. There is

no need of a different predicate in order to express existence; the already mentioned quantifier does the entire job. Thus, 'existence' means 'there is an x such that'. This interpretation seems easy to use, especially in a formalized language. On the other hand, it also seems to have its limitations and some weak points.

II. McGinn counterarguments

McGinn offers some harsh critiques on this view. There are four main counter arguments presented by the author. The first of them regards the concept of instantiations. Existence is defined through the phrase that a predicate 'has instantiations'. This can be understood in an objectual or substitutional sense. Taking into consideration the first sense, it means that in order for something to exist there have to be objects that are instances for some certain predicate (McGinn, 2000, p. 21). Let us take an example. Returning to the one already used: 'Lions exist'. According to the objectual analysis, there have to be some objects that instantiate the property of lionhood. This means that these objects exist, in order to be considered instances for lionhood. In this situation, how should the second occurrence of 'exist' be understood? McGinn considers this occurrence to be presupposed, without a proper explanation. In his words:

> 'The notion of existence is presupposed in the analysis, so the analysis does not settle what kind of notion is. (…) The instances have to be existent objects, so we are presupposing the notion of an existent object in our account of what an instance of a predicate is.' (McGinn, 2000, p. 21)

Thus, the instantiation of a property seems to presuppose the concept of existence. In order for an instance to be considered, it must already exist. Only existing objects can be proper instantiations. In this situation, if the orthodox view understands the idea that a property has instantiation in an objectual sense, it seems to be

doomed to circularity. As the author concludes, this interpretation cannot be considered to prove that existence is not a predicate.

On the other hand, the substitutional one seems to be the one that Russell preferred. In this situation, instances are propositions or sentences, rather than objects. But, according to McGinn, this interpretation suffers from the same weakness. The propositions or sentences that represent instances for the existing property have to be true. In order for a truth-bearer to be true, there must be at least an existing object referred to by the name used in the truth-bearer and the specific object has to satisfy the predicate it is attached to.

It seems that, in every case, an instance of a property means nothing more than at least one existing object that instantiates that specific property. In this situation, it seems that the definition of existence through instantiations of a property and possibility is circular.

The second objection considers the generality of the orthodox approach. According to McGinn the theory is not able to analyze the application of existence to the properties. The author claims that properties or propositional functions exist in the same way as other things, even if they are abstract objects.[2] In order to analyze that the property of being a lion exists, one should refer to some further property. It is obvious that the needed property cannot be the property itself, because lionhood is not itself a lion. In this situation, a new property that represents a description of the first one is introduced. Hence, the second property needs an instance. From here, there is a requirement for another existing object.

The real problem, thus, arises because for every existing property another one is needed. Starting from an existing property, another one is needed, and so on. But the one that represents an instance for the first property also has to exist. Hence, we are forced to accept that:

[2] This implies the acceptance of a strong realism. I am going to return to this later on in the paper.

> '(…) we are now launched on a vicious infinite regress (…) The problem, evidently, is that to analyze the existence of a property we need another property that the first one instantiates, and so on *ad infinitum*. Not only is it doubtful that there always *are* there further properties, but also we will not succeed in getting any of them to exist without the existence of further ones that raise the same question.' (McGinn, 2000, p. 24)

This requires that existence could not be used for properties. In this situation, the orthodox approach is not able to cover the whole range of the utilizations for existence. Because of this weakness, McGinn considers this approach 'ill-formed and meaningless' (McGinn, 2000, p. 25). The author does not accept to take as primitive the existence of properties. If the existence of properties would be accepted for granted, there would be no need for an analysis like the one already presented. In such a situation, the theory would have no problem regarding the existence for properties. However, McGinn considers that a proper theory of existence should be able to explain all the uses of the concept it is supposed to define. Thus, the approach proposed by Russell is not able to prove that properties exist. If this is the case, then it also fails in explaining that objects exist. In order for an object – x – to exist, there must be some existing property – P – such that x instantiates P.

The third critique follows the same line as the one already presented. It underlines some sentences that cannot be analyzed using the orthodox approach. It seems that singular attributions of existence are quite hard to be analyzed by the orthodox approach. For example, sentences as 'Natalia exists' seem to appeal, in order to be analyzed, to a description theory of reference and such a theory was heavily criticized. The other possible option is to accept that there are two interpretations of 'exist'. Thus, there is a predicative interpretation, as in the example presented above – in the case of singular sentences – and for general sentences as 'Lions exist' it is not taken predicative. This solution seems even more unattractive than the first one.

Sentences as 'Something exists' are even more problematic for the orthodox approach. This sentence is clearly meaningful and true, but it cannot be properly expressed without a predicate for existence. If it would be expressed symbolizing existence with the existential quantifier, then it will be something of the form '$(\exists x)$' with no predicate added. Thus, such a sentence might be considered only meaningless from the orthodox point of view. The problem is that it follows from sentences as 'Lions exist', being a logical consequence of any sentence of that form. Therefore, the author considers that;

> '(…) the orthodox view does not have the generality we should expect of a theory of existence.' (McGinn, 2000, p. 28)

Finally, the fourth counterargument focuses on the fact that nothing that failed to fall under some property could exist. In other words, whatever exists must have at least one property.[3] Thus, the orthodox approach rejects 'bare existence'. According to McGinn bare existence might be metaphysically impossible, but it does not seem to be a logical impossibility. But the orthodox view makes it impossible not only metaphysically, but also impossible to be expressed.

> 'I think the idea of an object[4] that has *only* the property of existence is not intrinsically self-defeating, but it would have to be if existence simply considered in property instantiations.' (McGinn, 2000, p. 29)

The problem seems to be not only that the orthodox approach requires a specific property instantiated in order for something to exist, but it also requires that property to be unique to that object. The instantiation of that property has to be sufficient

[3] A property that is different from the one that implies existence.

[4] The formulation McGinn uses seems contradictory. I am going to return to this in the next section.

for the object to exist, but not for the existence of other objects as well. McGinn considers that there might be an object that differs in no respect from a numerically distinct object. But this seems impossible if one adopts the orthodox view.

In conclusion, the already mentioned approach seems to be able to solve only a limited number of cases and leaves outside many others. Even more, it tends to consider impossible to express, either ill-formed, or impossible some perfectly meaningful and sometimes true sentences. In other words:

> '(…) the theory cannot deal with property existence, it cannot handle the full range of existential statements, and it links the possibility of existence too intimately to the idea of (uniquely) instantiating a property.' (McGinn, 2000, p. 30)

If those critiques would stand, then the orthodox approach would have no chance. Thus, according to McGinn, a theory of existence has to consider 'exist' a predicate in order to have the explanatory power such a theory needs. However, the Russellian view may be saved if some of those counterarguments would fail.

III. A critique on McGinn's counterarguments

Those arguments are strong enough to destroy the orthodox view. The main issue is that some of them seem to be quite implausible. The first argument is the one that stands. I do not see a way out for the advocate of the criticized approach. This might be the main issue for Russell's theory. The fact that the definition he provides is circular may be considered the weakest point of the theory. However, there are some advocates of the circular definitions.[5]

[5] Gupta and Belnap consider that truth might be defined appealing to a circular definition and that this does not destroy the coherence of a truth theory. This might also be extended to other notions, maybe existence. But for the aim of this paper, I will consider the first counterargument provided by McGinn to stand. For more information about the revision

Even if this is the case, one should accept circular definitions in order to escape this critique and I do not think that Russell would do so. In this situation, the argument stands.

For the second counterargument, the orthodox approach has an easy way out. Russell could avoid it by claiming that properties cannot exist in the same way as other objects do. He could also claim that his notion of existence is a strong one, one that implies the property of concreteness. In this situation, indeed, the existence of properties or other abstract objects would not be possible. Another escape of this would be to claim that an object exists only if it does so mind-independent. Thus, lions exist because they would exist even if no rational mind would observe their existence. However, one might claim that this is not the case for properties. This is strongly linked with the metaphysical view one has. In this situation, this second argument is not as strong as the author intended it to be. If an advocate of the orthodox approach adopts realism about properties and other abstract entities, then he must face this critique. If not, he has more than one possibility to escape it.

The third objection is not as simple to escape as the previous one. However, there might be some solutions, at least from a part of the counterargument. The critique implies that if existence is to be taken as equivalent with the existential quantifier and being defined as an instantiation of a property, then singular claims about existence cannot be handled by such a theory. McGinn argues that the possible escape from this is to accept a theory about reference that uses definite descriptions and such a theory is problematic. This is right, an approach of definite description is quite hard to support. On the other hand, Kripke's theory of rigid designators might work. Returning to the example from the presentation of the critique – 'Natalia exists' – the name that occurs in the sentence could be understood as a rigid designator. In this case it could be treated not as a constant, but rather as a predicate

theory of truth see: (Gupta, 1982, 1989) and (Belnap, 1982) and also (Belnap and Gupta, 1993).

that is satisfied by only one object. Formally this sentence could be '$(\exists x)\mathrm{N}x$'. This seems to fulfill all the claims imposed by the orthodox approach. However, if one does not want to treat names as predicates, the other possibility – also following Kripke's theory – could be to reach for the essential property, as origin. But this would complicate the solution. These being said, I strongly believe that singular claims can be handled by the orthodox approach.

