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Theoretical and Practical Reason in Economics: Capacities and Capabilities

Ricardo F. Crespo

THEORETICAL AND PRACTICAL REASON IN ECONOMICS: CAPACITIES AND CAPABILITIES

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THEORETICAL AND PRACTICAL REASON IN ECONOMICS: CAPACITIES AND CAPABILITIES

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List of contents

List of contents 5
Summary 6
Preface 9
Chapter I: Introduction 10
Chapter II: Nancy Cartwright, Capacities and Nomological Machines. The role of theoretical reason in science 21
1. Introduction 21
2. The Cartwright–Mill connection 22
3. The Cartwright–Anscombe Connection 25
4. The Cartwright–Aristotle connection..... 28
4. 1. Textual connections 28
4. 2. The ontology of capacities 31
4. 3. The epistemology of capacities 33
5. Cartwright's skepticism about capacities in the social realm..... 34
5. 1. Cartwright's skepticism..... 34
5. 2. Julian Reiss's interpretation and proposal.....37
6. Socio-economic Machines 38
7. Conclusion 42
Chapter III: Sen's capability approach: The role of practical reason in social science .. 45
1. Introducing the capability approach..... 46
2. Some problems in Sen's CA.....51
2.1. Identification of valuable capabilities: the debate over lists of capabilities 52
2.2. Heterogeneity and incommensurability.....55
3. Aristotle's ideas helping Sen.....57
3.1. Aristotle on lists 58
3.1.1. The supposedly Aristotelian list 58
3.1.2. The true Aristotelian list 60
3.1.3. Back to Sen..... 64
3.2. "Practical comparability" as a way of overcoming incommensurability..... 65
3.2.1. The Aristotelian Conception 65
3.2.1.1. Commensuration..... 65
3.2.1.2. Comparison by intensity or degree of quality..... 66
3.2.1.3. Comparison by priority..... 66
3.2.2. Back to Sen 69
3.3. Some conclusions regarding the Aristotelian contribution to the CA.....72
4. Capabilities and capacities 72
5. Conclusion 74
Chapter IV: Socio-Economic Machines and Practical Models: The Human Development Index (HDI) as a Case Study 75
1. Socio-economic machines.....76
2. The HDI 79
3. Some problems with index numbers and the HDI.....81
4. Theoretical and Practical reason in the HDI 85
5. Conclusion: The HDI as a blueprint for a normative socio-economic machine of human development..... 90
Chapter V: Conclusion: Theoretical and Practical Reason in Economics..... 96
References 101

Summary in English

The aim of this thesis is to argue for the usefulness of restoring the exercise of theoretical and practical reason in economics. The thesis presents ideas of Nancy Cartwright and Amartya Sen as instances of this restoration. It sees Aristotle as an important stimulus to the reasoning of both Cartwright and Sen, and looks at how we can use their ideas and his together to develop an understanding of practical reason that is valuable for solving concrete problems in science and society.

Cartwright speaks about "capacities" as real causes of the events. When causes combine in a stable way they produce patterns of behavior in nature we can explain. She proposes calling this arrangement of stable causes a "nomological machine". Sen speaks about "capabilities", as freedoms or possibilities of the human persons. Both Cartwright and Sen relate the terms capacities and capabilities to closely related Aristotelian concepts. Thus, this relation between capacities and capabilities suggests that we can combine these concepts to achieve certain results of interest to us in life.

The introduction of capacities and capabilities implies a revision of the epistemological and anthropological assumptions of current economics. The capabilities of Sen are the capacities of Cartwright in the human realm; human capabilities are the real causes of events in economic life and should be seen as the basis of their explanation. Institutions, moreover, are like "socio-economic machines" that allow us, through our use of practical reasoning, to appraise, deliberate upon and guide our decisions about capabilities (Cartwright's capacities in the human world). Institutions thus embody practical reason and insert certain predictability in human affairs.

The thesis presents a case study: the construction of an index as a "socio-economic machine", the Human Development Index, by an institution, the United Nations Development Program. This is an example of how one can combine Cartwright's capacities and nomological machines with Sen's capabilities through the use of practical reason to enrich the working of Economics.

Summary in Dutch

Dit proefschrift betoogt het herstel van de beoefening van theoretische en praktische rede in de economische wetenschap. De ideeën van Nancy Cartwright en Amartya Sen zullen als hulpmiddelen voor een dergelijk herstel gepresenteerd worden. Aristoteles wordt in dit proefschrift gezien als een belangrijke inspiratiebron voor de ideeën van zowel Cartwright als Sen. Besproken wordt hoe deze ideeën gebruikt kunnen worden om een opvatting van praktische rede te ontwikkelen dat geschikt is voor het oplossen van concrete problemen in wetenschap en samenleving.

Cartwright spreekt over "capaciteiten" ("*capacities*") als reële oorzaken van gebeurtenissen. Een stabiele combinatie van deze oorzaken produceert gedragspatronen die dan tevens met behulp van deze combinatie verklaard kunnen worden. Zij noemt deze constellatie van stabiele oorzaken een "nomologische machine". Sen spreekt over "capaciteiten" ("*capabilities*") als vrijheden of mogelijkheden voor mensen. Cartwright en Sen relateren beiden de term capaciteit aan het Aristotelische gedachtegoed. Deze Aristotelische

achtergrond van Cartwrights term “capacity” en Sens term “capability” maakt het mogelijk dat deze concepten ingezet kunnen worden om bepaalde resultaten die van belang zijn in het maatschappelijke leven te bereiken.

De introductie van het concept capaciteit impliceert een revisie van de epistemologische en antropologische vooronderstellingen van de huidige economiebeoefening. Daarvoor worden Sens “capabilities’ beschouwd als Cartwrights “capacities” binnen de menselijke sfeer; “capabilities” zijn de reële oorzaken van gebeurtenissen in het economische leven en kunnen daarmee tevens beschouwd worden als hun verklaringsgrond. Instituties worden beschouwd als de “socio-economische machines” die het mogelijk maken om met behulp van praktische rede onze beslissingen over “capabilities” te beschouwen, evalueren, en te onderbouwen. Instituties belichamen praktische rede en introduceren een zekere voorspelbaarheid in menselijke aangelegenheden.

Dit proefschrift bespreekt ook een specifiek geval van praktische rede: de constructie van een index als een “socio-economische machine”, namelijk de ontwikkeling van de Human Development Index door het instituut United Nations Development Program. Dit specifieke geval laat zien hoe Cartwrights “capacities” en “nomologische machines” gecombineerd kunnen worden met Sens “capabilities” om met behulp van praktische rede de werking van een Economie te verrijken.

Preface

Economics and Philosophy have been the two academic loves of my life. Having two loves in this case is not a sign of infidelity. The philosopher is "the lover of wisdom." A philosophical perspective is the greatest lovely perspective of any subject of knowledge. Thus, far from competing, philosophy reinforces love. Through this philosophical view I came to love more and more economics. These two loves lead me to the reflections contained in this thesis.

Economics was born as the practical or moral science about the best way of using what is needed for the sake of the good life, i.e., a fulfilled life. In a long way of 24 centuries economics lost this practical or moral approach and the aim of the good life. It became a technique for maximizing resources in order to attain subjective given ends.

My ultimate claim in this thesis is that economics must return to be a moral science. It has to return to be concerned with ends and with a consideration of means embedded by these ends. The renouncement to this concern is not a sign of modesty but of a probably unconscious will of avoiding difficult problems. In effect, the decision on ends is indeed a difficult task. However, a lack of deliberation about them supposes the acceptance of whatever ends without a rational discussion about them. Technical rationality is indeed a powerful device to the advancement of human knowledge but it is not enough. We only grasp the complete picture of any reality thanks to the most human use of reason, theoretical reason, and we can only reason about ends through practical reason. Economics deserves the contribution of the three uses of reason. This is the thesis that I want to defend here. I hope to be convincing.

My acknowledgements go in first place to my supervisor and co-supervisor, Profs. John B. Davis and Marcel J. Boumans. Their dedication to this work and patience with me went far beyond what I would have expected. Then, to my teachers, colleagues and students of the Faculty of Philosophy of Universidad Nacional de Cuyo, Mendoza, specially Carlos Ignacio Massini Correas, Jorge Martínez Barrera, Miguel Verstraete and Héctor Padrón. Also to my colleagues Fernando Tohmé and Marcelo Villar, for their continuous encouragement in this project. Finally, to all the members of my family.

Chapter I: Introduction

As civilization has evolved in an increasing degree, and an increasing number of people in the world have reached a level of development beyond the satisfaction of mere material basic necessities, economists have also begun to refine their concepts of poverty, equality and development, including more aspects than the per capita GDP. Nevertheless, as Amartya Sen (1987a: 3; 1993: 47; 1999b: 14, 2009: 253) notes, the idea of income as an incomplete and thus inadequate way of judging development is not new, but something already stated 2400 years ago by Aristotle in his *Nicomachean Ethics*. Nonetheless, the usual way of evaluating development has still been through different monetary indicators of income or expenditure. Sen's capability approach proposes a fundamental shift in the focus of attention from those indicators to actual opportunities or freedoms. Sen remarks: "the case for using instead direct indicators of the quality of life and of the well-being and freedoms that human lives can bring has been increasingly recognized" (2009: 225). This refinement implies greater complexity in the tools for measurement of development, thus an increasing focus on the technical aspects of these tools.

At the same time, an extensive discussion about the relevance, construction, merits and weaknesses of indexes such as the Human Development Index (HDI) has occurred. Much of this discussion, however, goes beyond the question of technique; the issues discussed concern prudential decisions such as, for example, what are the dimensions that should be taken into account to evaluate development and what are the weights that should be assigned to each of these dimensions. These decisions presuppose a definition of concepts like development and reflection upon the values that underlie development. In this work I will adopt the expression "theoretical reason" to mean reason applied to the development of knowledge and definition of concepts, and "practical reason" to mean human reason applied to the task of reflecting on values in order to act in a particular way.

The case of the HDI is only one of many possible examples of the fruitfulness of using theoretical and practical reason in economic thinking. The notion of rationality and the use of reason involved in standard economics is, however, a different one: technical or instrumental rationality and reason: "[t]he [economic] theory of choice is about being instrumentally rational. Instrumental rationality is defined as the choice of actions that best satisfy an individual's ends or objectives *however* those ends or objectives may happen to be characterized. Instrumental rationality is a rationality of efficient means, and *per se* is completely agnostic regarding the nature of the ends means serve" (Davis 2003: 27)[1]. That is to say, economics presupposes that the prior work of theoretical and practical reason to define relevant ends has been performed and limits itself to the subsequent means-ends allocation carried out by technical reason. It does not engage with the work of theoretical and practical reason concerning the ultimate ends of its field. Sen's criticism of contemporary economics points to just this lack of concern on values. Accordingly he asserts,

[1] In this way, the epistemological requirements of science are satisfied. As Davis (2004: 401) also says: "One reason that instrumental rationality theory has been attractive in economics is that having a single model of analysis makes possible a high degree of logical and mathematical determinacy in economic explanation". On the attraction of this version of economics corresponding to Lionel Robbins' definition, see Elias Khalil (1996: 28-30).

"rationality includes the use of reasoning to understand and assess goals and values" (2002: 46), that is, theoretical and practical reasoning. Economics' attention to only one of the roles of reason reduces it to a technical set of tasks that might be better performed by computers than by economists themselves.

Thus, given the ends or purposes, economics only looks for the best way of attaining them.[2] "Economics", Lionel Robbins maintains, "is not concerned at all with ends as such. (...). It takes the ends as given in scales of relative valuation, and enquires what consequences follow in regard to certain aspects of behaviour" (1935-84: 30). Talcott Parsons wisely captured the problems stemming from this position back in 1934. "To be sure", Parsons asserted, "an "end" may refer to a state of affairs which can be observed by the actor himself or someone else after it has been accomplished." Robbins' ends, Parsons concluded, are not ends (1934: 513-4). They are, if properly interpreted, a result: "The scale of valuation is not a factor in action, but is merely a resultant, a reflection" (1934: 516). That is, this result is as a mere final point, not an intended purpose or cause of the action. The final causes of actions are their ends or purposes. In the same vein, Frank Knight asserted:

> Economic rationality as a description of deliberative conduct is limited in two further respects, fully as important in principle as the fact that actual results of action diverges in all degrees from the intention of maximizing a given end. First, the end is rarely or never actually given in any strict sense of the word; rather, it is in some degree redefined in the course of the activity directed toward realizing it, and the interest in action centers in this definition and discovery of ends, as well as in their achievement (...) The second limitation to which the notion of given ends is subject –...– is that to the extent to which an end is give, it is not really the end in the sense of finality (1956: 128-9).

Real ends or purposes are not given but are generated in the very process of action. James Buchanan notes that "we must also acknowledge that men can choose courses of action that emerge only in the choice process itself" (1987: 78). Means and real ends mutually interact and adjust to one another. Elizabeth Anderson considers John Dewey's thought on this point. She notes,

> (...) the character and value of means and ends was reciprocally determined. We do not first already have an end in view, with the only question how to achieve it. We lack a complete conception of our end until we have a complete grasp of the course of action that will take us there (2005: 8).

Hence, treating ends as given assumes a sort of truncated action which does not reflect how we act. "Acting on such radically truncated judgments would be crazy", Anderson affirms (ibid.).Or, as Jean Hampton (1994: 215) asserts, in order to "to be able to reason instrumentally, we must be able to reason non-instrumentally" (see also the argument of John Broome 1993). Thus, we should not only reason about the allocation of means given our purposes (instrumental

[2] Strictly speaking instrumental rationality does not necessarily imply the addition of the postulate of maximization, but adds it. There is no logical implication from instrumental rationality to maximization but rather a psychological impetus that pushes us to adopt it (cf. Boudon 2004).

reasoning), but also reason about our purposes themselves (non-instrumental reasoning).

This need, far from being only a philosophical requirement, is also a very pragmatic economic one. For example, once sufficient provision of basic needs is attained, the decision about other objectives of economic policy calls for an exercise of reason capable of going beyond finding the best way of allocating resources among given objectives. We need a reason capable of defining, deciding and weighting those objectives. This is the form of reason in which the limits between economics and politics are blurred. We thus need to complement the theory of rational choice with other forms of rationality. Economics consequently, consciously or unconsciously, is always looking for new broader notions of rationality than the one involved in the standard rational choice theory. Psychology has challenged it. Laboratory and natural experiments have also challenged it. Sociology and anthropology have challenged it. Philosophy has challenged it.[3]

Here is where Aristotle's ideas about rationality may contribute. Aristotle distinguishes three uses of reason: theoretical, practical and *poietical* (technical or instrumental) predominantly used in three kinds of sciences. This distinction corresponds to the different subjects of those sciences (*Metaphysics* VI, 1, 1025b 20-1 and XI, 7, 1063b 36 – 1064a).

1. Theoretical reason understands reality and defines concepts. By theoretical reason we know the nature and causes of things and events. Theoretical science deals with those things that are not feasible or modifiable, or with changeable things for only the sake of knowing them, not for acting upon them. The Greek verb *theorein* means to contemplate: this is the only aim of theoretical science.

2. Practical reason is a discursive form of thinking about what we should do: it deliberates upon our purposes or ends. It points us toward ways of behaving toward individual persons and groups of persons. Practical philosophy or science is a discipline and critical reflection on practical reasoning, its process and its goals. It deals with those subjects related to human decision or choice. It has a practical aim (*Metaphysics* II, 1, 993b 21-2; cf. also *Nicomachean Ethics* I, 2, 1095a 6 and II, 2, 1103b 27-8).

3. Finally, technical or instrumental reasoning deals with artifacts and the rules for their production, and as stated before, with the allocation of means given the ends known by theoretical reason and appraised by practical reason.

Let us recapitulate and expand a bit on the explanation of these concepts for the sake of further clarity:

1. Reason has different uses and, accordingly, rationality has different applications. Among these uses and applications, we can agree with Philippa Foot (2003: 53) that "human beings are rational creatures, in being able to act on reasons." In effect, human beings decide what to do using their reason. This use of reason, aiming at action, is called practical reason. In contrast, when we

[3] As a result, we are witnessing an explosion of new adjectives to characterize "rationality" in economics, such as "bounded rationality" (Herbert Simon, e.g., 1976), "expressive rationality" (Shaun Hargreaves Heap 1989, 2001), "situated rationality" (Tony Lawson 1997), "achievement rationality" (Elias Khalil 1997), "background rationality" (Mark Peacock 2003), "creative rationality" (Alessandro Vercelli 1991), and "constitutive rationality" (Hamish Stewart 1995). Daniel Kahneman's behavioral approach (e.g., 2003), Albert Hirschman notions of "striving and attaining" (1985), and Sen's concepts of "capability" and "commitment" also entail different broad conceptions of rationality.

know something for only the sake of knowledge we are using theoretical reason. Practical reason always deals with the field of that which is feasible or possible for human beings to perform, while theoretical reason deals theoretically both with this field and with the field of things that we cannot change. Theoretical reason is a reflection on matters of facts and their explanation. Practical reason directs us to actions. By theoretical reason we know the order (or nature) of reality, including actions, while by practical reason we know how to impress an order upon our actions. Practical reason entails a normative intention about actions. In this way, human reason adopts a normative function. This normative character is specific to the structure of human action. As R. Jay Wallace (Wallace 2008: 1) explains, "practical reason is the general human capacity for resolving, through reflection, the question of what one is to do."

2. However, one may ask, couldn't persons decide to act irrationally? Strictly speaking they cannot, because human decisions always imply rationality. "Irrational" means instinctive, sensory in nature, and "outside" reason. Classical philosophy distinguished between "human actions" –deliberately performed– which are rational; and "acts of humans" –instinctive or mere reactions– which are irrational simply because they do not stem from reason and rational will. Actions stemming from instincts, passions or any irrational faculty are not determined by voluntary decisions and thus, considered in themselves, are not strictly "human actions", but rather "acts of humans". This does not imply a pejorative disqualification of instincts and passions. Rationality embeds them in such a way that we can also look for reasons for our instincts, feelings, whims and other emotions. They can be either adopted or judged by reason (Anderson 1997: 100-1 and John Finnis 1997: 227), but they cannot overrule reason. When reason serves the passions, we are *rationalizing*¸ instead of reasoning practically (Finnis 1998: 74) and when reason is annulled by passion, we encounter an irrational human act.

3. We should clarify that affirmation of the rationality of any human action presupposes the use of the term "rationality" in its broadest sense, without any qualification. If, for example, we define economic rationality as maximizing behaviour, we may find economically irrational human actions that are not irrational from the perspective of an unqualified concept of rationality. Or if we speak about ethical rationality, we may act irrationally from an ethical point of view when we commit sin; though the action is still unqualifiedly rational (persons may have their reasons for committing sins).

4. For Aristotle, every action aims at a good that is its end or reason (*Nicomachean Ethics* I 1). This is why for him goods or values are the reasons for actions. Practical truth is the good of man. This good might be universal or contextual depending on the subject. Thus, some goods are common to every man because they derive from the function of the human being whereas other goods are relative to societies, persons and situations.

5. According to Aristotle, both theoretical knowledge and practical reasoning deal with a constellation of ends of human or social life and also with means inasmuch as they fit or conform to this constellation. Additionally, the contributions of means to each individual's end is a matter of another kind of rationality, i.e., technical or *poietical* rationality.

6. Technical rationality has more to do with the "how-question" of achieving an end and practical rationality with the "what- and the why-question" of means and ends. Within the frame of the first question –the technical– we may consider how to best allocate those means in order to achieve

the specific end. This is a matter of instrumental maximizing rationality, broadly used by standard economics.

In sum, theoretical reason knows ends and means but does not concern action. Practical reason motivates action. Without denying the usefulness of technical reason, practical reason embraces it by putting it into a broader context which includes both an appraisal of the ends of actions and of the ethical adequacy of the use of means. Let us here from Aristotle:

> Thought by itself moves nothing, but only thought directed to an end, and dealing with action. This indeed is the moving cause of productive activity also, since he who makes something always has some further end in view: the act of making is not an end in itself: since doing well is the end, and it is at this that desire aims (*Nicomachean Ethics* VI 2 1139b 1-6).

This exposition is based on the classical Aristotelian notion of practical reason (and its rehabilitation from the 1950s onwards to this day). We leave aside at least two relevant positions on practical reasoning, the Kantian and the Humean.[4] On the one hand, according to Immanuel Kant practical reason is separate or autonomous from theoretical reason. As Garrett Cullity and Berys Gaut (1997: 20) argue, this involves relying on foundational claims concerning practical reason that are unjustified. For Kant, there is not a theoretical science dealing with the practical field, but some set of convictions about practical principles. "These postulates", asserts Kant, "are not theoretical dogmas but, suppositions practically necessary" ([1788] 1952: 348). Instead, for Aristotle a rational theoretical inquiry about the practical field is possible. That is, for him ethics is a science.

On the other hand, David Hume does not allow a role for practical reason. For him reason is only instrumental: it allocates means given the goals determined by irrational tendencies. Reason depends on and obeys motivational tendencies. For Hume, there is no rational deliberation about ends and deliberation about means is not tied to any rational consideration of ends. His statement is very well known: "Reason is, and ought only to be the slave of passions, and can never pretend to any other office than to serve and obey them" (Hume [1739-1740] 1968: 415 -II, iii, 3). According to him, what motivate actions are ends determined by passions, not by reason, (id: 415). In this task, passions may be unreasonable only when they are based on a wrong judgment about the existence of their objects or:

> when in exerting any passion in action, we chuse means insufficient for the dessign'd end, and deceive ourselves in our judgments of causes and effects. Where a passion is neither founded on false suppositions, nor chuses means insufficient for the end, the understanding can neither justify nor condemn it. 'Tis not contrary to reason to prefer the destruction of the whole world to the scratching of my finger (416).

[4] For an exposition of these varieties of practical reason, see Cullity and Gaut (1997) and Ellijah Millgram (2001).

That is, reason's place concerning human conduct is only instrumental. In Hume's version of rationality, "reason is to be seen as an instrument to achieve ends that are not themselves given by reason. We may say that an act is irrational if it is not the best means of achieving the ends that the actor himself had a view when choosing the act" (Robert Sugden 1991: 753).

For this position, the only role of reason is the allocation of means for the sake of given ends. Human rationality is only instrumental rationality. This conception was broadly adopted by modern social sciences. Raymond Boudon (2004: 57) very well describes the situation:

> In general terms, the equation that assimilates rationality and instrumental rationality is so influent that social sciences' most literature on rationality almost exclusively deals with instrumental rationality. In other words, social sciences tend to admit that the notion of rationality essentially applies to the adequacy of means and ends, actions and objectives, or actions and preferences. At most, they recognize that rationality can also take the form of an exigency of coherence or transitivity of objectives or preferences. But they avoid applying this category to the contents of preferences or objectives.

Thus, why I adopt the Aristotelian concept of practical reason is that I find it more adequate than the Kantian and the Humean concepts. The Kantian notion of practical reason, as explained, is disconnected from theoretical reason, and in the Humean conception, reason is only instrumental.

In fact, a strong movement to rehabilitate the Aristotelian notion of practical reason and science has arisen in the second half of the last Century, mainly in Germany. A collective work edited by Manfred Riedel (1972-4), entitled *Rehabilitierung der praktischen Philosophie*, stands as a hallmark of this current. The members of this movement conceive the practical paradigm as a reaction against the modern prevailing requirement of value-neutrality in the realm of the social sciences. For value-freedom proponents, scientific reason is only applicable to means. The goals or ends are a private matter, which lies beyond the limits of science.

This rehabilitation of practical science assumes that every kind of knowledge entails an entanglement of values and facts and that value-free science is an impossible enterprise. Even a descriptive list requires principles of selection (see Finnis 1982: 4). Leo Strauss warns about the peril of denying this entanglement (1959: 21):

> It is impossible to study social phenomena, i.e., all important social phenomena, without making value judgments. (...) Generally speaking, it is impossible to understand thought or action or work without evaluating it. If we are unable to evaluate adequately, as we very frequently are, we have not yet succeeded in understanding adequately. The value judgments which are forbidden to enter through the front door of political science, sociology or economics, enter these disciplines through the back door.

If these values, which inevitably tinge social thinking, are not rationally recognized and established, we may be dominated by ideology. The Frankfurt

School also, in its critical diagnosis of modernity –a critique of instrumental reason– looks for a role for practical reason (and also perhaps theoretical reason). Max Horkheimer ([1967] 2007: 21), for example, maintains that reason aims at much more than the mere task of regulating the relation between means and ends: it aims for an understanding of ends; Socrates died for this ideal (Horkheimer [1967] 2007: 21).

If all the former is true, how should we regard the modern ideal of value-free science? It seems we will have to interpret value-freedom in another way. Value-neutrality is not a matter of leaving values aside, but of reasoning impartially about values. How are we to neutrally describe social facts? Neutrality in the selection of concepts in social sciences is only achievable through the scientific determination of standards for rational practical reasonableness (see Finnis 1982: 12). That is, the way to manage the value-free ideal is not to push values away –something impossible– but to reason about them, and thus rationally determine those that should be pursued. This is the task of practical science. We can see then that a conception of practical reason entails a parallel conception of practical science.

The main traits of this science as conceived by Aristotle and by Aristotelian practical science according to its current supporters is needed to complete this understanding.

1. First, given the contingency of human action stemming from human freedom and from the singularity and complexity of human affairs, practical science acknowledges the inexact character of its conclusions. In the realm of practical reason we necessarily focus on local situations because this is a field of actual individual or social practice, always particular, relative to the considered subject of the action, to an individual or society. Nevertheless, this relativity or subjectivity is not relativism or subjectivism. The action must not be capricious. Moreover, Aristotle maintains that in the practical field we may find greater accuracy than even in the technical field: "virtue, like nature, is more accurate (*akribestera*) and better than any form of art" (*Nicomachean Ethics* II 6 1106b 14-15). The virtuous man gets the right particular decision and action.