On the other hand, there might be some sentences that raise some issues for this view. For example:

(1) Something exists.

(2) Nothing exists.

(3) Not everything exists.

A possible solution could be to use the predicate 'is a thing' in order to escape the problem. However, this might not be generally accepted, and it seems not to work for (3). In this situation, this part of McGinn's argument stands. This issue does not weaken only the Russellian approach. Any view about existence that considers existence to be expressed only by the existential quantifier seems to have the same problem. For example, Lewis' approach[6] takes existence in a weaker sense but faces the same issue. This does not mean that the advocate of such an approach does not have to solve the problem.

The fourth argument seems self-contradictory in its formulation. The idea of bare existence might raise some paradoxes. Bare existence is defined as an existing object that does not have any other properties than existence. It seems that the definition already presents two more properties: 'is an object' and 'does not have any other properties (than existence)'. Hence, bare existence is quite hard to be expressed without reaching for other properties and producing inconsistencies. Even more, if the second property – the property of 'not having other properties (than existence)' – is accepted to be a genuine one, then a form of paradox occurs. In other words, the object that does not have any other property, but

[6] For more see (Lewis, 1990).

existence, already has the property of 'not having any other property'. Thus, it has two different properties.

McGinn's argument to support the idea that bare existence is not a contradictory notion is that:

> '(…) there seems no logical bar to a range of individuals existing in a world without there being a property that singles each of them out uniquely – as it might be, a collection of indiscernible red steel spheres.' (McGinn, 2000, p. 29)

I am quite sure that McGinn claims that there should not be a property that singles out a specific object, because he wants to reject the theory of definite descriptions. However, Kripke's theory – that was already mentioned – keeps the identity of an object with itself without the problems of the definite description theory. In this situation, we may accept that there might be a collection of 'indiscernible' red steel spheres, but those spheres – being a collection – differ from a single sphere. Thus, being many they must be different. Even if it is accepted that they are not different because of any physical difference – they share the same physical properties, they must differ in at least one sense. That sense, according to Kripke, is their origin. Thus, they may seem 'indiscernible', but they are different objects. It might be, then, concluded that McGinn's argument favoring the conceivability of bare existence fails.

In order for something to be existent, it seems that it must have at least one other property. These being said, I tried to offer some arguments that bare existence is not only metaphysically impossible, but also conceptually impossible. Such a concept is not coherent. In this situation, the fourth critique vanishes.

To sum up, it seems that an advocate of the orthodox approach has to face only two critiques. Firstly, he has to face the problem of circularity. Russell's definition for existence already presupposes the concept that should be defined. Secondly, the sustainer of the theory should accept or solve the fact that his theory is not as general as he wishes. There are some sentences that cannot be expressed using the theory presented. Those

sentences are meaningful and sometimes even true and logical consequences of some accepted sentence, but they seem to be ill-formed in the orthodox approach.

Conclusions

In this paper I presented McGinn's critiques on Russell's theory of existence. I also tried to argue that some of these do not stand. Thus, McGinn offers four main counterarguments for the orthodox approach. I consider that only two of them are proper counterarguments and damage the already mentioned approach. The other arguments seem to self-contradictory – as the last one – or have pretty easy ways out – as the second one and a part of the third one.

This does not mean that the orthodox approach does not have its issues. I did not try to support the orthodox approach here. My aim was to present a critical analysis of McGinn's counterarguments. I strongly believe that those arguments are enough to raise some serious problems for the orthodox approach, but this is not the aim of this current paper.

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UTILITARIANISM, CONSEQUENTIALISM AND MAKING ROOM FOR SUPEREROGATION

NORA GRIGORE

Abstract. I am discussing three strategies of fitting supererogation within consequentialist frameworks, namely Slote's (1984) and Scheffler's (1994). My main claim is that not only the utilitarian or consequentialist framework is modified to accommodate supererogation, but also the concept of supererogation suffers transformations in the process. It is therefore questionable if the theories discussed manage indeed to make room for the commonsensical moral intuitions carried by the concept of supererogation.

Keywords: *Ethical Theories, Supererogation, Consequentialism, Optimization, Satisficing.*

Ethical theories, of both utilitarian and deontological persuasion, tend to have difficulties in accommodating the commonsensical intuition that some morally good deeds cannot be required, *i.e.* in accommodating supererogation. As Heyd (1982) notes, in their "pure but crude forms", the two kinds of ethical theories have difficulties in accommodating supererogation for different reasons: deontological theories because they tend to assume that the domain of the morally good is exhausted by duty (in its various forms); utilitarian theories have difficulties because they tend to require uncompromised maximization of the good, not leaving any space for extraordinary good deeds that should not be required. This does not mean, of course, that more refined versions of the two cannot attempt to accommodate supererogation (the degree of their success is another matter).

In focus here are act-consequentialist[1] theories and their relation to a commonsensical concept of supererogation. I hope to show that, in trying to accommodate supererogation, not only these theories suffer modifications but also the concept of supererogation emerges as different from the commonsensical one.

To 'accommodate' supererogation means that some plausible explanation has to be given within the theory for the commonsensical intuition that morally excellent deeds cannot be required. In order to accommodate this basic intuition about supererogation, utilitarians and consequentialists will usually change not only the theoretical setting of their theory, but also the meaning or the sphere of the concept of supererogation.

I. Supererogation under Utilitarian lenses

The commonsensical notion of supererogation has, I claim, deceptive clarity and simplicity. This might be because it constitutes only a broad outline of a possible problem: the details are to be filled in by anyone trying to figure out an explanation for the tenets of supererogation. Hurka and Schubert (2012), for example[2], paint this broad outline in the following manner:

> The concept of supererogation has two sides. On one side, a supererogatory act isn't morally required; on the other side, it's somehow better than its alternative, or "beyond" duty in a sense that connotes superiority. (Hurka and Schubert, 2012:8)

[1] I will call them "consequentialist" from now on for brevity of expression.

[2] A similar one: "Supererogatory acts have at least two essential features: i) they must be morally optional in the sense of being neither obligatory nor forbidden and ii) they must be in some sense morally superior to some other act that the agent may permissibly do instead. Differing accounts of supererogation typically vary in terms of what they take to be the relevant sense of moral superiority. "(Portmore, 2003: 326)

This two-parts view of supererogation seems straightforward. And yet a multitude of questions are left unanswered: What makes the supererogatory deed superior? Is it superior because of the sacrifice of the agent? Could one imagine deeds that go beyond duty with little or no sacrifice? There are many other features that can be added to the simple two-parts view of supererogation in order to make possible a full theoretical explanation. The features that appear in consequentialist discussions of supererogation sometimes fill in the general picture of supererogation, and sometimes transform it; for while sometimes consequentialist and utilitarian theories adapt themselves to accommodate supererogation, sometimes the concept of supererogation is adapted to fit an utilitarian frame.

To see this process of reciprocal influence unfolding, one needs to look at the outline of a consequentialist/ utilitarian theory and notice which basic traits of these theories come into conflict with which basic traits of the commonsensical concept of supererogation.

In order to chart the differences, the conflicts and the transformations that follow the reconciliation attempts, I will identify the main fault-lines of this conflict, flagging the most promising attempts at resolution.

I.1. The impersonal scale measuring the good

First, one might notice that in characterizing the two sides of supererogation (being neither obligatory nor forbidden and being morally better than alternatives) the second part is left vague; we are told that the supererogatory action is "better in some sense" but one is left to fill in the details as one chooses. This is exactly where consequentialist and utilitarian theories supply promptly detailed theoretical constructions, so that "better" tends to acquire a quite technical sense. A favored, well-known technical device is to appeal to an impersonal ranking[3] of states of affairs as a scale in determining the rightness of a moral deed.

[3] Act-consequentialism is generally characterized as a certain sort of view about the relation between an act's rightness and its consequences.

I.2. Required optimization or maximization

The commonsensical understanding of supererogation lacks not only explanations about what "better" moral deeds might mean, but also the idea of an optimal or maximally good moral deed. This idea is one of the hallmarks of consequentialism:

> Among ethical theories, those that I call 'act-consequentialist' may be characterized roughly as follows. Such theories first specify some principle for ranking overall states of affairs from best to worst from an impersonal point of view. (…) After giving some principle for generating such rankings, act-consequentialists then require that each agent in all cases act in such a way as *to produce the highest-ranked state of affairs that he is in a position to produce.*[4] (Scheffler, 1982:1)

The idea of a maximum of good is not, in itself, incompatible with supererogation. However, the whole point in setting a maximum is that, by the lights of consequentialism/utilitarianism, the deed with the best outcome is *obligatory*. Obviously, this is one of the features of consequentialist and utilitarian theories that comes into conflict with supererogation. It is already a commonplace[5] to point out the incompatibility between the requirement of maximization and supererogation: if supererogation is mainly about doing more than required, then to require the maximum one can do leaves no place for going beyond what is required. As the two (supererogation and the maximization requirement) seem to exclude each other,

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An act-consequentialist holds that states of affair (outcomes, consequences) can be objectively or impersonally ranked according to their goodness and that any given act is morally right or permissible if and only if its consequences are at least as good, according to the impersonal ranking, as those of any alternative act open to the agent--the doing of an act being itself included among its consequences. (Slote, 1984: 139)

4 My italics

5 See Heyd (1982), Mellema (1991), New 1974, Portmore (2003), Scheffler (1982), Slote (1984).

one is forced to say either that supererogation does not actually exist (and to explain away the commonsensical moral intuition upholding its existence[6]) or to say that consequentialist and utilitarian theories should give up optimization or maximization, respectively. The route usually taken is to accept that supererogation represents a robust intuition of common sense morality and the consequentialist inspired theories should adapt in order to accommodate it. In this sense, authors who want to stick to the basic intuition of consequentialism while being able to accommodate supererogation[7], propose giving up the maximization requirement and adopt instead a satisficing requirement, *i.e.* the view that what is morally required is to do something "good enough" by some adopted standard, not something that is best. If this proposal indeed reconciles the commonsensical notion of supererogation with consequentialism, will be discussed in the following sections.

There are authors such as Zimmerman (1993) and Vessel (2010) who disagree with this widely held verdict of incompatibility between supererogation and maximization requirement. Their strategy will be to try to keep the maximization requirement while introducing other changes in the conceptual frame surrounding the problem of compatibility of the two.

I.3. The threshold of supererogation as satisficing

Obviously missing from the core of any consequentialist or utilitarian theory is the idea of a threshold of what is required, beyond which one may permissibly act in order to obtain even better outcomes. On the other side, supererogation is actually defined by the existence of such a threshold. As a consequence, consequentialist theories trying to accommodate supererogation will usually adopt a kind of threshold of what is required below the optimal or the maximum possible. The kind of threshold to be

6 See New (1974) and Vessel (2010).

7 Slote (1984), Hurka and Schubert (2012), Dreier (2004).

discussed is the one given by the concept of *satisficing*, where the outcome is not supposed to be the best possible one, but one that is "good enough" in the circumstances. This proposal will obviously create room for going "beyond what is required". Nevertheless, it will also leave some room for doubt and debate regarding the success of capturing the commonsensical moral intuition of supererogation by this theoretical device.

I.4. The outcome of the action and the sacrifice of the agent as a cost

The sacrifice of the agent and the overall (presumably) good result of his deeds are not quantified or measured against each other according to the commonsensical view of supererogation. In a consequentialist or utilitarian frame naturally the outcome will be important and it will be important for it to be measurable/ quantifiable. The impersonal maximization of the good is an idea usually aiming at something like the "greater good" of all. The problem with supererogatory action is that the pursuit of the greater good by the agent might come with a heavy cost for the agent. The two-part image of supererogation (that is, permission and superiority of the supererogatory action) does not mention the sacrifice of the agent as a condition for something to be considered supererogatory. It only says that one is permitted not to do it; it does not say why. However, often times the classical paradigmatic examples of supererogatory actions are saintly and heroic deeds, which tend to have a heavy cost for the agent and to bring very good outcomes (for the rest). Even if sacrifice is not always present with supererogatory action, it is enough to have some cases of supererogation that bring very good results with heavy cost (*e.g.* the soldier who saves many lives by sacrificing his own life) in order to generate objections to theories of utilitarian inspiration. For, in a classical "crude" version of utilitarian theory, such heavy sacrifices will be required in case they maximize the result. Therefore, this trait of utilitarianism has become a classical objection usually labeled as the *demandingness objection*: it is too

much to require from an agent to always maximize the goodness of the outcome. Critics point out that this is where the concept of supererogation, properly integrated, would bring some relief from exaggerated utilitarian demands by making sacrifice and heavy cost for the agent optional. The manner in which authors attempt to make this integration is by leaving the agent some latitude regarding the allocation of her time and effort: this is where the agent-centered prerogatives make room for agent-favoring permissions and agent-sacrificing permissions in Scheffler (1982), Slote (1984b) and Hurka and Schubert (2012).

These points from I.1 to I.4 are sensitive points where supererogation and consequentialist theories collide. Authors who will try to make supererogation sit comfortably with consequentialism and utilitarianism will adopt strategies following these fault-lines. They will propose to give up the requirement of "the best outcome" (*i.e.* of optimizing/maximizing) and settle for "good enough", or they will propose to have an agent-centered approach rather than an impersonal one, thereby calling into question the impersonal scale for measuring the goodness of the outcome of a moral deed. A third option will be to enlarge the area of permissions usually available in an utilitarian setting (making more actions permissible for the agent in accordance with commonsensical moral intuitions).

I will present two strategies of this kind:

A) *Giving up the optimization/maximization requirement* and adopting a *satisficing* requirement instead. (Slote (1984))

B) *Giving up the impersonal scale measuring the outcome* (and adopt a more agent-centered approach). (Scheffler (1982)).

II. Satisficing as the Reconciliatory Solution between Supererogation and Consequentialism: Michael Slote

Usually, when supererogation is taken into account in consequentialist contexts, the main concern is not the problem of supererogation, but some larger theoretical point. In Slote's case,

supererogation, seen as a carrier of powerful intuitions of ordinary morality, serves as a test for the consequentialist position, a test meant to reveal if these powerful moral intuitions can be acclimatized in a consequentialist environment.

There are, famously, a number of moral verdicts upheld by common sense morality and denied by consequentialist inspired theories. Slote himself quotes Bernard Williams and Samuel Scheffler as prime examples of authors criticizing consequentialism for its disconnect with important moral intuitions:

> Moreover, critics of optimizing consequentialism have recently tended to focus on one particular way in which such consequentialism implausibly offends against common-sense views of our obligations of beneficence. They have pointed out that (optimizing) act-consequentialism makes excessive demands on the moral individual by requiring that she abandon her deepest commitments and projects whenever these do not serve overall impersonally judged optimality. For example, it has been held by Samuel Scheffler (and others) that it is unfair or unreasonable to demand such sacrifice of moral agents, and by Bernard Williams (and others) that such requirements alienate individuals from their own deepest identities as given in the projects and commitments they hold most dear, thus constituting attacks on their integrity (integralness) as persons. (Slote, 1984:157)

Slote accepts that the traditional form of consequentialism (*i.e.* the one requiring an optimization of the overall outcome) cannot accommodate some of these commonsensical moral intuitions. It is clear that the common moral sense will judge the optimizing requirement to be too demanding, especially in cases of great sacrifices. For example, it might be optimal, in the aggregate, for one soldier to die in order to save all the others in his company. However, the verdict of the common moral sense will be that such sacrifice cannot be demanded and the soldier failing to optimize the outcome in this way cannot be blamed.

According to Slote, this does not mean that consequentialism as such should be abandoned, for one may abandon the optimality requirement without abandoning the basic intuition of consequentialism, namely that there is a connection between the rightness/wrongness of a moral deed and its consequences. His claim is that at least this one intuition of the common sense morality regarding supererogation, namely the intuition that one is not always required to act in a manner producing the best outcome, may be accommodated in a consequentialist setting.

Slote remarks that act-consequentialism has been regarded as a "unitary moral conception", according to which "the rightness of an act depends on whether it produces the best consequences impersonally judged"[8]. However, this conception includes two claims that are conceptually separable: first, that rightness of an act depends only on how good its consequences are, and second, "that the rightness of an act depends on its having *the best*[9] consequences (producible in the circumstances)"[10]. One may uphold the first without endorsing the second. That is, one may maintain that only its good consequences make an act right, yet these good consequences need not be the best possible ones. They need only be "good enough" to make an act right:

> Could not someone who held that rightness depended solely on how good an act's consequences were also want to hold that less than the best was sometimes good enough, hold, in other words, that an act might qualify as morally right through having good enough consequences ,even though better consequences could have been produced in the circumstances? (Slote, 1984: 140)

Therefore, Slote advocates a new kind of consequentialism, one that does not have the optimizing requirement. His strategy is

8 Slote, 1984: 140.
9 My italics.
10 Slote, 1984: 140.

to argue that a 'satisficing consequentialism' (rather than the 'optimizing consequentialism') would agree more with intuitions of common-sense morality of benevolence and would be, in this way, more plausible:

> And since the plausibility of various forms of consequentialism partly depends on how far their implications diverge from the deliverance of ordinary moral intuition, this new form of consequentialism may turn out to have some distinctive advantages over traditional optimizing forms of consequentialism. (Slote, 1984: 152)

Slote borrows the notion of "satisficing" from economics[11] where an action is said to satisfice rationality inasmuch as its outcome is less than the best but nevertheless "good enough".