However, as just mentioned, practical science is also inexact. Aristotle maintains that "the same exactness (*akribeia*) must not be expected in all departments of philosophy alike (...) but only such as belongs to the subject-matter of each, and in a such degree as is appropriate to the particular line of inquiry" (*Nicomachean Ethics*, I 3 1094b 13-14 and I 7 1098a 28-29). Yet, as Richard Kraut asserts, Aristotle "is asking us to have different expectations of different fields: not *higher* standards for some fields and *lower* for others, but *different* standards" (2006, p. 87). René Antoine Gauthier and Jean Yves Jolif also make an interesting point (1970: II, 14). They note that Aristotle distinguishes three classes of facts: necessary facts which always occur in the same way, general facts which occur most times in the same way, and accidental facts which scarcely ever occur in the same way (*Physics* II 5 196b 10 ff. and *Metaphysics* VI 2 1026b 27ff.). Exact sciences deal with the first category, physics and politics with the second, and the third cannot be the subject-matter of any science. "General facts" are *hos epi to polu* (those that happen in many cases –but not of necessity and always, *anankes kai aei*–). This is an expression not only used in the quoted passages from the *Metaphysics* and *Physics*, but also in the *Nicomachean Ethics* (I 2 1094b 21), in the latter in reference to the practical realm. Indeed being "general facts" is a matter of the lack of exactness

about them.[5] Given that for example, by definition, statistics deals with general facts it is clear that it cannot be, in that sense, an exact science. This does not imply a weakness but a rigorous adjustment to the nature of the subject-matter. *Akribeia* (exactness) means "exactness, minute accuracy, precision."[6] For Plato it had a mathematical sense (see *Philebus* 55e-59d); Aristotle, in contrast, also considers a non-mathematical *akribeia*, e.g., in practical decisions. It is in this sense that Aristotle argues, as mentioned above, that virtue is more accurate and better than any form of art. In modern measurement theory we can distinguish accuracy, which refers to truth of the observation, and precision, which refers to the likely spread of estimates (see Marcel Boumans 2008). Bertrand Russell (1923) defines accuracy in this way: "One system of terms related in various ways is an accurate representation of another system of terms related in various other ways if there is a one-one relation of the terms of the one to the terms of the other (...) Maps, charts, photographs, catalogues, etc. all come within this definition in so far as they are accurate." *Akribeia*, in the classic Greek sense more means accuracy than precision. Particular actions of a virtuous person might be accurate; but as soon as we generalize we loss accuracy. Nevertheless, as also noted, lack of *akribeia* does not imply a lower level of truth, but a practical truth, which is the suitable truth for this subject-matter. So, this cannot be considered a weakness of practical science: it corresponds to its scope and character.

2. Second, practical science must be closely connected to the concrete case. Aristotle also asserts that "each man judges correctly those matters which he is acquainted; it is of these that he is competent critic" (*Nicomachean Ethics* I 2, 1094b 28). What, then, is the key to correctly judging what to do? A correct practical reasoning requires experience, theoretical knowledge of principles, and good intention (characteristics of the virtuous man).[7] An adaptation to the particular case, considering its cultural and historical environment, is necessary. A wise mix of adequately chosen scientific types and historical, cultural and empirical elements is the key to a correct interpretation of human action.

3. Third, as I mentioned, there is the normative character of practical reason conducive to the normative character of practical science and its engagement with values.

4. A fourth trait of practical science is its pragmatic aim. An abusive theoretical aim has invaded the realm of social sciences. Social science may have a theoretical aim, but it is always oriented to action due to the essentially practical character of its subject.

5. Last, we ought to note the methodological strategies of the practical sciences. The bibliography on this topic is rich and could be summarized in a proposal for methodological pluralism. In his *Nicomachean Ethics* and in the *Politics,* Aristotle admirably combines axiomatic deduction, inductive inference, dialectic arguments, rhetoric suggestions, imagination, examples, and topics. All

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[5] This notion of inexactness is different from that in Mill (1882) and Daniel Hausman (1992). Why do conclusions hold in most and not in all cases? Roughly speaking, for Mill and Hausman, inexactness is characteristic of theory and science. The root of this is that sciences cannot consider all the causes producing an actual effect. They only try to consider the essential causes. In actual events, however, other disturbing causes interfere. As a consequence, events happen in most but not all cases. Aristotle considers this "epistemic" inexactness, but he also holds to an "ontological" inexactness: he is indeterminist.

[6] *An Intermediate Greek-English Lexikon*, founded upon the seventh edition of Liddell & Scott's Greek-English Lexikon, Oxford at the Clarendon Press, 1900.

[7] This is why for an Aristotelian conception a good social scientist has to be virtuous.

these methodological instruments participate in the reasoning of a prudential science.

I come back to economics. To take ends as given presupposes a lack of use of theoretical reason, because it leaves aside the ultimate causes of actions and events.[8] It also leaves aside practical reasoning, because it assumes that we do not reason about our ends or goals. In an increasingly globalized world and within the frame of an increasingly interdisciplinary relation between disciplines, instrumental rationality is not enough to deal with the economic aspects of reality. Theoretical reason will help us understand the roots of the problems of economic life and will lead to the use of practical reason to manage these problems.

Given all this, the aim of this thesis is to argue for the usefulness of theoretical and practical reason in economics. I present and explain the ideas of Nancy Cartwright and Amartya Sen in these terms. The thesis sees Aristotle as an important stimulus to the reasoning of each, and looks at how we can use their ideas and his together to develop an understanding of practical reason that is valuable for solving practical problems in science and society.

Cartwright speaks about "capacities" as the real causes of the events. Sen speaks about "capabilities" as the freedoms or possibilities of the human person. Both Cartwright and Sen relate these terms to closely connected Aristotelian concepts. This suggests the research question of the thesis: "How do we combine capacities and capabilities to determine an adequate way of acting in personal and social life?" A proposed answer is that we must understand how practical reason is institutionalized in the world in the sense of being embedded in practices and procedures that allow people to solve practical problems that require the exercise of practical reason.

Thus Cartwright thinks that since capacities are, real stable causes, they are the real springs of events and how we must explain them. These capacities can give rise to Cartwright's "nomological machines" which are "stable configurations of components with determinate capacities properly shielded and repeatedly running" (Cartwright 2001: 292; see also Cartwright 1999: Chapter 3, 50). However, she is cautious about whether we can know these causes, is and especially skeptical concerning Economics:

> The natural thought about the difference between the most fundamental capacities studied in physics and the capacities studied in economics is that the economic capacities are derived whereas those of fundamental physics are basic. Economic features have the capacities they do because of some underlying social, institutional, legal and psychological arrangements that give rise to them. So the strengths of economic capacities can be changed, unlike many in physics, because the underlying structures from which they derive can be altered (2007a: 54).

[8] The lack of theoretical reason in economics is manifested in problems of definition of concepts, even of the concept of economics itself. Uskali Mäki (2002, p. 8) holds that 'economics' is a dangerously aggregated notion: "there is no one homogeneous 'economics'." New currents such as, for example, complexity, also lack a clear definition of concepts. In the introduction to the proceedings of a Conference held at Santa Fe Institute, we read: "what is the complexity perspective in economics? That is not an easy question to answer (...) the authors of the essays in this volume by no means share a single, coherent vision of complexity in economics" (Arthur, Durlauf and Lane, 1997: 2).

For Cartwright, economic models need to make many unrealistic assumptions given the paucity of economic principles with serious empirical content. As a result, their conclusions are rarely applicable to real world situations (2007a: V, *passim*). She does suggest, however, that we should try to understand how social structure affects outcomes (2007a: 79). Using her concept of a nomological machine, then, we might be able to overcome to some extent the epistemic shortcomings of the economic realm. A nomological machine is a methodological instrument that may be applied to different fields. We thus might think about analogous "socio-economic machines". I will argue that institutions can have this role and that this can be understood in terms of the working of practical reason. They should, however, be expected to have specific characteristics, given the fluctuating and complex subject they will deal with.

Sen's capability approach has caused a revolution in the way of appraising development and poverty. By focusing on capabilities, Sen reinserts the notion of ends back into economics and economics back into the practical area: capabilities are themselves ends, purposes, freedoms. For Sen, a crucial aspect of human well-being –understood in a broad sense that goes beyond utility– is human "agency". Agency is related to the quality of life, but it also includes the goals of others and the possibility of commitment to actions that do not benefit the agent himself. Human agency entails freedom: freedoms are "capabilities" of performing some actions which Sen calls "functionings". These capabilities and functionings compose a good life. Capabilities, for Sen, are seen as a better way of assessing well-being than utility or income.

Sen's capability approach is a broad perspective that considers the person's individuality as a unique, reflective and free agent, socially shaped, with a specific conception of the good. This leads to an enriched evaluation of well-being, of equality, of development and of all the fields in which it may be applied. The focus is not on the means (for example, income), but on the ends (e.g., the satisfaction of the aspirations and ultimate goals of different people). This acknowledgment of human heterogeneity and also of the heterogeneity of objectives implies a broadening of the informational basis for evaluation and a consideration of the plurality of different human situations. Notwithstanding this, this plurality does not mean that we accept capricious ambitions, desires and behaviors. For Sen, the free agent must be responsible and consider not only his concerns but also others' concerns and necessities. Capabilities according to Sen are heterogeneous and incommensurable. We can only compare them. Decisions about capabilities are thus prudential and go beyond calculations. They are ruled by practical reason.

As Davis (2003) has shown the individual in standard economic theory is not a human person; there is neither choice nor freedom in rational choice or in revealed preference theory (2003: 48-9). For Davis, the abstract individual conception of economics "shares much the same philosophy of mind underlying an important strand of cognitive science, namely, computational functionalism, or the view that the mind is a computer and the individual a symbol-processing system" (2003: 82). With Sen, in contrast, economics' individual becomes a human individual.

The introduction of capacities and capabilities calls for a revision of the epistemological and anthropological assumptions of current economics associated with reintroducing the theoretical and practical uses of reason. I will show that the capabilities of Sen are like the capacities of Cartwright in the human realm; human capabilities are the real causes of the events in economics

and should be the way of explaining them. Institutions, then, are essentially socio-economic machines that, through people's use of practical reasoning, make it possible to appraise and deliberate about their capabilities (Cartwright's capacities in the human world). In this way, institutions embody practical reason and insert a certain type of predictability into human affairs. This "predictability" is enough for developing practical science which is fortunately inexact; "fortunately" because the opposite would mean that freedom has been abolished. How, then, do we combine capacities and capabilities and work to achieve certain results of interest to us in life? By the institutionalization of practical reason in socio-economic machines.

These hypotheses will be developed in the following Chapters. Chapter II deals with Cartwright's thinking. It will first explain her thinking about capacities as the real causes of things, and then will show the Aristotelian influences on this understanding, and finally will propose the idea of a socio-economic machine.

Chapter III deals with the thinking of Sen. First, it explains his capability approach, including its strengths and weaknesses (as well as important criticisms of it). Then, it will show the capability approach's Aristotelian connections. Finally it will explain my view of human capabilities.

Chapter IV closes the thesis with a case study: the building of an index through the development of an institution, the HDI and the UNDP, as an example of the creation of a socio-economic machine. This will be the last step in combining Cartwright's capacities and idea of nomological machines with Sen's capabilities approach, as a demonstration of the activity of practical reason to enrich the working of economics. This case study will also suggest other possible applications of practical reason through the development of other economic institutions.

Chapter II: Nancy Cartwright, Capacities and Nomological Machines. The role of theoretical reason in science

1. Introduction
2. The Cartwright–Mill connection
3. The Cartwright-Anscombe Connection
4. The Cartwright-Aristotle Connection
4.1. Textual connections
4.2. The ontology of capacities
4.3. The epistemology of capacities
5. Cartwright's skepticism about capacities in the social realm
5.1. Cartwright's skepticism
5.2. Julian Reiss's interpretation and proposal
6. Socio-economic machines
7. Conclusion

1. Introduction

In Chapter I, I contended that Economics needs to recover an understanding of the role of theoretical reason in economic knowledge. This need goes from the necessity of a definition of Economics and its main concepts to the recognition of real causes of economic affairs.[9] It thus goes beyond the old positivistic concept of scientific explanation as "saving the phenomena". This concept consisted in delivering unified descriptions of natural regularities among things compatible with the observable, without trying to delve into unobservable underlying entities. In fact, however, in order to save regular phenomena it is necessary to commit to causal mechanisms that can be detected from data, but that do not register directly on human perceptual systems or experimental equipment (see Bogen 2009). For James Bogen and James Woodward (see Bogen and Woodward 1988 and Woodward 1989: 393) phenomena are stable and general features of the world that are beyond data, and that can be explained and predicted by general theories. Theories, for them, are not about data, but about phenomena. Phenomena, explains Bogen (2009), are processes, causal factors, effects, facts, regularities and other pieces of ontological furniture. This implies that knowledge goes beyond observation; observations only help us arrive at the knowledge of those kinds of phenomena, a theoretical reason's knowledge.

In agreement with Bogen and Woodward (1988) and quoting them, Nancy Cartwright (1989: 169) states that "nature is full, not only of data, but of phenomena as well." She understands scientific explanation in terms of stable causes which she calls "capacities" or "natures" (Cartwright 1992: 71, nt. 7). This contention has Aristotelian roots acknowledged by her. For her, those phenomena considered by Bogen and Woodward include capacities and interactions. Her general program aims at defining what capacities are (ontology), how they are known (epistemology), and how we use them

[9] L. Boland (2010) notes that causality does not matter for economists. Economics is dominated by model builders that only worry about which variables are "determined" by the model.

(Cartwright 2007b: 1). She also attempts –with a certain skepticism– to apply this conception of scientific explanation to the social realm, and specifically to economics. She is thus using theoretical reason in science.

Cartwright opposes Hume's reduction of causality to regularity of mere association: "The generic causal claims of science are not reports of regularities but rather ascriptions of capacities, capacities to make things happen, case by case" (Cartwright 1989: 2-3). She also opposes covering-law explanations because they do not consider causes; they only include the so-"probed" singular case within a general covering law. Cartwright's following quotation (1989: 211) is clear:

> I chose deliberately the Aristotelian language of matter, form, and function because these terms are fundamental to a preliminary description of phenomena that appear in my image of science. This language is a thread to the neo-Humean covering-law theorist, and it is meant as such.

Otherwise, Cartwright agrees with John Stuart Mill's proposal about the existence of "tendencies" which she identifies with "capacities": "I suggest that the reader take my 'capacity' and Mill's 'tendency' to be synonymous" (Cartwright 1989: 170). According to Cartwright, Mill's tendencies are not tendencies of events but tendency factors or stable real causes. These tendencies or capacities give rise to Cartwright's "nomological machines" (NM), "stable configurations of components with determinate capacities properly shielded and repeatedly running" (Cartwright 2001: 292; and Cartwright 1999: Chapter 3, 50). Only when and where a NM can be built or shown to exist, can we speak of natural or of scientific laws.

As mentioned in the previous paragraphs, Cartwright combines elements from Aristotle with others from Mill. She also takes elements from Elizabeth Anscombe and Ian Hacking. I think that a good way of explaining Cartwright's thought is to analyze the influences received from Aristotle, Mill and Anscombe.

I will first analyze the Cartwright–Mill connection (Section 2), then the Cartwright– Anscombe connection (Section 3), and finally the Cartwright–Aristotle connection (Section 4). In these sections I will make a number of criticisms that help to highlight the nature of her position. Section five will deal with Cartwright's skeptical statements about the possibility of explanation in social science. In the sixth section I will develop a proposal for socio-economic machines based on her thought in order to overcome the reasons of her skepticism. In sum, I will first explain Cartwright's framework stressing its metaphysical or theoretical commitments (Sections 2, 3 and 4), I will then explain the difficulties she finds in applying her ideas to the social field (Section 5), and I will finally propose a development of her views aimed at offering an operative way of dealing with this field (Section 6).

2. The Cartwright–Mill connection

This section aims at making clear the metaphysical commitments behind Cartwright's conception of a capacity. Cartwright is quite explicit about how her account is connected to Mill's: "[M]y views and arguments are essentially the same as Mill's in modern guise" (Cartwright 1989: 8). Her goal is to develop Mill's proposal to deal with causes in different causal situations (1989: Section

4.5, pp. 170-9). Mill's tendency idea, according to Cartwright, corresponds to "the essential behaviour of a factor" (1989: 203).

In Book III, Chapter X of his *System of Logic*, "Of the plurality of causes, and of the intermixture of effects", Mill argues that one phenomenon can be produced by different causes: "it is not true, then, that one effect must be connected with only one cause, or assemblage of conditions" (1882: 311). One phenomenon may involve a concurrence of causes. This may happen in two different ways. In the first way, the different causes modify or interfere with each other's effects, thus constituting a compound causal action. Mill exemplifies this by the joint operation of different forces in mechanics. In the other case, "illustrated by the case of chemical action, the separate effects cease entirely, and are succeeded by phenomena altogether different, and governed by different laws" (1882: 315). In the first case, Mill explains the action of each cause by saying that "it *tends* to move in that manner even when counteracted" (1882: 319: italics in the original). He concludes: "All laws of causation, in consequence of their liability to be counteracted, require to be stated in words affirmative of tendencies only, and not of actual results" (1882: 319). Cartwright (1989: 179) concludes from this that: "Mill's view has to be that the fundamental laws of nature are laws that assign stable tendencies to specific causes," which is Cartwright's notion of capacities.

A few words on Mill's thinking about the social sciences and Political Economy should be added to understand the problem involved here.[10] In Book VI of his *System of Logic*, "On the Logic of the moral sciences", Mill describes the difficulties involving knowledge in these sciences, given the complexity of their subjects, the innumerable influencing circumstances and their modifiable character. He argues that it is extremely difficult to arrive at "the ultimate laws of human action", i.e., causal laws in this realm (1882: 597).

The only thing we can do in each of these moral sciences is to propose an hypothesis or *axiomata media* in accordance with the previous highest –and also hypothetical– generalizations we have about human nature, that are then to be verified (or not) as empirical laws. The first part (the two first steps: hypothesis and deduction) of the method is called *a priori*, and the last one (empirical verification) is called *a posteriori* (1882: 605). The whole method is called *Deductive* (1882: 599). This method is applicable only when the plurality of causes is of the mechanical kind, i.e., as involves a composition of causes. When the plurality is of the other kind, a chemical-like one, the only possible method is experimental, in order to try to isolate the different influencing factors. But this is impossible given that we cannot do experiments under the required conditions specified by Mill (1882: 610-3).

Mill claims that there is one branch of social science that can be studied according to the Deductive method, namely, Political Economy. This is because the main motivation for action in this field can be identified, i.e., the desire for wealth, allowing us to apply this method, explain, and even make predictions. He recognizes, however, that "there is, perhaps, no action of a man's life in which he is neither under the immediate nor under the remote influence of any impulse but the desire of wealth" (1882: 624 and [1844] 1974: 139). It would thus be "absurd" (1882: 624 and 1974: 139) for any political economist to think that mankind is really thus constituted. However, this is the way in which the

[10] For an exposition of this topic, see Hausman 1981 and 1992, pp. 123-151, and D. Wade Hands 2001, pp. 14-25.

science proceeds (1882: 624 and [1844] 1974: 139). The application of Mill's Deductive Method to economics stems from treating desire for wealth as the sole end, which for him is unrealistic –because human actions actually have a plurality of motives (1882: 624-5; see also [1844] 1974: 139). However, among the available hypotheses, it is "the nearest to the truth" (1882: 624 and [1844] 1974: 139). Mill adds: "This approximation has then to be corrected by making proper allowance for the effects of any impulses of a different description" (1882: 625 and [1844] 1974: 140).

Cartwright has been criticized for her interpretation of Mill: her concept of capacity is different from Mill's concept of tendency. Christoph Schmidt-Petri (2008) argues that Cartwright's capacities are significantly different from Mill's tendencies, which he also believes are problematic for Mill's entire thinking. According to Schmidt-Petri, Mill uses the concept of tendency for entirely practical methodological reasons rather than for metaphysical reasons (2008: 292). They thus do not support Cartwright's realist view of capacities (2008: 298). The key question is: are real causes internally consistent with Mill's Humean-like context?

This point is considered by Cartwright (1989: 178-9). She quotes Peter Geach on this, but she may underestimate the possible inconsistency. Recently, however, in her reply to Schmidt-Petri (2008b), she has admitted that she was possibly wrong in applying her concept of capacity to Mill. Geach (1961: 103) argues that Mill, confronted with the facts, was obliged to affirm the existence of these real tendencies. But he complains that this doctrine incompatible with Hume's invariable-succession theory.[11] The point about the inconsistency of this "unofficial doctrine of tendencies" with Hume's laws as invariable sequences is also made by Quentin Gibson (1983: 298). In sum, the difference between Cartwright capacities and Mill tendencies is that while for her capacities are clearly and always real stable causes, for Mill the concept of tendency is only a methodological device not necessarily expressing an ontological reality.

It can well be argued that Mill was fundamentally a Humean about causality. The Humean concept of cause in its most basic sense, according to Fred Wilson (2007: 12), stems from our experience of matter-of-fact regularity. It relates phenomena to phenomena, not phenomena to *noumena*. A law is a regularity; to explain a fact is to put it under a law. For Hume a causal judgment is a judgment of regularity (2007: 18). Craig Dilworth (2006: 14) thinks that in the spirit of Hume Mill identifies causality with succession. He also explains how N. R. Campbell attacked Mill for his Humean conception of causality as succession (2006: 27). John Skorupski (1989: 175) also asserts that Mill regards causation exclusively as a relation between phenomena. All we know are uniformities in the spatio-temporal relations among phenomena. We know nothing about 'metaphysical' causes and we do not need to take them into account in inductive reasoning. Geoffrey Scarre (1998: 114) considers Mill's scientific project as metaphysically abstemious about causes. They are mere constant conjunctions.

Robert McRae (1948), poses a possible solution to Mill's two-fold notion of cause suggesting a change in Mill's conception of causality. First, we have the Mill as recipient of Berkeley and Hume. Mill states:

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[11] He adds that Mill's tendencies are very close to Aquinas doctrine of *inclinationes* or *appetites* in nature –interestingly, because these *inclinationes* are also very close to Cartwright's capacities of nature (cf. Geach 1961: 104-5).

> when I speak of the cause of any phenomenon, I do not mean a cause which is not itself a phenomenon; I make no research into the ultimate or ontological cause of anything (...) Between the phenomena, then, which exist at any instant, and the phenomena which exist at the succeeding instant, there is an invariable order of succession (...) To certain facts, certain facts always do, and, as we believe, will continue to succeed. The invariable antecedent is termed the cause; the invariable consequent, the effect (1882: 236-7).

Then, however, in the same book, after defining the causal relation as invariable succession between phenomena, Mill introduces considerations which are incompatible with that definition (cf. McRae 1948: 242). He realizes that there are cases in which temporal succession is not a sign of causality (e.g., day and night). As a result, he concludes: "Invariable sequence, therefore, is not a synonymous with causation, unless the sequence, besides being invariable, is unconditional" (Mill 1882: 245; see also 582 –Book VI). This second version of causation is closer to Cartwright notion of capacity.

The balance of positions is not ultimately clear and we can say that Mill's ideas about the nature of causality and consequently about the methodology of science are inconsistent. There is some coincidence between Mill and Cartwright; to achieve it, she has discarded the –probably the more genuine– Humean Mill, and adopted the Mill of real causes.[12]

3. The Cartwright–Anscombe Connection

In this connection the contrast is the opposite of that with Mill: between a more metaphysically committed Anscombe and a Cartwright less prone to metaphysical commitments. However, this contrast also serves to define Cartwright's position. At the beginning of the first chapter of her *Hunting Causes* (2007b: 11), Cartwright states: "The central idea behind my contribution to the project [on causality] is Elizabeth Anscombe's". Cartwright refers to Anscombe's paper "Causality and Determination" (Anscombe 1971).[13] In this chapter, Cartwright highlights the singular character of causality and the plurality of causes. She concludes by asserting: "I have presented the proposal that there are untold numbers of causal laws, all most directly represented using thick causal concepts, each with its peculiar truth makers" (2007b: 22).

In *The Dappled World* (1999) Cartwright dedicates Chapter 5, "Causal diversity; causal stability", "to Elizabeth Anscombe, from whom I learned" (1999: 135). The context of this chapter was to show the particularity and multiplicity of causes: "there is a great variety of different kinds of causes and (...) even causes of the same kind can operate in different ways" (1999: 104). She also quotes Anscombe (1971) in *Nature's Capacities and their Measurement* in this context: "often the operation of a cause is chancy: the cause occurs but the

[12] I leave for Section 5 consideration of another connection between Cartwright's position and Mill's work related to the difficulties of explanation in the social sciences.

[13] It is the Inaugural Lecture for the chair that had been held by Ludwig Wittgenstein at Cambridge. Anscombe studied with Wittgenstein and was one of his literary executors (she translated some of his works and wrote *An Introduction to Wittgenstein's Tractatus*). She was an Aristotelian and her most famous book, *Intention*, inspired by Aristotle, became a philosophical classic.

appropriate effect does not always follow, and sometimes there is not further feature that makes the difference" (1989: 105).

In the essay quoted by Cartwright, "Causality and Determination" (Anscombe 1971), Anscombe argues two main theses. The first is to "refuse to identify causation as such with necessitation" (1971: 88). "Causality" she asserts, "consists in the derivativeness of an effect from its cause" (1971: 91-2). She reasons (1971: 91):

> [I]t's not difficult to show it prima-facie wrong to associate the notion of cause with necessity or universality (...). For it being much easier to trace effects back to causes with certainty than to predict effects from causes, we often know a cause without knowing whether there is an exceptionless generalization of the kind envisaged, or whether there is a necessity.

Related to the possibility of observing causality in individual cases, Anscombe discusses two arguments. First, we actually use many causal terms in ordinary language. The idea of causality comes from an abstraction that begins with particular observations of different kinds of singular causations: "scrape, push, wet, carry, eat, burn, knock over, keep off, squash, make, hurt" (1971: 93). And this happens to such a degree that if a language did not include causal verbs, we would not be able to speak about the world. The second argument stems from the problem of induction. We cannot obtain a generalization from a singular cause. Adding the clause "if normal conditions hold" is too vague. The task of excluding all the required circumstances cannot be carried out, and we do not know if we know them all.