[11] Dreier (2004) criticizes Slote for his assumption that examples taken from the domain of economics could be made analogous to the ones from the moral domain: Dreier claims that the "good enough" of someone selling a house on the spot for a lower price is not the same as the "good enough" of someone offering *not the best* room, but *a room* to a homeless family, even though they might present a *prima facie* similar structure. The similarity consists in the fact that both are examples of agents choosing an option that, they admit, weighs 'less' on the scale of good than another option available to them. Briefly, the reason why he thinks rational satisficing does not work is that in normal, rational cases, agents will always maximize their preference, never satisfice. What Slote and others have described as cases of satisficing are actually, according to Dreier, cases of maximizing one's preferences. For let us take the example of the person selling their house. If they sell it for a lower price because they do not want to wait longer in incertitude, then this is their preferences, so they are actually maximizing their preferences even if they accept a lower price (because the utility is higher for a satisfied preference, even if the price obtained is lower). In order to truly satisfice, Dreier claims, the person selling the house would have to have a certain preference to which they attach the highest utility (e.g. to obtain a higher amount of money) and then to go against that very preference (*i.e.* to accept less). In short, in order to truly satisfice, one would have to prefer more money and then accept less money (which has an irrational air about it). Instead, what typically happens in examples like this one, claims Dreier, is that one

His first example of an agent plausibly settling for less than the best, but nevertheless "good enough", is the example of someone selling their house: they might accept not the best price but something that is deemed a satisfactory price and is offered more promptly. The reason for accepting the lower price, claims Slote, is not an anxiety about not being able to sell or an indifference towards money, but simply being content with "good enough". A second example is "the snacker": the person who chooses not have an extra snack offered for free even though they know they would enjoy it and they do not fear any bad consequences. They simply decide they had enough to eat: Slote considers this to be a kind of moderation, one that is not a form of asceticism and which "it is difficult to see why it should count as irrational"[12] . By analogy, he claims, we can make equal sense of cases of moral satisficing. For example, a hotel manager helping out a homeless family by giving them a spare room has done nothing wrong if she did not offer them the best room. While she did less than the best, her commendable gesture of benevolence was good enough in the circumstances. Another example[13] used by Slote is the doctor who volunteers to go to a country in need of medical help. However, he is not required to go to the country which is most in need; no matter where he chooses to go (maybe following a personal interest), his gesture would be commendable even if the outcome is not the best possible, but only good enough.

Slote thinks that a consequentialist theory of the good enough can accommodate supererogation. It can do so because it creates a

prefers time and so accepts less money, which is perfectly rational and this is why the example sounds plausible, but it is a *maximizing* example, not a *satisficing* one; in order to satisfice one would have *to accept less of the same thing that one prefers*.

12 Slote (1984), p. 145.

13 For how our intuitions might incline towards supporting a "maximizing" or "satisficing" verdict depending upon the kind of example and context we use, one can read Jenkins and Nolan's article "Maximizing, Satisficing and Context" (2010). Their thesis, in short, is that one will side with "satisficing" if "best" is understood in context as meaning "the few at the top" and with maximizing if "best" is understood as meaning "the one at the top".

threshold for what is required – the good enough – one that the agent may go beyond. Satisficing[14] makes room for supererogation because it is permissible for both the doctor and the hotel manager to optimize, to do more than the required "good enough". Going beyond the established threshold would count in these circumstances as supererogatory:

> One of the chief implausibilities of traditional (utilitarian) act-consequentialism has been its inability to accommodate moral supererogation. But a satisficing theory that allows less than the best to be morally permissible can treat it as supererogatory (and especially praiseworthy) for an agent to do more good than would be sufficient to insure the rightness of his actions. Thus, if the person with special interest in India sacrifices that interest in order to go somewhere else where he can do even more good, then he does better than (some plausible version of) satisficing act-consequentialism requires and acts supererogatorily. But optimizing act-consequentialism will presumably not treat such action as supererogatory because of its (from a common-sense standpoint) inordinately strict requirements of benevolence. (Slote, 1984: 157)

The viability of Slote's solution[15] is not the important point here, so I am not going to try to decide if his proposal of

[14] Hurka (1990) is critical of Slote here because, Hurka claims, Slote is equivocating between two possible meanings for "satisficing": the "absolute" and the "comparative". The absolute satisficing simply establishes a threshold of good enough action without reference to other alternatives present to the agent. The comparative satisficing demands that the outcome of the action be "reasonably close to the best" and so it makes reference to the maximum possible. Hurka believes only the absolute kind of satisficing would work for Slote's version of consequentialism because in a bad situation only absolute satisficing would make sure that enough has been required from the agent, enough to improve the situation significantly; the comparative satisficing, he claims, would only ask for some kind of improvement on the bad situation (which would be some percentage of the maximum).

[15] Slote admits that his solution needs elaboration. The "good enough" of satisficing needs specification. He reviews some conceptions about

reconciliation succeeds. From the perspective of accommodating supererogation, I believe two points are important.

First, the conflict he is trying to resolve is not about the demandingness of the optimizing consequentialist theory. The demandingness objection is a fairly common one against traditional utilitarian and consequentialist theories. The charge against theories of this kind is that they ask too much from the agent by making the optimal or the maximal result obligatory because sometimes the best result comes with a very large cost for the agent (for example, paradigmatic cases of saints and heroes involve extreme sacrifices). And common sense morality objects that such large costs cannot be demanded. This objection will be discussed in detail in the next section, where the impersonal aspect of consequentialism comes into play. Here it is important to notice that the objection discussed by Slote against optimizing consequentialism is not the same as the demandingness objection: the incongruity between common sense morality and optimizing consequentialism discussed here is simply that common sense morality accepts without problems that the agent might do less than the best (even when there is no significant sacrifice involved on the part of the agent):

> So the divergence between common-sense morality and standard (utilitarian) act-consequentialism with regard to such cases cannot be accounted for in terms of a disagreement over whether one can correctly require an agent to sacrifice his own desires, projects and concerns in the name of overall optimality. (Slote, 1984:151)

Slote points out that his example of the hotel manager helping out the homeless family is an illustration of this idea: there is no major sacrifice in this case on the part of the hotel manager, but common sense morality and the traditional consequentialist

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satisficing from Popper and Bentham and reaches the conclusion that a certain percentage below the maximum would probably be an appropriate conception of "good enough".

view still diverge regarding the optimization requirement. Therefore, the agent may do less than the best not because the optimization requirement asks too much (much more than it is reasonable to ask) but simply because it seems perfectly acceptable and reasonable to do less than what optimization requires. In short, one is allowed to satisfice, not only when there is a large cost for the agent (and because of that) but simply because the action appears to be a perfectly reasonable action.

Secondly, and more important, Slote points out that the concept of supererogation obtained by giving up the optimizing requirement *is not the same supererogation concept* featured in the commonsensical view about supererogation:

> Such consequentialism in effect then allows various sorts of compromise between the demands of impersonal morality and personal desires and commitments. To that extent, it allows greater scope for personal preferences and projects than traditional optimizing act-consequentialism does. However, it offers less scope than would be available on most common-sense views of what an agent may permissibly do. For ordinary morality would presumably allow an agent (capable of doing better) to pursue projects that do not contribute very much to overall human well-being, and satisficing consequentialism – unless it maintains a very weak view about what it is to do enough good – will rule such projects out. (Slote, 1984:158)

The main point here, I think, is that even when one has made some room for going beyond what is required (*i.e.* when satisficing is required, optimizing is not), the obtained concept of supererogation might have a narrower scope than the one attributed by the commonsensical view. The doctor volunteering to take care of patients in a country that she prefers, will behave supererogatorily if her plans change and she agrees to go to a different country, where help is most needed – this will be the verdict of satisficing consequentialism. However, the doctor *is*

required to reach this satisficing threshold (that is, to go to a country in need), which means that satisficing consequentialism will *require* some acts of benevolence that might be declared by common sense morality to be entirely *optional*.

An equally important point is that restricting the concept of supererogation is the result of compromise between the commonsensical notion of supererogation and the impossibility of supererogation (within optimizing consequentialism). This compromise also makes room not only for supererogation but also for a more personal approach to morality. To recall, the consequences of an action were to be measured on an impersonal/impartial scale of goodness for states of affairs. Slote is not arguing, like Scheffler (1982), that one may ignore at times this scale (because of an "agent-centered prerogative") but he is saying that given more choice (by not being under the obligation to optimize), agents may choose something closer to their own plans and aspiration when they are only under a satisficing obligation. The doctor in Slote's example may choose, in this way, a country she is interested in, instead of the country most in need of medical assistance.

In conclusion, Slote's attempt to reconcile supererogation with consequentialism has modified both consequentialism (by giving up the optimization requirement) and the concept of supererogation (which will have a narrower domain than the commonsensical one).

III. The impersonal trait of consequentialist evaluations

When confronted with the conflict between utilitarian maximization requirement and the intuition that some excellent moral deeds cannot be required, some authors have chosen to drop the maximization requirement. That resulted in adopting satisficing as a solution. Once the requirement is established at the 'good enough' level, the agent may be said to go beyond what is required and therefore some room is made for supererogation (even though

it might not have the same wide scope as the commonsensical notion of supererogation; some things required by satisficing might end up as purely optional from the point of view of common sense morality).

This is not the only strategy available in order to acclimatize supererogation in consequentialist and utilitarian environments. Another strategy, sometimes involving satisficing, is based on an objection against the *impersonal and impartial* kind of evaluation demanded by consequentialist and utilitarian frames. At first sight, it does not seem to be a connection between supererogation and the impersonal aspect of consequentialist/utilitarian evaluation of states of affairs. However, once the agent is allowed to depart in various ways (*e.g.* by being allowed to give more weight to his own preference) from the impersonal/impartial way of measuring the overall goodness of the outcome, the obligation to maximize is implicitly dropped and this usually makes room for a notion of supererogation.

The objection against impartiality has a tradition. Bernard Williams describes impartiality in morality in general as being

> (…) something which, indeed, some thinkers have been disposed to regard as the essence of morality itself: a principle of impartiality. Such a principle will claim that there can be no relevant difference from a moral point of view which consists just in the fact, not further explicable in general terms, that benefits or harms accrue to one person rather than to the other. (…) from the moral point of view, there is no comprehensible difference which consists just in my bringing about a certain outcome rather than someone else's producing it. (Williams, 1981: 96)

Impartiality is not a trait of utilitarians only; theories of Kantian and deontological descent have also claimed that being impartial and impersonal are main ingredients of being moral. Nevertheless, utilitarianism has a specific way of demanding impartiality, one implied by the way the sum of individual utilities

is supposed to be calculated. Nobody's happiness is supposed to matter more and the only thing that matters is the maximization of the total, a total in which any kind of individuality is lost (as in any sum total). The acute problem facing this view becomes evident when the utilitarian demands that any resource of time and energy be dedicated to the maximization of the sum total. It would seem that there is no room left for the agent to be involved in personal projects that do not bring sum total maximization of utility.

This kind of critique of utilitarianism, about the tendency of utilitarian theories to require the atrophy of the personal, has prompted attempts of reconciliation between the impersonal approach and an agent-centered approach. Scheffler's agent-centered prerogative is such an attempt.

III.1. Scheffler's agent-centered prerogative and making room for supererogation

Scheffler (1982) lists two classical objections to theories of consequentialist/utilitarian inspiration, one targets the "view from nowhere" and regards the distribution relations between agents in a utilitarian scenario. The other focuses on the point of view of the agent making decisions in a consequentialist manner.

The first objection is that utilitarianism prescribes ignoring the unhappiness of a few if this leads to a maximization of overall happiness. The second is Bernard Williams' worry that living in accordance with utilitarian prescriptions results in alienation from one's own life projects. Scheffler argues that Williams' worry about alienation is rather vague. If it means that utilitarianism demands that sometimes we give up our own plans when these would extract a large cost or impose too much damage on the others, then this does not seem wrong and it is something required by pretty much all non-egoistic moral theories, not only by utilitarianism. However, a charitable interpretation of Williams' objection would be, according to Scheffler, that alienation takes place, not because the agent is required to *give up to some* of his projects, but because

the agent is required to evaluate *all* personal projects by reference to the impersonal scale measuring the capacity to increase the overall goodness or happiness; this is quite unnatural because this is not how we usually evaluate our projects:

> Utilitarianism thus requires the agent to allocate energy and attention to the projects and people he cares most about *in strict proportion* to the value from an impersonal standpoint of his doing so, even though people typically acquire and care about their commitments quite independently of, and out of proportion to, the value that their having and caring about them is assigned in an impersonal ranking of overall states of affairs (Scheffler, 1982: 9)

Notably, Scheffler considers this second objection as an objection not only against utilitarian theories, but also against any kind of consequentialist theory because they share the theoretical feature of impartial ranking of overall states of affairs.

Scheffler's proposal for tackling this difficulty is the introduction of an agent-centered prerogative which is meant to make it permissible for the agent to spend resources on projects evaluated *out of proportion* with the impersonal scheme:

> On a plausible view of this kind the answer to the question of whether an agent was required to promote the best overall outcome in a given situation would depend on the amount of good he could thereby produce (or evil he could avert), and on the size of the sacrifice he would have to make in order to achieve the optimal outcome. More specifically, I believe that a plausible agent-centered prerogative would allow each agent to assign a certain proportionately greater weight to his own interest than to the interests of other people. It would then allow the agent to promote the non-optimal outcome of his choosing (...) (Scheffler, 1982: 20)

Some but not all kinds of projects may receive this permission, of ignoring the impersonal ranking. I will not enter into the details of his proposal here, like the circumstances in which it is permissible to ignore the impersonal ranking, how the greater weight for the agent's plans will be assigned, difficulties of this view and so on. Whatever the details of this proposal, one thing becomes clear, there is room made for supererogatory conduct:

> Since it would permit people to devote energy and attention to their projects and commitments out of proportion to the weight from the impersonal standpoint of their doing so, the view would lack the feature that generates that objection. But at the same time, it would certainly on such a view always be *permissible* for an agent to bring about the best available state of affairs. Thus there might be an agent who willingly sacrificed his own projects for the greater good; on this view his conduct would be supererogatory. (Scheffler, 1982: 22)

Scheffler main focus here is, obviously, not supererogation. Rather, the main concern appears to be finding a way to meet certain objections (related to the impersonal/impartial way of evaluating outcomes) raised by common sense morality against consequentialist and utilitarian theories. This is an enterprise similar to Slote's (1984), but while Slote was *keeping the impersonal ranking* of states of affairs and was proposing a lower threshold for what is morally required *on that scale*, Scheffler wants to proclaim the agent's *independence from the impersonal scale* in certain circumstances (circumstances in which the scale may be legitimately ignored).

According to Scheffler, the agent is allowed sometimes not to take into consideration the obligation of optimization/maximization because the agent is allowed sometimes to evaluate the outcome of his action independently from the evaluation on the impersonal scale. This is the agent's prerogative, to be morally permitted in certain circumstances to ignore the demand of producing the impersonal best ranking outcome and thereby to ignore the maximization demand. In circumstances where the agent has this

prerogative, she might nonetheless choose to take into account the demands of the impersonal ranking at a cost for her own plans. This is the spot where supererogation falls into place: when the agent is allowed to choose between ignoring and taking into account the demanding impersonal scale, the agent might choose the „greater good" of the impersonal demands and act in this way supererogatorily. Examples are easy to find: Slote's doctor may choose to go to a country where her medical help is going to have the greatest impact (impersonally judged) or in a country where the impact is more modest, but where the doctor might also have a personal interest in being there; in this case, going to the country where the impact is greatest (impersonally judged) is supererogatory.

There are several assumptions here that Scheffler does not discuss[16]. In a comparison of the outcomes of personal plans with outcomes of the actions prescribed by the impersonal ranking, the assumption seems to be that the impersonal ranking is going to be more demanding, *i.e.* it is going to ask for more things to be sacrificed. This needs not always be the case. A personal plan may sometimes involve many more sacrifices of well-being than the impersonal demands of morality: the impersonal evaluation of outcomes might require the doctor to go to the country most in need, but joining a religious order might require going to the county most in need, celibacy and asceticism.

Another question is whether a sacrifice on the part of the agent is an indication of morally better outcomes impersonally judged. This needs not be always the case either[17]. The larger picture of presuppositions seems to be divided in two: on the one hand, actions made according to personal plans would presuppose less sacrifice from the agent and moral outcomes scoring lower on the impersonal scale of the good (*i.e.* the outcomes would be less good for others but better for the agent); on the other hand, actions

[16] This is not a criticism, nor, for that matter, surprising since supererogation was not his main topic of discussion.

[17] For an illuminating discussion of how sacrifice might lead to worse overall results, one might see Jean Hampton, "Selflessness and the Loss of the Self "(1993).

made by accepting the demands of the impersonal scale would presuppose more (or more serious) sacrifices from the agent and they would score higher, even highest on the scale (*i.e.* the outcomes would be best for others but less good for the agent). These are common assumption to make, but by no means unassailable ones. Especially in a consequentialist framework, one cannot take for granted that the greater the sacrifice of the agent is, the greater the value of the outcome will be.