The second thesis held by Anscombe in "Causality and Determination" involves an argument against determinism and for indeterminism. She also defines the latter. She distinguishes between being determined in the sense of pre-determined and determinate. What has happened is determined once it happens and this is obvious (this is the sense in which Aristotle asserts that the past and present are necessary). What she is concerned with is pre-determination. Here another distinction arises: there are non-necessitating causes, or causes "that can fail of [their] effect without the intervention of anything to frustrate it" and necessitating causes, or causes that can only can be frustrated by interference.[14] Indeterminism, then, is the thesis that not all physical effects are necessitated by their causes. This does not mean, however, that indeterminate effects have no causes (1971: 101).

Anscombe's account of causation seems to fit with Cartwright's ideas. For Cartwright, first we observe singular causality, then we look among the causes we observe for those that are stable, and finally we say we have a law and a set of causal laws or capacities –a nomological machine– that would hold if there were no interferences with them. There is a plurality of causes, and indeterminism may hold even in the physical realm (see Newman 1995: 277 on Cartwright's denial of ontological determinacy).

Although she does not use the same label, Cartwright also considers necessitating and non-necessitating causes. We find an example of her consideration of necessitating causes in the reply of Cartwright to Margaret

[14] For example, tetanus is a necessitating cause of death because without treatment it is not possible for one who has tetanus to survive.

Morrison (1995) concerning the possible tension between her singularism and universalism. Cartwright states (1995: 179-180):

> I would say that our central usage of tendency terms supposes that the association of tendencies with properties or structures (...) need not be universal; it may hold across certain regimes or domains. But within the domain in which the claim of association can be regarded as true, the tendency when appropriately triggered will always operate unless there is a good physical reason why not.

In this respect, Cartwright distinguishes the interferences of tendencies specified by rules of composition (or cases of "co-action", e.g., 1995: 179 and 180) and interaction, "when the tendencies associated with a given factor are changed in the presence of another" (1995: 180). Cartwright refers to Anscombe's non necessitating causes when she asserts that "the exercise of a capacity need not occur universally upon triggering even when nothing interferes" (2007a: 20; cf. also 2, 4, 50-1). She gives a physical (the quantum capacity of an excited atom to emit a photon) and a "human" example: "triggering my irritability *can* produce anger but it *may not* (...) It may even happen that the capacity is there all my life and never exercised" (2007a: 20). This kind of cause evidently entails a difficulty for scientific explanation and even more for prediction.

There are two other points I would now like to make. First, Cartwright does not take into account –nor does she deny– a relationship between human freedom and determinism. Anscombe states that physical indeterminism is indispensable for human freedom –we cannot be free if we do not have some control over our own physical activity.[15] She adds, however, "but certainly it is insufficient. The physically undetermined is not thereby 'free'. For freedom at least involves the power of acting according to an idea", and this goes beyond mere non-predetermination of an indeterministic physics (1971: 102). This would imply a greater complexity of human affairs that the one claimed by Cartwright; but she does not use this argument to explain it. There nonetheless seems to be a lot of room for freedom in Cartwright's thought (for example, this seems to underlie Cartwright and Del Seta 1997). This is relevant for our concern with the explanation in social sciences. I will return to this.

A second point is that Anscombe's position supposes a strong metaphysical commitment regarding causes which Cartwright shares. For Andrew Newman (1995) Cartwright sometimes avoids traditional categories of metaphysics. In effect, she sometimes uses terms (even the very term "capacity", instead of cause) that are not the traditional ones. However, this does not mean that she is abandoning her metaphysical commitment; it would presuppose returning to what she is criticizing; instead of a kind of general agnosticism concerning real causes we would have a singular agnosticism. We cannot work with "as if natures or capacities" clauses because if capacities are not real her capacity account would make no sense. On balance, Cartwright's metaphysical commitment is clear (see e.g. 1989: 136, 139, 140, 142, 146, 147, 197, 223, 226; 1992: 51; 1995: 181; 2007a: 7, 11, 28, 32; 2007b: 49, 132 and 250). For example, she asserts that our objective in science is to discover "the nature of things"

[15] Mill is a determinist. For Mill causation implies determination (1882: 581 ff.). In this Cartwright does not follow Mill.

(1999: 181). For her, capabilities are something in the world (1989: 181). Newman explains this nicely when he asserts that Cartwright keeps her distance from the usual categories of metaphysics. He remarks, however, that her arguments definitively favor realist metaphysical views (1995: 274-5). In conclusion, Cartwright supports a notion of non-deterministic singular real causes and she holds that scientific explanation is the knowledge of these causes.

4. The Cartwright–Aristotle connection

I divide this section into three sub-sections: in the first sub-section I will present the textual connections between Aristotle and Cartwright, and in the second and third sub-sections I will offer an Aristotelian account of Cartwright's ontology and epistemology of capacities.

4. 1. Textual connections

Aristotle is an author often quoted by Cartwright. The references she makes to the Greek philosopher show how ontologically radical her conception of capacities is, because she identifies them with Aristotle's concept of nature, a radical inner principle of things. For both Aristotle and Cartwright, if we do not consider natures we do not arrive at a real explanation of things and events. Cartwright cites the *Physics*, the *Metaphysics*, the *Nicomachean Ethics* and his scientific treatises. Her acknowledgment of Anscombe might also be regarded as Aristotelian. In *How the Laws of Physics Lies* she quotes Aristotle, first to indicate that there is a trade-off between generality and truth (quoting the *Nicomachean Ethics* II 7–1983: 9). Then she uses a passage of *Metereologica* as example of idealization (1983: 110). Finally she cites an Aristotelian passage about chance –*Physics* II, 5– related to her explanations about disturbing causes. In *Nature's Capacities* Aristotle is one of the authors most often cited, along with Mill, Clark Glymour, Hume and Albert Einstein. For example, she adopts Aristotelian abstraction (1989: 197-8), and uses his classification of four causes (1989: 211-214 and 218-226). She also asserts that her conception of capacities resonates with Aristotle's (1992: 45-8, 69, 1999: 72; 2001: 277, 290).

Cartwright explains in Chapter 6 of *The Dappled World* (reprinted with slight changes in 2001):

> [The thesis that] I am most prepared to defend, follows Aristotle in seeing natures as primary and behaviours, even very regular behaviours, as derivative. Regular behaviour derives from the repeated triggering of determinate systems whose natures stay fixed long enough to manifest themselves in the resulting regularity" (1999: 149; 2001: 290), [i.e., a NM].

In Chapter 3 of *The Dappled World* she asks: "What facts then are they that make our capacity claims true?" She concludes:

> [T]he best worked out account that suits our needs more closely is Aristotle's doctrine on natures, which I shall defend in the next chapter. Capacity claims, about charge, say, are made true by facts about what it is in the nature of an object to do by virtue of being

> charged. To take this stance of course is to make a radical departure from the usual empiricist view about what kind of facts there are (1999: 72).

Instead of the usual empiricist view, she is adopting an "Aristotelian empiricist" view. Let me explain what I mean by this expression. The view that most scholars hold about Aristotle's doctrine of science originates in his account of a necessary, deductive science. Aristotle, however, only exceptionally –for example in logic and mathematics– deals with science in the way detailed in the *Posterior Analytics*. This is the book where Aristotle characterizes that kind of science. It is one of the books in the set of books on logic, called *Organon* (i.e. "instrument" of thinking). Jean Marie Le Blond, in his classic *Logique et Méthode chez Aristote*, maintains that "the books composing the *Organon*, are more concerned with *explaining* science in a rigorous way than with *doing* science. His scientific books, on the other hand, focus on research and they are the ones that reveal the method" (1939: 191). That is, the *Organon* contains a theory of science, while the scientific books are actual science that does not always follow the precepts of the theory. In fact, in his scientific studies –especially biological (*On the Part of Animals*, *The History of Animals*), physical (*Meteorology*), and practical (Ethics and Politics)– Aristotle allows plenty of room for experience, and he does this in order to discover and also verify scientific principles (see Lloyd 1974: pp. 99-124). He says in *Generation of Animals* (concerning his observations about the generation of bees) that "credit must be given rather to observation than to theories, and to theories only if what they affirm agrees with the observed facts" (III 10, 760b 31; cf. also *De Anima*, I, I, 639b 3 ff. and 640a 14 ff.). Causes are grasped by a sort of intellectual intuition –called abstraction– which presupposes experience but is not based on a complete enumeration of cases. Moreover, sometimes, one or a few cases suffice to abstract the universal (see Jaakko Hintikka 1992: 34). But they still have to pass the test of verification. Le Blond shows how Aristotle uses experience in detailed observation as well as in experiment: it is a "flux and reflux of the research going from facts to theories and from theories to facts" (1939, p. 242). This clearly explains why Aristotle states in *Nicomachean Ethics* (VI, 8) that "a boy may become a mathematician but not a philosopher or a natural scientist." The reason, he adds, is that the philosopher and the natural scientist need experience. He states in *On Generation and Corruption* (I 2 316a 5-8):

> [l]ack of experience diminishes our power of taking a comprehensive view of admitted fact. Hence those who dwell in intimate association with nature and its phenomena are more able to lay down principles such as to admit of a wide and coherent development.

That is, experience plays a fundamental role in Aristotle's real science, an experience that allows us to reach real causes. This is my interpretation of Cartwright's proposal. Joining the three following quotations show the connection empirical experience-causes held by Cartwright.

Chapter 4 of *The Dappled World* (1999) is based on Cartwright's "Aristotelian Natures and the Modern Experimental Method" (1992). Here she persuasively shows that what science actually does by studying "the inner

constitution [of things and events] is a study of an Aristotelian-style nature" (1992: 69; 1999: 102):

> Still, I maintain, the use of Aristotelian-style natures is central to the modern explanatory program. We, like Aristotle, are looking for 'a cause and principle of change and stasis in the thing in which it primarily subsists' [*Physics* II, 1, 192b22], and we, too, assume that this principle will be 'in this thing of itself and not *per accidens*' (1992: 47; 1999: 81).[16]

However, nature is captured by its empirical manifestations. We get at nature through its acts:

> I want to recall the Aristotelian idea that science aims to understand what things are, and a large part of understanding what they are is to understand what they can do, regularly and as a matter of course (Cartwright 2001: 277).

This is why for her it is important to look at the actual practice of science.[17]

There is, finally, an interesting paper by Cartwright, "No God, No Laws", that also makes reference to Aristotle. The thesis of this paper is that the concept of a law of Nature cannot be made sense of without assuming God's existence. All depends on the meaning of law of Nature. She reviews the empiricist position –"just a collection of events, one after another" (2007c: 3), the Platonist –a relation among abstract entities, and the Instrumentalist. She then explains the problems of those positions. The empiricist is only descriptive; it cannot be taken to explain what happens. The Platonist offers explanations, but they have nothing to do with the empirical world. Concerning the Instrumentalist position, it is ultimately based on regularities that do not necessary hold. Finally, she explains "Aristotelianism" where "the laws of science describe the powers that systems in Nature have by virtue of certain facts about them" (2007c: 21). She concludes: "I endorse this kind of pre-Cartesian/pre-Humean empiricism and I have spent a lot of effort trying to show that notions like powers and causings are not only compatible with an empiricist view of science but that we cannot make sense of science without them" (2007c: 22). The argument of her paper is that the other positions cannot support laws of Nature without assuming God's existence. Instead, for Aristotelianism with no need for laws of nature there is no need of God. "On the Aristotle-inspired account, there is necessity and governance in Nature: natural

[16] She adds three differences between Aristotle and modern science: (1) the change for substances to structures; (2) that causes often do not reveal themselves directly but by experiments; (3) coming back to (1) stressing the stability of structures (1992: 47; 1999: 81). She emphasizes that the properties studied by modern scientists do not reveal the essence of that to which they belong (1992: 48; 1999: 82).

[17] This argument is central to her philosophy of science, as argued by Hands: [T]he final court of appeal for philosophical debates about science is the actual practice of science (...). [W]hat science is must be regulated by the practice of science, and she argues repeatedly that real practicing scientists actually do presuppose that capacities and causal powers exist in systems they study" (2001: 313 and 315). Hands attributes this to Otto Neurath's influence.

systems have powers and events in Nature are made to occur in the way that they do by the exercise of powers" (2007c: 23).[18]

We may draw a parallel between this search for inner causes and Woodward's looking for phenomena through data. This is an Aristotelian empiricism: through observations the mind captures something that is beyond them and that is the real explanation of the thing observed and its actions. This is the work of theoretical reason. This is why, according to Cartwright's conception of empiricism, we need powers and causes: they are the real support and the explanation of the observable. (2007c: 22).

Once presented the connections between Aristotle and Cartwright's thoughts I think that deepening her Aristotelian roots is valuable because it will consolidate and bring more strength to her position. First, I will analyze the ontology of Cartwright's capacities from an Aristotelian perspective. Then I will tackle the topic of the knowledge of capacities.