However, Scheffler's claim that there is room made for supererogation by his agent-centered prerogative is not affected by the issue I have just raised. What is new and remarkable about his way of seeing supererogation is that there is no threshold, properly speaking, that the agent would go above and beyond. The agent is presented with a choice (in the circumstances where the prerogative is allowed) of doing more for herself (*i.e.* personal plans) or more for others (paying heed to the impersonal ranking). She is permitted to do either and there is an option where she would do more by impersonal standards. But in choosing to take into account and obey the obligation presented by the impersonal scale, she does not go beyond an established threshold of obligation that was lower o*n the same scale*. She has simply chosen *another scale* (a more demanding one).

As the commonsensical concept of supererogation involves a threshold of duty beyond which actions are considered excellent but non-obligatory, I will conclude that Scheffler's kind of supererogation is a different one than the commonsensical one. Therefore, not only his version of consequentialism is modified in trying to make room for supererogation (by introducing the agent-centered prerogative) but also the concept of supererogation is modified in the process. The kind of supererogation emerging from his considerations is not properly describable as "an action going beyond duty". Rather, it would be better described as choosing an action considered best on the impersonal scale in circumstances where the agent is allowed to ignore the impersonal considerations of greater good and tend to her own plans and

interests (e.g. the doctor who would choose to go where she is most needed instead of following her personal preferences).

IV. Conclusion

The strategies used to acclimatize supererogation in a consequentialist environment might seem to be unilateral strategies, proposing a one-way modification: consequentialism (or utilitarianism) needs to adapt itself to commonsensical moral intuitions about what can be required from a moral agent and therefore needs to change the force and the extent of its requirements. As a result, the agent will be morally justified in doing less than the best[18] (by various theoretical devices).

My aim was to show that the proposed modifications are not unilateral, in that they also modify the commonsensical concept of supererogation. As a result, some form of supererogation can be allowed to subsist within various consequentialist/utilitarian frameworks. However, the positions discussed here make room only for a modified (usually restricted) concept of supererogation, not for the full commonsensical concept of supererogation. Therefore, the problem if they truly accommodate supererogation-as-we-know-it (instead of changing supererogation to fit their theoretical needs) remains an open question.

One might argue that the commonsensical concept of supererogation is a vague, incomplete one. Various theories may fill in the blanks according to their specificity without actually changing the main contours of the commonsensical picture. However, I believe this cannot be said, at least about the theories presented here. Slote and Scheffler not only add various features to the commonsensical picture of supererogation, but they also subtract other important features, which change amounts to a more visible and clearer transformation of supererogation.

[18] That is, the agent will be justified in acting such that the outcome of her actions will not be the best outcome, impersonally considered.

Slote's proposal is to drop the optimizing requirement and to adopt satisficing as a reasonable threshold of what can be morally required from an agent. This is an important change in a consequentialist theory. It is such an important change that other authors[19] have doubted that without a maximization/optimization requirement a theory may be said to still be utilitarian/ consequentialist. Nevertheless, this is not the only change taking place: the concept of supererogation allowed by satisficing has a narrower domain than the commonsensical one because some actions declared obligatory by the satisficing theory will still be merely permitted according to common sense.

Scheffler's proposal is to allow agents to sometimes not measure the outcome of their actions according to the impersonal scale. In this way an agent-centered prerogative is created, a prerogative that allows the agent to choose between the impersonal overall good and the personal private good (under certain conditions). If the agent chooses to act in accordance with the impersonal scale, then that is supererogatory action, according to Scheffler. However, the resulting concept of supererogation does not have a threshold of actions that are required (which is an important feature of the commonsensical notion of supererogation). There are two ways of measuring the outcome and the agent may choose one or the other, but no *one* threshold of what is required.

To conclude, I believe that the various strategies used to accommodate supererogation within consequentialism and utilitarianism sometimes change the concept of supererogation itself. Not only does ordinary supererogation appear to be rather difficult to incorporate in an utilitarian setting, but also, the question remains open if these theories have indeed incorporated the commonsensical moral intuitions about what is permitted and what can be required.

[19] New (1974), Vessel(2010), Zimmerman (1993)

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CAN POVERTY BE SUCCESSFULLY ERADICATED BY TAKING INTO ACCOUNT ONLY "CAPABILITIES"?

INGRID NICULESCU

Abstract. In this article I focus on the implications of the capability approach to eradicate poverty and eliminate inequalities between human beings. Even if the existent social problems have been debated throughout time by numerous researchers, different analyses having been made, concerning poor, vulnerable groups, and marginalized communities, we must focus on the causes which lead to the occurrence of disadvantages. Beyond that, we must investigate a few strategies concerning social inclusion and reducing poverty that contains numerous methods through which we can emphasize the development of disadvantaged people's capabilities. My claim is that an increase of income represents just one way of helping to improve the life of these persons, but we must also take into consideration objectives such as the individual capability for self-development and the ability to function. To this matter, I will examine what capabilities an individual has or needs, to develop properly.

Keywords: *poverty, capabilities, quality of life, Martha Nussbaum, Amartya Sen, Thomas Pogge.*

0. Introduction

Considering the large number of vulnerable people living in poverty, the main issue is this: what can we do to help them escape from the circle of poverty, in which many were born and from which they cannot rid themselves? These groups need certain services granted to them, in the interest of participating in social and economic life. For instance, the national strategy on poverty reduction (2015-2020) from Romania concerns the ensuring of the Minimum Income for Inclusion[1], a program through which financial support will be combined

[1] To be consulted *The national strategy on poverty reduction 2015-2020*.

with different measures of reinstatement in the labor market, but also with the encouraging of children to participate in school.

Poverty and the absence of well-being, as problems encountered in contemporary society, can be studied from several perspectives; for example, we can consider a theory based on complex equality or a capability approach. Regarding complex equality, Michael Walzer and David Miller argued that different principles of justice can be applied in certain circumstances for different types of well-being. On the other hand, Martha Nussbaum and Amartya Sen have developed the theory of capabilities, claiming that it is important to see what individuals can do, what they can become, and what their ability to function is, in such a manner that it can be establish the degree to which a person's life is either good or bad.

When the aim is to find solutions to eradicate poverty, an important aspect is whether to increase the income of poor people, insuring the welfare of such individuals, or to focus on the capabilities that these people have? In the next sections, we will concentrate on how the capabilities are understood and defined. Therefore, we will argue about: "what is each person able to do and to be" (Nussbaum 2011, 18), what are the opportunities that person must choose, act and, not least, the importance of the capability approach. As we will see, Amartya Sen considers the superiority of these capabilities over the resources, beyond the conception that economic development is an indicator for the population's quality of life. Another perspective, the one of Nussbaum, focuses around a normative conception regarding social justice, which can be followed by considering a set of capabilities, meant to protect the individual.

I. The Central Capabilities

For a person to overcome the unfavorable situation in which he finds himself, one must go beyond the resources he has access to and focus on a way through which he can use them. This is an approach that considers one's capabilities, meaning, what he can

do or become, using the available resources and opportunities. There are two main definitions of capabilities advanced by Amartya Sen and Martha Nussbaum.

Martha Nussbaum base her main argument in her own theory of *social justice* on a list of ten central capabilities derived from the concept of dignity (Nussbaum 2011, 33). Amartya Sen considers identification of these capabilities, focusing on the quality of human life, without considering the identification and definition of social justice.

Capabilities are answers to the question *"what is this person able to do and to be"*, argues Martha Nussbaum (Nussbaum 2011, 20). Therefore, these are a set of opportunities to choose from and to act, or certain substantial freedoms of the individuals, which must be promoted by any society and which can be chosen by any person, for their use or not. The answer to Nussbaum's question considers welfare regarding the income of the people, as well as the capabilities and freedoms of which every person benefits:

> "The Capabilities Approach can be provisionally defined as an approach to comparative quality-of-life assessment and to theorizing about basic social justice. It holds that the key question to ask, when comparing societies and assessing them for their basic decency or justice, is <What is each person able to do and to be?> In other words, the approach takes *each person as an end*, asking not just about the total cost or average well-being, but also about the opportunities available to each person. It is *focused on choice or freedom*, holding that the crucial good societies should be promoting for their people, is a set of opportunities, or substantial freedoms, which people then may or may not put into action: the action is theirs". (Nussbaum 2011, 18)

In other words, capability means the opportunity of doing certain things, considering each person's decision, whereas functioning, or what a person can be, is different. Nussbaum argues for a clear distinction between capabilities and functioning

(Nussbaum 2011, 25), and uses Sen's example to introduce it: let us imagine a person who is starving and a person who is fasting. Both persons have the same type of functioning; they function in a certain manner if they feed themselves (nutrition is in the foreground). However, the starving person does not have the capability of feeding, whereas the fasting person has this capability, but chooses not to use it.

Beyond that, someone can assume that there are people who have certain capabilities but cannot use them. For example, let us imagine a man who developed his intellectual capabilities but who is uncapable to make smart economic decisions. Moreover, there are individuals who possess internal capability to participate in politics, but they are unable to participate in the meaning of combined capabilities; they could be immigrants without any legal right or they can be excluded from participation (like black people were excluded in at the beginning of last century). Giving someone the chance to exercise their own capabilities is essential here. It is also possible to live in a social and political environment in which one can accomplish their internal capabilities (judging the government), but they lack the ability to think critically or speak in public (Nussbaum 2011, 22).

Regarding these examples, Nussbaum distinguishes between the internal and the combined capabilities. *Internal capabilities* represent the intellectual and emotional capabilities, personal features, health, body skills, also the internal learning of perception and movement of a human being (Nussbaum 2011, 21). These can be developed by education, using resources and improving physical and mental health by the society. *Combined capabilities* represent internal capabilities, as well as social, political and economic conditions.

The above distinction highlights the fact that, although some people have internal capabilities, they might lack combined capabilities. We must take into consideration the fact that each individual has some basic capabilities, which are fundamental ones because of their innateness and make possible the future development. But without the involvement of the state regarding the development of these capabilities through a proper education,

these individuals cannot integrate in the community, or worse, they will not be a part of it.

On the other hand, capabilities are not just abilities which are found inside each of us, they are also liberties and opportunities (created from the interaction of political, social and economic environments), argues Sen. Therefore, capabilities represent *what they can have or what they can be,* not only *what a person is able to do or to be,* as Nussbaum argues. Capabilities represent the way through which people can reach to some important activities. Therefore, it is about the goods that people can have or use, not about what they are able to have or are able consume. This idea is considered from the perspective of access and liberty of which people benefit, but also of a person's ability to accomplish certain activities.

Sen's theory of capabilities is based on the advantages and disadvantages which someone has (or not), according to *what a person is able to do or to be.* Therefore, it is not about the resources which are available, but about the fact that "people should have access to whatever they (have good reason to) want to be or to do, but also that they should have the freedom to choose among these options." (Wolff, De-Shalit 2007, 37)

Another perspective regarding the capability approach belongs to Thomas Pogge. He claims that this approach does not help the individuals to properly evaluate their own needs, which can undermine, in certain ways, person's own dignity (2010, 44).

Pogge says that, "by shaping institutional arrangements in such a way that resource distribution in society compensates for the natural inequalities endowments, capability theorists are committed to make interpersonal comparisons and judging human beings as being better or worse than others" (2002, 204-205).

The disadvantages some people face does not occur merely because of the social institutions which have no account for the special needs of these people, argues Pogge, but due to the institutional schemes and cultural practices which are too sensitive to biological differences. For instance, if these differences should be removed, the disadvantaged people (for example, women)

would benefit from the equality of opportunity, political rights or the equality for getting paid for the work and effort they have invested. Pogge's argument is based on the idea that social institutions are the ones that apply different treatments to people, which leads disadvantages. (Pogge 2010, 25).

We can ask ourselves why Pogge believes that we should seek for a public criterion of public justice. In his view, the public criterion should tell us how institutional order should be so that resource distribution could compensate, in certain situations, for natural inequalities (Pogge 2010, 44).

The global institutional structure plays an essential role within producing and maintaining poverty, whereas the global institutional order prejudice the poor people, claims Pogge.

"Global order is made of rules and reglementations established by global institutions such as World Trade Organization – WTO, The World Bank, The International Monetary Fund – IMF, and by the United Nations System" (Gauri, Sonderholm 2012, 22). The main task of these institution is to create a system focused on the national interest of the developed countries, and, as an additional secondary task, the underdeveloped countries interest (Pogge 2008, 122). The system is unjust because it does not pay enough attention to the interests of the poor citizens from underdeveloped countries and can be criticized from a morally point of view for representing the interest of the rich and powerful nations which, in some cases, might be exactly to exploit the poor, considers Pogge.

II. Multiple meanings of the term

Capabilities have been explained and defined using multiple terms, by Martha Nussbaum, Amartya Sen and other researchers. The term can be understood as functionality, liberty or opportunity. Starting from Nussbaum's definitions, Christopher Riddle defines capabilities as being a set of different functionalities from which a person can choose, these functionalities representing things or activities from which some can be chosen. Therefore,

"one's capability set represents her freedom to choose alternative lives to lead. These capabilities should be pursued by each and every person and the goal of such an approach is to treat each person as an end, and never as a mere means to the ends of another" (Riddle 2014, 32)

Sen's capabilities (*to be and to do something*) are called **functionalities**. When talking about wellbeing, it is important to fulfil some functionalities, only this fulfilment ensure capabilities' development. Therefore, we can assume that the liberty of that person is the most important, if we discuss about liberty in the sense of focusing on the real opportunities of a person to do what they want. There is a debate regarding the sense of the term *capability*, because it is often used in different ways: sometimes capabilities can be interpreted as *liberties* for functionalities, other times they can reffer to possible combinations of functionalities which have not been yet achieved (Wolff, De-Shalit 2007, 37).

Considering the theory of capabilities, the following question arises: it matters only the level at which a person can function, at a certain time, or it is also important to consider the perspective of those persons to sustain that level of functionality? Jonathan Wolff and Avner De-Shalit's suggest that people's perspectives maintain certain functionalities (Wolff & De-Shalit 2007, 9).

Functionalities, understood as things a person can achieve, but also as the perspectives that person has towards achieving those things, are considered as "that various things which that person is able to do (or to be) in leading a life. The capability of a person reflects the alternative combinations of the functionalities the person can obtain, from which he can choose a collection" (Sen 2008, 24). Sen argues, through the capability approach, that we can evaluate someone's welfare or liberty considering the capabilities they already have, but also the capability of acquiring these functionalities. Thus, to eradicate poverty, it is important to take into consideration the capabilities and functionalities people have.

To distinguish between the notion of *capability* and that of *opportunity,* understood in its traditional sense, Sen introduces in discussion the concept of **liberty**. This refers to the liberty of

choosing the life one wants to live, or the real opportunity to choose the functionalities of life one values.

One attempt to define liberty, based on the capability approach, concerns the distinction between *control freedom* and *effective freedom* (Vallentyne 2006, 83-84). To control the freedom to function, one must attain certain possible functionalities, through manifestation someone's will. The effective freedom to function includes all other possible functionalities, independent of one's will, and opposite to others choice.

Another type of liberty is the *favour independent liberty* (Pettit 2001, 13). According to Pettit it is an intermediate liberty which lays somewhere between the previously mentioned liberties. To understand the term, Pettit gives the following example: let's assume that a disabled person asks for help to outdoors. That person is dependent on asking the members of the society a favour, and they will accept in, so that a disabled person could live a better life. For the assurance of welfare for that person, it is important, first, that a life independent of favours is assured, as much as possible.

If we view poor people as less advantaged people, we can look at these disadvantages in relation to a lack of **opportunity**, which can follow in the uncertainty to function in different situations. In these situations, people less advantaged do not dispose from real opportunities. Wolff and De-Shalit consider that the idea of capability is too vague, suggesting that it should be replaced with the idea of *real opportunities* (2007, 9). These disadvantages are interpreted as the results of low functionalities. Every individual must be responsible for his actions, and to do this, it is important to approach the problem of real opportunities, to achieve sure functionalities (Riddle 2014, 32).

Sen and Nussbaum have argued that capabilities are the relevant benefits, seen as opportunities to function in life. This perspective seems to be different from the approach on the welfare opportunity. Peter Vallentyne (2006, 79) argues that, although certain versions of the capability approach are incompatible with certain versions regarding the opportunity of welfare, the most

plausible version of capability is identical to an easy generalization of the perspective based on the opportunity of welfare. Capabilities represent, thus, the opportunities which every person has in order to be able to function. These functionalities include facts and states of facts. Opportunities need to be understood, therefore, as effective freedoms not as control freedoms. Effective freedoms include opportunities based on pure luck without letting the past choices to affect one's chances (Vallentyne 2006, 82).

III. Reconsidering the importance of resources

If we analyse the problem of poverty considering resources (that people have or have not), we can compare the advantages and disadvantages which the poor are facing, based on monetary value. For example, we have evidence that low income prevents people to benefit from some facilities. From this perspective, poor people seem to be the ones who do not benefit from certain resources, opportunities or abilities (Wolff, De-Shalit 2007, 4).

Initially, economic development represented a good way to measure the progress of many countries. One of the advantages of using this method was that the gross domestic product; this was easily measurable, "since the monetary value of goods and services makes it possible to compare quantities of different types" (Nussbaum 2011, 47); moreover, this type of measurement was considered transparent (and the data could not be easily modified).

But measuring the GDP (Gross Domestic Product) and the economic growth did not lead by default to an improvement of the quality of life. If the purpose is to eradicate poverty and to improve the quality of life, this method is not sufficient, at least not regarding to health and education. Cultural, ethnic, institutional or geographical factors should be considered when we analyze how welfare can be promoted through education. If an educational system has bad institutions it does not matter how much a well-developed country allocate to it because it would not function properly, or at least not as good as a country which

allocates a similar amount but in a more effective matter thanks to its better institutions. This contrafactual example gives a specific example on how focusing on economic growth can deceive us.