4. 2. The ontology of capacities

According to Cartwright, capacities, natures, or "powers to do" are real causes (cf., e.g., 1989: 182). They have three elements: (1) potentiality: what a factor can or tends to do in the abstract; (2) causality: they are not mere claims about co-association; (3) stability (Cartwright 1998: 45). She calls them "natures" (1992) and quotes –as already noted– Aristotle's definition of nature as "the cause and principle of change and stasis in which it primarily subsists in virtue of itself" (*Physics* II 1 192b 22-3). She then argues that this is what she wants to mean by capacity (1992: 71, nt. 7). Capacities, then, are internal forces, 'inner causes'.

According to Aristotle, a capacity or *dynamis* is a "power to do". He defines it as "a source of movement or change, which is in another thing that the thing moved or in the same thing *qua* other" (*Metaphysics* V, 12, 1019a 15-6). *Dynamis* is an "urge of nature to grow to maturity, to realize form, and to perform the due function" (Guthrie 1967: 140).[19] With respect to causes, Aristotle uses the idea of potentiality in reference to material cause. However, for Cartwright and also for Aristotle, the causal structure of a nature (formal cause) is the most relevant cause in the very being and in the scientific explanation of a concrete phenomenon. Causes, in any case, are the four kinds of causes considered by Aristotle, material and formal, efficient and final (*Metaphysics* I, 3-10; *Physics* II, 3) that allow different types of explanations, "a doctrine of four becauses" (John L. Ackrill 1981: 36) that answers to these questions: out of which is this made? (material cause), why is this this thing and not other? (formal cause), who is this made by? (efficient cause), and for the

[18] This dispensable character of God, however, is probably not an entirely correct reflection of Aristotle's position. For Aristotle, God is the prime mover and part of Nature (*physis*), and no power, no event, no change could exist without this prime mover (*Metaphysics*, Book Lambda). But in another sense, Cartwright's view is correct, because for Aristotle the causal intervention of God in the whole of nature does not imply a special intervention, external divine plan, or design.

[19] *Dynamis* is a power, might, strength; an ability to do something, a faculty, a capacity: Greek-English Lexicon of Lydell – Scott (Oxford, Clarendon Press, 1900).

sake of what is this made? (final cause).[20] Aristotle explains it in the *Physics* (II, 3 194b 16-35):

> In one sense, then, (1) that out of which a thing comes to be and persists, is called ´cause', e.g., the bronze of the statue (...). In another sense (2) the form or the archetype, i.e., the statement of the essence, and its genera, are called 'causes' (...). Again (3), the primary source of change or coming to rest; e.g., the man who gave advice is a cause, the father is the cause of the child (...). Again (4) in the sense of end or 'that for the sake of which' a thing is done (...)

According to Aristotle, the way of explaining these causes is theoretical knowledge. According to Cartwright, there are different kinds of causes: "causation is not one monolithic concept" (2007b: 44). This is also maintained by Aristotle (*Physics* II, 3). However, Cartwright maintains that there is a common characteristic to the plurality of causes: "the idea that causes allow us to affect the world" (2007b: 46).

A capacity, for Aristotle, may also be a habit or disposition (*Categories* VIII) and an action or passion (*Categories* IX) –physical as well as human– i.e., kinds of accidents that admit variations of degree (a way of measuring).

When she refers to capacities' stability and applicability (1989: 146; see also 1992: 51), Cartwright states that "capacities are much like essences". In this regard, she asserts that her conception of capacities has Aristotelian resonances (1992: 45-8, 69, 1999: 72; 2001: 277, 290). Among the Aristotelian causes, she assigns priority to the *form*, which is similar to causal structure (1989: 223). It seems then that capacities act necessarily, because if a natural thing has an essence or formal cause it will act according to it. But in nature, Aristotle holds, necessity is not absolute, but hypothetical.[21] The necessity of, for example, a specific matter is conditional upon those formal and final causes (*Physics* II, 9; see also Richard Sorabji 1980: Chapter 9). He asserts (*Physics* II, 9, 200a 10-15):

> For instance, why is a saw such as it is? To effect so-and-so and for the sake of so-and-so. This end, however, cannot be realized unless the saw is made of iron. It is, therefore, necessary for it to be of iron, if we are to have a saw and perform the operation of sawing. What is necessary then, is necessary on a hypothesis; it is not a result necessarily determined by antecedents.

That is, a specific matter is necessary given the end; but the end itself is not necessary. In nature events are generated by a conditional convergence of causes that do not always simultaneously occur. In the example of the saw the material and the end might not fit. In another passage he states that "some cases, moreover, we find that, at least, for the most part and commonly, tend in a certain direction, and yet they may issue at times in the other or rarer direction" (*On Interpretation* IX, 19a 20-3). What is material is contingent. This is an ontological matter. The constitution of material natural things is such as to

[20] For the Aristotelian doctrine of the four causes see, e.g., Anscombe and Geach 1961: 44-54, Henry Veatch 1974: 41-55, William Wallace 1996: 3-34, or W. D. Ross 1959: 74-78.
[21] On this topic see, e.g., Mansion 1913: 169-178.

require a convergence of principles to produce the very thing and its activities. "Those things that are not uninterruptedly actual exhibit a potentiality, that is, a may be or may not be. If such things may be or may not be, events may take place or not" (*On Interpretation* IX, 19a 10-3). One of those principles is matter "which is capable of being otherwise than as it usually is" (*Metaphysics* VI, 2, 1027a 14). This case corresponds to the no-necessitating category of Anscombe, "one that can fail of its effect without the intervention of anything to frustrate it" (1971: 101). In addition, Aristotle also considers the possibility of defects, both in arts (technique) and nature (*Physics* II, 8, 199a 33 – 199b 6). This is a first reason for the contingency of causes in the natural field, but that also applies in the social field. Indeterminism, I asserted with Anscombe and Cartwright, is the thesis that not all effects are necessitated by their causes. That is, the effect could not be produced, not because of the action of an outside influence, but because of the inaction of the very internal cause of the effect.

A second reason for contingency are causes acting from outside. Aristotle considers luck (*týche*) and spontaneity (*automáto*) (*Metaphysics* XII, 3, 1070a 6-7; cf. also VII, 7, 1032a 12-3). Both terms express an event that results by coincidence (*apo symptômatôn*: *Physics* II, 8, 199a 1-5). But, does coincidence rule out causality? Aristotle's answer is "no"; lucky or spontaneous events have causes; but they are indefinite: "that is why chance is supposed to belong to the class of the indefinite and to be inscrutable to man" (*Physics* II, 5, 197a 9-10). Causes acting from outside might be unexpected because they are not known, or because they are known but cannot be shielded. In the former case, they are a source of contingency. Instead, in the later case, they are not, because though undesired, they are known.

Aristotle maintains that when chance enters there is no regularity (*Physics* II, 8, 198b 35). However, as Ackrill (1981: 40) notes in reference to *Physics* II 7 198a 5-12, "luck and chance, he [Aristotle] is claiming, presuppose patterns of normal, regular, goal directed action". Thus, luck and chance does not impede the tendency of capacities towards their ends. Let us hear Aristotle again:

> Those things are natural which, by continuous movement originated from an internal principle, arrive at some completion: the same completion is not reached from every principle [each one has its own], and it is not by chance; but always the tendency in each is towards the same end, if there is no impediment (*Physics* II, 8, 199b 15-19).

We have then an ontological foundation for both necessitating and non necessitating causes;now for Cartwright's defense of indeterminism and singular causation.

4. 3. The epistemology of capacities

How do we recognize capacities? This is not an easy task. Cartwright maintains that stable causes or capacities are known by intellectual abstraction (1989: 8, Chapter 5). She also shows that capacities –under specific (and difficult to achieve) conditions– can be deduced from probabilities, and that they can be measured (1989: 1.4 and 2.4). However, this way of proceeding always supposes that we have some causes to begin with: "no causes in, no causes out" (1989: Chapter 2).

To measure capacities is not to know capacities. We may measure some effects, or some things that cause other things, but not the causation itself. "We cannot, of course, tell by measurement itself that what we are measuring is a real capacity" (Cartwright 2007a: 42, nt. 57). We need theoretical reason. However, measurement is crucial in order to have initial experimental contact with data that manifest causes and effects and thus allow us abstract knowledge of them. As the classic dictum states, "nihil est in intellectus quod prius non fuerit in sensu"; this initial experimental contact is necessary. Perception and abstraction are closely related and are difficult to distinguish. In actual knowledge, the senses and the intellect intervene together. Causes are perceived by senses and understood by the mind.[22] This can also be applied to experiments. The cause may be assimilated to what Aristotle calls a "common sensible": "objects which we perceive incidentally through this or that special sense, e.g. movement, rest, figure, magnitude, number, unity" (*De Anima* III, 1, 425a 16-7). This perception is the basis of abstract knowledge of concrete causes and is complemented by it. Measures induce or allow us to infer an abstract knowledge of causation (Cartwright 2007b: 178). This involves a process of subtracting the concrete circumstances and the material in which a cause is embedded and all that follows from doing this (Cartwright 1989: 187). In conclusion, this Aristotelian analysis confirms the real and deep character of Cartwright's capacities and the need for theoretical reason to know them.

5. Cartwright's skepticism about capacities in the social realm

Cartwright, however, is more skeptical about the possibilities of causal explanation in the social realm than in natural science[23]. I will first present the problem, the reaction of economists, and the problems with this reaction. Then, I will present Cartwright and Julian Reiss' proposed solutions. Then I will discuss Aristotelian arguments for Cartwright and Reiss's solutions.

5. 1. Cartwright's skepticism

In *Nature Capacities*, Cartwright maintains that both the natural and social sciences belong to a world that is governed by capacities which cannot be made sense of without them (1989: 2). However, it seems that there are some differences between the two types of sciences.

In the Introduction of this Chapter I presented Cartwright's notion of a nomological machine. In *The Dappled World* she defines it in this way:

> It is a fixed (enough) arrangement of components, or factors, with stable (enough) capacities that in the right sort of stable (enough) environment will, with repeated operation, give rise to the kind of regular behaviour that we represent in our scientific laws (1999: 50).

That means that nomological machines might fail due to three possible reasons: 1) not fixed enough arrangement of its components, 2) not stable enough capacities, and 3) not stable enough environment or circumstances (1999: 49).

[22] On the knowledge of causality see William Minto 1997: 36 ff..

[23] For a discussion of Cartwright's skepticism see Boumans 2005: 102, Kevin Hoover 2002: 157-8, 173 or Reiss 2008.

Capacities, their combination and circumstances are more prone to change in the social field.

In Section 3 on the Anscombe-Cartwright connection, I mentioned the case of interaction, "when the tendencies associated with a given factor are changed in the presence of another" (Cartwright 1995: 180). She considers this case in *Nature's Capacities*: "the property that carries the capacity interacts with some specific feature of the new situation, and the nature of the capacity is changed" (1989: 163). As Julian Reiss (2008: 265) notes, Cartwright even employs John Maynard Keynes ideas about a "holistic" world in order to support her skepticism about social capacities for this reason (Cartwright 1989: 156-8). Circumstances leading to particular combinations affect the stability of causes. Cartwright maintains that "most of what happens in the economy is a consequence of the interaction of large number of factors" (Cartwright 2001: 279). She recently notes the "peculiar nature of the capacities at work in economics" (2007a: 75 and 209: 50). She asserts that Mill's analogy does not apply to economics: "this idea falls apart in typical economic cases" (ibid.). The results of economic events depend on structural circumstances. She adds that this point is apparent in Mill's work on psychology: "the capacity will not display itself in the 'expected' manifestations unless it is nurtured, trained and allowed to display itself freely" (2009: 51). She stresses that this is something that she has only recently discovered (2009: 47 and 50). Her doubts about the appropriateness of Mill's analogy were already present in her 2001 paper (2001: 290): "there is no guarantee that the analytic method is the right method for all the problems that economics wants to treat." Things, however, are never black or white. Cartwright will help us to find a solution. She has recently stated:

> Social science is hard, but not impossible. Nor should that be surprising; natural science is exceedingly hard and it does not confront so many problems as social science – problems of complexity, of reflexivity, of lack of control. Moreover the natural sciences more or less choose the problems they will solve but the social sciences are asked to solve the problems that policy throws up (2007b: 42).

To do social science is harder than to do natural science but not impossible.[24] We are confronted with additional problems of complexity, reflexivity and lack of control, which are another way of expressing the consequences of

[24] What difficulties are added for Aristotle in the social realm? Concerning "chance", which is one of the roots of unexpected results, I mentioned that Aristotle distinguishes luck (*týche*) and spontaneity (*autómaton*), as different kinds of it. What is the criterion for this distinction? Luck pertains to the human and social realm, being a specific difference of spontaneity, the genus: "They differ in that 'spontaneity' is the wider term (...) Chance [luck] and what results from chance are appropriate to agents that are capable of good fortune and of moral action generally. Therefore necessarily chance is in the sphere of moral actions" (*Physics* II, 6, 197a 36 – 197b 2). This specific meaning of chance has a reason. According to Aristotle, the practical realm is more contingent than the natural realm. He identifies two reasons for this: "variety and fluctuation" (*daiphoran kai planen*) of actions. That is, there are many possible situations and the human being may change his decisions, i.e., it is free. Summing up, we have different Aristotelian reasons for uncertainty regarding the working of causes: 1) they might simply not act by themselves, 2) they might be modified by disturbing causes and 3) specifically in the social realm human freedom might change or disturb causes; this is a realm of reflexivity, complexity, and singularity. On the role of freedom in social science and specifically economics, see Giorgio Israel 2007: 19 and 21.

interactions. Without stability of causes we do not have capacities and we cannot build social nomological machines. Cartwright fears that "causal interactions are interactions of causal *capacities*, and they cannot be picked out unless capacities themselves can be recognized" (1989: 164).