I am not arguing that economic factors are irrelevant, all that I am trying to say is that by focusing merely them we lose from our sight other relevant factors, in same cases factors that can be way more important. According to the national strategy regarding social integration and the poverty reduction 2015-2020, the relative monetary poverty can be reduced only by increasing of poor people's capabilities to generate, on their own, an increased income. This can be done through "(i) improvement of the technical skills, of education and experience on the labour market of the people affected by monetary poverty, (ii) increasing the employment rate of this part of the population and (iii) integration of measures which will increase the income of the targeted group (like measures to reduce discrimination)" (Țesliuc, Grigoraș, Stănculescu 2015, 56).

IV. Is the capability approach superior to the resource approach?

Pogge suggests that we should ask ourselves which of these approaches can offer more plausible public criteria for a social justice. By doing this he rejects the arguments referring to the capability approach, arguing that the theorists of capabilities have exaggerated the systematic difference between two similar approaches. The capabilities theorists assume, whereas the resource theorists deny, that a public criterion of social justice should take into account the measure in which these people, with a certain physical and mental constitution, may change resources in valuable activities. What we must take into consideration is an evaluation of feasible institutional schemes, in terms of access of the participants to valuable resources, or in terms of capabilities, argue Pogge (2010, 18).

If we support the view that the capability approach is more plausible than the resource approach, it does not mean that the former is inferior to the last one. Pogge claims that both Sen and Nussbaum make the same mistake: they compare an implausible way of thinking (according to which feasible institutional schemes

are based on the average income or GDP per inhabitant) with a more plausible way of thinking based on capabilities, and then suggest that the capability approach is more plausible than the resource approach (Pogge 2010, 19).

The capability approach has been seen by Amartya Sen as an ideal, the important thing being that citizens must be equal in terms of capabilities and not of the resources of which they dispose. But what is the relation between the equality based on resources and that based on capabilities? Whereas Dworkin considers that the two types of equality are identical, Sen rejects this perspective. Therefore, Sen argues that those who wish to measure equality in terms of resources are focused on the personal freedom of the individuals. The problem relating to these liberties is not treated correctly.

Still, Sen does not consider that we can speak of equality of liberties, because people have reached different levels when it comes to their abilities and can reach different levels of functioning. People do not have the same abilities to do as they will. They have the same material resources, but the capability to use them is different, and thus, we can no longer speak of freedom exercised equally. An equal freedom can be reached only when we compare people's capabilities, but not also the resources which they possess, argues Amartya Sen.

V. Welfare beyond capabilities and resources

The lack of opportunities, of income and the limited access to constant employment are just a few of the issues recurring mainly from the inequalities present in society and have negative effects especially on vulnerable groups. We must take into consideration the *equality concerning the resources* of individuals, separately, (such as: health, talent, ambition and other opportunities), *equality concerning the welfare* which everyone can achieve (based on the resources they have had) and *equality concerning the opportunities or capabilities* that a individual has (Dworkin 2002, 285).

Furthermore, we must ask ourselves if an equal distribution of capabilities and opportunities in necessary to ensure welfare of a individual. From Sen's and Nussbaum's perspective, a society is just if the capabilities seen as opportunities to function are distributed equally, and these arguments are based on the capability distribution. Considering the context where the society members are facing problems caused by poverty, we must ask ourselves if is necessary to focus on equal distribution of capabilities or opportunity distribution towards welfare achievement.

If we accept the assumption that welfare is our aim, we depend on the following question: How can we measure the welfare of the individuals? Sen and Nussbaum argue that we must consider all the opportunities which every individual has, so that he can function and live a decent life, argument that follows from the previous sections. The wellbeing of the citizens is not an objective that can be fulfilled considering a certain person's preferences, because they are way too flexible.

If we want to find an answer, we must distinguish between two perspectives: (i) an objective way of measuring poverty (following the objective economic indicators of somebody's welfare, like the expenses or the income of that person) and (ii) a subjective way of measuring poverty[2] (subjective opinions of the poor ones regarding their situation are all being considered). It is well known that this subjective measurement has certain advantages, because certain long-term economic measurements are highlighted, therefore some future opportunities or possible disadvantages are anticipated[3].

Nic Marks, the founder of the Welfare Center, achieved such a subjective way of measuring poverty. He considers that the most important thing is that all human beings in the world are happy. Therefore, when we ask one what *he wants*, he replies that he wants to be happy, healthy, loved and to have possessions[4]. For

[2] To be consulted Posel and Rogan (2016)

[3] To be consulted Singh-Manoux, Marmot and Adler (2005)

[4] To be consulted Nic Marks (2010)

the happiness of the people to be measured, Nic Marks proposed an index, considered by himself to be the main method to measure sustainable welfare. This index, The Happy Planet Index (HPI)[5], is considering data measurements regarding: life expectancy, the lived welfare and the ecological footprint (resource consumption and the human impact on the environment, regarding preserving or deterioration of the environment).

Despite the subjective and objective way of measuring poverty, the violation of human rights and liberties represents a problem which worsens the situation of the disadvantaged people and this still affects people all over the world. Nussbaum argues that unequal treatment, which prevents the development of equal capabilities, should be forbidden because it is incompatible with equal human dignity, and a theory of justice must ensure equal human dignity (Kelly 2010, 72).

It might be argued the subjective way of measuring poverty based on happiness does not help to eradicate poverty. Here we can identify several reasons why. First, poor people can be happy if they have alcohol, tobacco and sugar. For example, people don't have access to different resources or foods with a lot of nutrients (such as dairy products, meat or vegetables), but they can be happy if they have enough money to spend on alcohol, tobacco and sugar, if we focus on different traditions and ways on spending time and socialise. Secondly, people can be unhappy even if they have plenty of resources, but they lack the ability to spend or don't know what is in their interest. Furthermore, it is difficult, if not

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[5] The HPI can be calculated in the following way: $\frac{\text{Lived welfare} \times \text{Life expectancy}}{\text{Ecological footprint}}$.

Through the lived welfare a certain index taken from Gallup World Poll[5] is aimed, by asking a question called *the life scale*. This question asks for the participants to imagine a scale, where 0 is the worst life possible and 10 is the best life possible, then to pinpoint on the scale where they think they actually are. The ecological footprint is considered a measure regarding resource consumption. By the mean of this index, we have to aim the fact that the purpose of poverty eradication is that to produce happiness, healthy lives and welfare of the being.

impossible, to eradicate poverty focusing on the subjective way, because people's lives can be improved if they have money and a lot of other resources (such as capabilities, as we have argued earlier, a proper education or the other people's assistance).

If we accept the assumption that poor and vulnerable people need help, we can rely on society based on social cooperation. Rawls social cooperation rely on the idea of reciprocity between individuals, without an explicit focus on extreme dependency relationships.

We can consider three situations: (i) one based on „care for children, elderly people, and mentally or physically handicapped people are a major part of the work that needs to be done in any society, and in most societies, it is a source of great injustice. Any theory of justice needs to think about the problem from the beginning, in the design of the most basic level of institutions, and particularly in its theory of the primary goods". (Nussbaum 2006, 64), or another one (ii) based on the bad luck (chance): If an individual finds itself in an unfortunate situation because of bad luck (for example, was born blind or without any talent which others have), then that individual should be relieved from that responsibility (Dworkin 2002, 287) or another one (iii) based on choice – for example, after deliberate decisions (they have now, less resources than other people because they have spent it on luxury items or because they choose to not work anymore for underpaid jobs), that individual finds himself in an unfavourable situation, than that individual must assume the responsibility of their own choices. In the last case, the situation of the disadvantaged individuals is the result of their own choices, not of fortune, and those individuals should not have the right to any compensation, argues Dworkin.

Dworkin argues that we must take into consideration the problem of personal and collective responsibilities by making the distinction between *chance* and *choice* and we must consider the way in which fortune, choices and our judgement shape our own perception regarding responsibility (Dworkin 2002, 298).

VI. Conclusion

The strategies regarding poverty eradication and social inclusion, approached from different perspectives, seem to help improve the situation of the poor citizens. In this paper, I showed a few perspectives on how poverty can be eradicated. I started from explaining what capabilities are and how important they are. Amartya Sen and Martha Nussbaum argue this way. I presented three types of equality (regarding resources, welfare and opportunities or capabilities of an individual) and I examined what implications they have on the capability perspective. The arguments regarding poverty eradication and improving the quality of life, simultaneously with the proper development of an individual capabilities, were followed by counterarguments supported by Thomas Pogge, by means of which he demonstrates that the poverty issue cannot be resolved through this new perspective. Pogge's argument considers a public criterion of social justice, which should tell us how the institutional order should be, such that resource distribution should compensate, in certain cases, for the natural existent inequalities.

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