What do economists say when confronted with this problem? Economists are well aware of the necessity of stability of causes. Cartwright presents the example of the Cowles Commission's vision of econometrics: "Econometrics arises in an economic tradition that assumes that economic theory studies the relations between causes and effects" (1989: 149). Econometricians also assume that these causes are stable, like Mill's tendencies or Cartwright's capacities, always acting though not always observable (1989: 150ff.). They also assume that those causal relations are autonomous, i.e., they do not depend on other relations (1989: 155). In contrast, she notes that Keynes conceives of a world of causes but not of capacities (1989: 157). That is, the problem is not the absence of causes but their instability. This is why she asserts that her claim is "not that phenomena of economic life are governed by capacities, but rather that the method for econometrics presuppose this" (1989: 158).

In addition, for Cartwright economists build "over-constrained" models (2007a: Essay V, especially 73-74, 2007b: Chapter 15, especially 219, and 2009: 48-50) that are too "simple" or "sparse", not "simplified" representations of reality (2007a: 70, 2009: 46), in the sense that they are not Galilean idealizations. Galilean idealizations are abstract theories that put away disturbing causes to look for a key causal factor. Let us explain why economic models are not like this. Unlike physics, Cartwright notes, economics has very few uncontroversial principles or basic –not derived– capacities at its disposal. In economic models we thus use only a few principles (usually, the maximizing principle). Then, given that paucity of economic principles with serious empirical content, economic models need to make many unrealistic assumptions "in just the wrong way" (2007a: 78, 2009: 57). Why is this way wrong? We cannot build a model with the only constraint as the maximizing principle. We need to postulate a lot of assumptions. "But then," Cartwright asserts, "we can read out only special-case conclusions, not general claims about the manifest results of the capacity" (2007a: 75, 2009: 50). As a consequence, "the results of the model are over-constrained [and] (...) the manifest results depend intimately on 'extraneous' factors –factors beyond those that define a Galilean experiment" (2007a: 74, 2009: 49). As a result, the conclusions of economic models are not applicable to real situations (2007a: 78 and V *passim* and 2009: 57): "the unrealistic structural assumptions of the model are intensely relevant to the conclusion. Any inductive leap to a real situation seems a bad bet" (2007a: 70, 2009: 45). The models "buy internal validity [rigour: 2007b: 234-235] at the cost of external validity" (2007b: 221).

Then, according to Cartwright, given the paucity of economic principles, economists take the wrong way of adding assumptions instead of the right way of looking at the structural circumstances that originate particular economic interactions. Cartwright asserts:

> The natural thought about the difference between the most fundamental capacities studied in physics and the capacities studied in economics is that the economic capacities are derived whereas those of fundamental physics are basic Economic features have the capacities they do because of some underlying social, institutional,

> legal and psychological arrangements that give rise to them. So the strengths of economic capacities can be changed, unlike many in physics, because the underlying structures from which they derive can be altered (2007a: 54).

She then suggests that we should try to understand how these structures affect outcomes (2007a: 79, 2009: 57).

In conclusion, given that economic causes are highly dependent on structural circumstances and that we do not have many principles in economics, we need to find out how these circumstances affect the outcomes. These latter will be consequently "special-case conclusions, not general claims about the results of the capacity" (2007a: 75, 2009: 50). Let us consider Julian Reiss' view of the matter (Reiss 2008).

5. 2. Julian Reiss's interpretation and proposal

Based on his reading of Cartwright, Reiss first agrees that she is a skeptical about the existence of social capacities: "to be consistent she cannot believe that the social world is actually governed by capacities" (Reiss 2008: 265). Reiss's arguments concern the special nature of the social world (full of complex, unstable and interactive phenomena) and that social science methods (theoretical economics, natural experiments and singular causes analysis –or bootstrapping) fail to yield knowledge about social capacities. But, Reiss reasonably adds, although there is no good reason to believe in the existence of social capacities, there is also no good reason to believe they do not exist. He thus declares himself as an agnostic but not an atheist regarding social capacities (2008: 278). Thinking in terms capacities presupposes the applicability of a method of analysis and synthesis (composition law):

> Situations are broken down to tractable parcels, the behaviour of these parcels is analysed severally, and finally, the bits are synthesised to let us know about the initial situation (...) In the social sciences, by contrast, the method of analysis and synthesis (in this sense) seems less applicable. No factor produces anything on its own (...) We need a thick network of causal conditions to produce any result. Furthermore, the result that is actually produced very often depends crucially on the conditions that are present when the factor operates (2008: 274).

Given that this method is less applicable in the social sciences, what are we to do? Reiss (2008: 280-5) first proposes a more empirically based detection of capacities. He holds that we should pursue a more empirical social science. For him, the empirical road has not been sufficiently traveled (2008: 283). He brings up Gustav Schmoller's methodological principles of inductively proceeding situation by situation and says that he does not see a better way of finding social capacities. Cartwright agrees: "we need to look on a case-by-case basis" (2008a: 290).[25]

[25] This local character of economic truths recalls Keynes' advocacy of the role of economics concerning models: "Economics is a science of thinking in terms of models joined to the art of choosing the models which are relevant to the contemporary world (...) *Progress* in economics

Second, Reiss also suggests we try "to find a number of "off-the-shelf" principles that are informative about how to export claims established by a natural experiment to other contexts" (2008: 282). He offers as example Geoffrey Hodgson's proposal for general biological, psychological, anthropological and sociological principles abstracted from history (Hodgson 2001: 326-7).

Putting together Cartwright and Reiss's suggestions we reach at a sensible strategy for dealing with the social field: to pursue more empiricist work, to analyze the influences of underlying structures, to look for "off-the-shelf" possible principles, and to be conscious of the context dependence of conclusions.[26]

Given these constraints on social sciences, in the next Section I will propose a proceeding to deal with social phenomena which, though elaborated on the basis of Cartwright's thought, goes beyond it. This proposal is related to the specific role assigned by Cartwright to social sciences: they are "asked to solve the problems that policy throws up" (2007b: 42).

6. Socio-economic Machines

Suggestions for a positive proposal were advanced in the last Section. A synthesis of those conclusions is that, on a case by case basis, we need to focus on local conditions of economic events thus looking for the specific capacities acting in those situations. Extra principles would be helpful for this work. In addition, we can conclude that stable institutions might be of great assistance by bringing structural stability into social events.[27]

Cartwright speaks about complexity, reflexivity and lack of control as causes of additional difficulties in explaining causes in the social realm (2007b:

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consists almost entirely in a progressive improvement in the choice of models (Keynes 1973: 296). (...) Good economists are scarce because the gift for using 'vigilant observation' to choose good models (...) appears to be a very rare one (Keynes 1973: 297). The specialist in the manufacture of models will not be successful unless he is constantly correcting his judgment by intimate and messy acquaintance with the facts to which his model has to be applied" (Keynes 1973: 300).

[26] Concerning Aristotle we find in his work: 1) a justification of uncertainty in the natural and social fields and of the consequent hard character of natural and social science, 2) a case-by-case analysis of particular practical situations, 3) some general principles or capacities of human beings and 4) an emphasis on institutionalized behaviors that may give rise to stable causes. That is, we find in Aristotle arguments for the Reiss-Cartwright strategy. For Aristotle, complexity and reflexivity imply "variety and fluctuation", and rule out general analyses of social matters. These "problems" are related to human interpretations and freedom, which paradoxically are some of the most valuable human characteristics. These "limitations" entails the definition of well-delimited subjects if we want to explain. The perspective on prediction is even more limited because conditions are always prone to change. However, all these difficulties do not rule out capacities, though their contents surely change depending on the underlying institutional structures.

[27] This is also held by Aristotle. For him the stability of causes of social phenomena presupposes their embodiment in institutions (in the broad sense of the term that includes habits, routines and institutions in a narrow sense). Generalizations in practical science are based on actual dispositions or habits. The more stable the habits and tendencies the more predictable the outcomes. Aristotle develops a theory about the stability of habits (*Nicomachean Ethics*, VII, 9, 1151b 25-7 and VII, 10, 1152 a, 26-7). When habits are sufficiently stable as to constitute social institutions, practical science is firmly based. Therefore, institutions are very important for they consolidate tendencies and habits and facilitate a more accurate practical science. Thus, we can predict better when social institutions are solidly consolidated.

42). She also speaks about the derived nature of social capacities. They depend on social, institutional, legal and psychological arrangements that give rise to them, i.e., underlying structures that can be altered. Thus the social field entails a special kind of NM, a socio-economic machine (Cartwright 2001 and 2002). These socio-economic machines, given the nature of the economy, should be highly local: they are associations "generated by particular social and economic structures and susceptible to change by change in these structures" (Cartwright 2002: 141). Referring to one example that she provides, she asserts:

> Each of the countries studied has a different socio-economic structure constituting a different socio-economic machine that will generate different causal relations true in that country and concomitantly different probability measures appropriate for the quantities appearing in these relations (Cartwright 2002: 143).

For Cartwright (2002: 143), we need arguments both at the phenomenological and theoretical level to achieve knowledge of those local particularities. Models are blueprints of those socio-economic structures (Cartwright 2002: 150). On the one hand, these blueprints must maintain a close relation to the specific situation they aim to explain. In this regard we have Aristotle, Keynes and Cartwright together in agreement. On the other hand, the greater the scope of the related institutions, the greater will be the universality or scope of the socio-economic machine.

This story, however, does not end here. I propose we deepen Cartwright's concept of a NM. What kind of reality is it? It is a real configuration of stable causes, "a system of components with stable capacities" (1999: 49). However, there is a nuance in Cartwright's concept of NM when it refers to the social field. In these cases, rather than an established arrangement that is "there outside" and that is only explained, a machine is a system built by us as a way of producing a result. Consider the following passages:

> In building the machine we compose causes to produce the targeted effect (1999: 65). ...you give me a component with a special feature and a desired outcome, and I will design you a machine where the first is followed by the second with total reliability (1999: 72). ... [W]e always need a machine (...) to get laws – (...). Sometimes God supplies the arrangements –as in the planetary systems– but very often we must supply them ourselves, in courtrooms and churches, institutions and factories (1999: 122).

> Just as the science of mechanics provides the builder of machines with information about machines that have never been constructed, so too the social sciences can supply the social engineer with information about economic orders that have never been realised. The idea is that we must learn about the basic capacities of the components; then we can arrange them to elicit the regularities we want to see. The causal laws we live under are a consequence – conscious or not– of the socio-economic machine that we have constructed (1999: 124).

That is, while in subjects such as physics we have one kind of machine, another kind of machine that could be labeled as "practical" is more suitable for technical and practical fields. This is an arrangement meant to achieve a particular result. Thus, the machine suitable for the physical field may be called natural machine in the sense that it stems from a natural arrangement and naturally produces its effect, without intervention of outsiders, and is a "theoretical" machine in the sense that we know it without intervening or trying to change it. "Practical" machines are especially relevant for Cartwright. She stresses the importance of the *construction* of regularities (see, e.g., 1989: 182). As she states in the Introduction to *the Dappled World*, "I am interested in intervening". So the question is: "how can the world be changed by science to make it the way it should be?" (1999: 5). In the Introduction to *Hunting Causes and Using Them* (2007b: 1) she adds that the three questions, what are our causal claims, how do they know them, and what use can we make of them, play a central role.

In this second kind of machines, i.e., practical, with its correspondent design, there are roles for theoretical, practical and technical reason. By using theoretical reason we "learn about the basic capacities of the components" (1999: 124) of the practical machine, and about the relationships among them:

> We must develop on the one hand *concepts* [...] and on the other, *rules for combination*; and what we assume about each constraints the other, for in the end the two must work together in a regular way. When the concepts are instantiated in the arrangements covered by the rules, the rules must tell us what happens, where *regularity* is built into the demand for a rule: *whenever* the arrangement is thus-and-so, what happens is what the rule says should happen.
> Developing concepts for which we can also get rules that will work properly in tandem with them is extremely difficult, though we have succeeded in a number of subject areas (1999: 56).

These concepts and rules are known by theoretical reason. We also make use of technical and practical reason to design rules. Both uses of reason are implied in the quoted statement: "how can the world be changed by science to make it the way it should be?" (1999: 5). We have to define how the world should be – practical reason's role– and how this can be achieved –the task of technical reason in combination with practical reason in the way we organize productive actions.[28]

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[28] In the *Metaphysics* Aristotle distinguishes between two kinds of human actions. First, *immanent* actions, that is, actions whose aim is the action itself such as seeing, thinking or living. The results of immanent actions remain in the agent. Second, he notes *transitive* actions where the "result is something apart from the exercise, (and thus) the actuality is in the thing that is being made" (*Metaphysics* 1050a 30-1). Transitive actions are actions the results of which transcend the agent and are something different from the agent as, for example, a good produced. Aristotle calls immanent action *prâxis* and transitive action *poíesis* (*Nicomachean Ethics* VI, 4, 1140a 1). Practical and technical reasons regulate the practical and *poietical* aspects of actions. All actions are both immanent and transitive except in the case of a fully immanent action (to think, to love). Let me provide an example: when somebody works there are two results, i.e., an 'objective' result, such as the product or service (transitive), and the 'subjective' result such as the increase in ability or the self-fulfilment of the agent as well as the morality of the act (immanent). Technical perfection may not be enough. We may be demanded to fulfil

How do we design these practical machines? Their design starts with their blueprints. For Cartwright, theory is not enough:

> The theory gives purely abstract relations between abstract concepts. For the most part, it tells us the capacities or natures of systems that fall under these concepts. (...) No specific behavior is fixed until those systems are located in very specific kinds of situations. When we want to represent what happens in these situations we will need to go beyond theory and build a model, a *representative* model. And (...) if what happens in the situation modeled is regular and repeatable, these representative models will look very much like blueprints for nomological machines (1999: 180).

This kind of model, Cartwright holds, "provide precisely the kind of information I identify in my characterization of a NM" (1999: 53):

> All these models provide us with a set of components and their arrangements. The theory tells us how the capacities are exercised together" (1999: 53). "In a nomological machine we need a number of components with fixed capacities arranged appropriately to give rise to regular behaviour. The interpretative models of the theory give the components and their arrangement (1999: 187).

In the formulation of models, theoretical reason also has a key role. We must take into account all the relevant factors and their relationships. As Cartwright argues:

> The situation must resemble the model in that the factors that appear in the model must represent features in the real situation (...) But it must also be true that nothing too relevant occurs in the situation that cannot be put into the model (1999: 187).

Models can have explicative (theoretical) or productive (practical) roles, depending on their subject. Practical and technical reasons intervene in the design of the latter category of models. For Cartwright, in economics, we often use these latter models:

> Models in economics do not usually begin from a set of fundamental regularities from which some further regularity to be explained can be deduced as a special case. Rather they are more appropriately represented as a design for a socio-economic machine which, if implemented, should give rise to the behavior to be explained (2001: 278).

One task of economics is the explanation of economic events. Another is the prescription of individual or economic behaviors in order to reach a goal, a normative task. This normativity may be practical (related to ends) or technical

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other goals different from the very product during its production. There is a continuum of practical and technical reasoning in the performance of a transitive or productive action.

(related to means). Hence, we might postulate different types of socio-economic machines and models: theoretical and practical machines and models. Practical models have two tasks: determining and prescribing ends and means. Theoretical reason provides the concepts and knowledge of causal links for both kinds of machines. Practical and technical reason enters into the second kind of machine and model.

Human and social ends are not simply data but a task to be performed. Thus, they are normative. We can assume that man is rational, but he is also often irrational. As an empirical postulate, rationality often fails. This is why socio-economic theoretical models will frequently fail. Instead, we can always use rationality as a normative postulate.

Practically-designed machines are also local but they share some common principles. In the next Chapter I will propose these common general principles (Section 3.1.2). They are of two types: 1. a few general anthropological constants of human beings that are capacities, and 2. some capabilities that can be assumed as ends in practically-designed socio-economic machines. I will also argue that these capabilities are in themselves capacities and, in addition, they are capacities of the human realm (Section 4). Then, we will look for the specific derived principles for each situation.

In sum, socio-economic machines assume general principles but need to be local, adapted to the conditions and institutional arrangements of each situation. As mentioned, the broader the institutions, the more universal in their applicability, because, in fact, institutions are practically-designed devices that insert predictability into the realm of hazard and freedom. We need theoretical reason to know their specific natures and conditions that affect their working. A specific economic policy, for example, is a design of a socio-economic machine. It defines goals and means to attain them. Both the goals and the means may coincide or not with social and individual goals. Then, disturbing causes may interfere. The alignment of policy and people goals is the difficult task of practical reason; once achieved, the road of technical reason is more straightforward. This alignment of goals and design of the way to attain them is the work of a practical model.

Practically-designed socio-economic machines are the work of practical reason concerning ends and of technical reason concerning means, also using theoretical concepts. The contingency of the practical field is overcome by designing it. Institutions may manage and provide legitimacy to this work of theoretical, practical and technical reason. Institutions actually are socio-economic machines.

7. Conclusion

Looking for causes as the way of making explanations in science has not been the usual position in the philosophy of science of modern times. However, some philosophers have not abandoned this classical goal. Cartwright is one of them. She has clearly held that explanation is the aim of science and that science should explain real causes using theoretical reason.

She originally regarded Mill's concept of tendencies as a similar attempt. Nevertheless, Mill is not a good ally for Cartwright's project. He has interesting insights but they are blended with seemingly inconsistent positions. His theory of causality seems to be inconsistent and he adheres to determinism.

We find in Aristotle and in Anscombe's interpretations of causality more adequate companions to sustain an alternative doctrine of explanation by real causes in sciences –about their singularity and about indeterminism. This proposal entails the acceptance of metaphysics, i.e., that causes are ontologically real, not mere products of the senses or the mind. From this perspective causality is a process of the actualization of the power of an entity that may or may not occur due to internal or external factors. Matter, as conceived by Aristotle, is open to different actualizations. "What desires the form is matter, as the female desires the male" (*Physics* I 9 192a 22-3); but the adequate form is not always present. And that may be because either there is not an agent, or the agent is not capable, or it does not have the proportionate end to produce the effect. Additionally, capacities are often interfered with by disturbing causes; they are eliminated when they mix with one other; and even affected by freedom in the human field. We may know sometimes, but the richness of reality is such that it is often impossible to know. We are not gods. Our limited knowledge, however, is enough to manage our lives in an appropriate way.

Nancy Cartwright assumes a relatively greater difficulty in achieving causal explanations in the social realm than in the natural one. Given the similarity of her conceptual framework for causal explanation to that of Aristotle and Anscombe, I have suggested that they could offer good philosophical arguments to justify this difference. The greater complexity, the reflexivity and the lack of control have to do with singular human situations and with human freedom.

The specific limitations of the social realm have led economists to design specific formalized models. But Cartwright offers a warning. The social scientist must be careful about saying what real capacities are presupposed in his/her models as blueprints of NM (Cartwright 1999: 53 ff.). This care entails a careful observation and verification. Let us hear again from Aristotle: "credit must be given rather to observation than to theories, and to theories only if what they affirm agrees with the observed facts" (*Generation of Animals* III 10, 760b 31).

Indeed theories are often too general and do not achieve real explanations: we thus need models. Although those models need "hyper-fine tuning" (Cartwright 2002: 146), they leave the doors opened to hope: "social science is hard, but not impossible." This hope stems from the stability or regularity produced by institutions, habits or routines (Cartwright 1999: 138). It seems then that the correct way of doing social science should start by studying the underlying structure of social capacities and events (Cartwright 2007a: 79, 2009: 57).

Finally in this Chapter, based on Cartwright, I proposed we distinguish different types of socio-economic machines and models: theoretical and practical machines and models. Practically-designed machines are governed by practical and technical reason and can be embodied in institutions. Models are the blueprints of those machines. This set of conceptual tools will be fundamental in Chapter IV for the formulation of a proposal of socio-economic practically-designed machines and practical models, a proposal that points to one of the hypotheses of this thesis: we can combine Cartwright's NM with Sen's capabilities and thus get a way of inserting theoretical and practical reason into social science --specifically economics. Given the ontologically based difficulties of the practical realm the way of dealing with it is by impressing on it a normative order that respects its natural order and human freedom. This is the role of practical reason.

In conclusion, Cartwright reinserts theoretical reason in science, including social science. Explaining by causes requires the use of theoretical reason. This does not mean that this knowledge is universal; it recognizes the changing nature of some subject-matters, and concentrates on local knowledge in these cases. Theoretical knowledge is a key element because it provides the concepts that practical and technical reasons need to operate. The next Chapter will focus on the reinsertion of practical reason in economics and the fourth Chapter will apply the three types of rationality to a case study: The Human Development Index.

Chapter III: Sen's capability approach: The role of practical reason in social science

1. Introducing the capability approach
2. Some problems in Sen's capability approach
2.1. Identification of valuable capabilities: the debate over lists of capabilities
2.2. Heterogeneity and incommensurability
3. Aristotle's ideas helping Sen
3.1. Aristotle on lists
3.1.1. The supposedly Aristotelian list
3.1.2. The true Aristotelian list
3.1.3. Back to Sen
3.2. "Practical comparability" as a way of overcoming incommensurability
3.2.1. The Aristotelian Conception
3.2.1.1. Commensuration
3.2.1.2. Comparison by intensity or degree of quality
3.2.1.3. Comparison by priority
3.2.2. Back to Sen
3.3. Some conclusions regarding the Aristotelian contribution to the CA
4. Capabilities and capacities
5. Conclusion

In the last Chapter I presented Cartwright's account of scientific explanation, an approach that highlights the role of theoretical reason in science, including social science. By theoretical reason we know the causes of events. For Cartwright, instead of trying to establish empirical laws, science must go deeper in search of causes. When causes are stable, they are capacities. Capacities are the internal forces of things. Once we detect stable configurations of capacities (nomological machines) we may establish scientific laws.

However, while physical causes are mostly stable, there are only a few human and social causes which remain constant; consequently, there are only few human or social capacities, and it is more difficult to detect them. Beyond the complex character of human situations –which may also be a characteristic of the physical world– human beings are additionally –and fortunately– free. This characteristic creates unpredictability, fluctuation and context-dependency in human causes. This is why human and social causes are not universal, but only general, i.e., they apply in most but not in all cases, and are highly dependent on the case or context. It is in this sense that the human and social sciences are inexact. The way of dealing with this kind of subject-matter is by practical reason. Practical reason tries to reasonably discover or define individual or social capacities. The causes of human actions are their ends which are the subject of practical reason. Freedom, however, will be always present and may change these ends: this may be a "problem" for science but is a marvelous blessing for human life.

In this Chapter, I will present Amartya Sen's Capability Approach (CA) highlighting how it creates a role for practical reason in social sciences, and specifically into economics. In this way, I will begin to complete one objective of this thesis, i.e., to show the usefulness of introducing practical reason into economics. Sen focuses his attention on the capabilities of persons, which are

their ends or purposes. He maintains that dealing with them requires the use of practical reason. In Chapter I, I defined practical reason as human reason exercised in the task of directing people towards decision, choice and action. Practical reason tries to answer questions such as "what should I intend?", "how should I behave?" Hence, practical reasoning is discursive thinking about what we should do: it looks for ends and reasons and appraises the impact of the means on them. As also explained in Chapter I, sciences studying and applying practical reason are called practical sciences.

The use of practical reason to deal with the practical realm is thus a strength of the CA. At the same time, however, it is considered a weakness by some critics. As I noted, the particularities of the practical subject matter – unpredictability, fluctuation and context dependency– make practical science inexact. Given this, practical science cannot provide general recipes: this is the shortcoming noted by critics when accusing the CA of inoperativeness. They understand that a science is operative when it has principles that can be applied to many different cases. The more universal and operative (in the critics' sense) a science is, the less practical it is (in the sense of being adapted to particular cases). Conversely, the more practical a science is, the less universal and operative it is. However, practical reason helps for making practical decisions: in this sense it is highly operative. Confronted with this tension, Sen favors the practical side. He forcefully defends the heterogeneity of human beings, situations, and objectives. Consequently, he is also ambiguous concerning the definition and hierarchical ordering of capabilities. This obviously undermines universal recommendations.

In this Chapter, Section 1 will present the CA, specially focusing on one of its contributions: to explain development and the removal of poverty in a more qualitative manner than is usually the case in economics. Section 2 will deal with two problems in Sen's CA: first, the definition of specific capabilities given their plurality, second, how to choose among capabilities given their incommensurability, and thus the issue of whether there is a hierarchy of capabilities. These two problems are at the root of the claim that the CA is inoperative. Section 3 will concentrate on how Aristotle's ideas help address the CA's problems: the identification of capabilities, their weight and hierarchy, and the issue of its operative character. In Section 4 I will explain a bridge between Cartwright's capacities and Sen's capabilities: I will maintain that Sen's capabilities are the capacities (in Cartwright's sense) of the human world. The conclusion (Section 5) will advance part of my overall position: the CA can be made operative by a normative model that includes the relevant arguments and information needed to construct socio-economic normative machines, i.e. machines which are the embodiment of the effective work of practical reason.

1. Introducing the capability approach

The CA is a broad framework for the evaluation or assessment of individual well-being, as well as the development of entire countries, socio-economic circumstances and social arrangements for the purpose of implementing social and economic policies. The CA has a highly interdisciplinary character. Such character facilitates the multidimensional nature of the objectives to be achieved, i.e., outcomes –functionings– and freedoms –capabilities. Sen's CA has promoted wide-ranging research and the development of different versions of the CA. These different versions raise difficult questions as to what the

specific constitutive ends of a good life are or what the concrete content of the CA is. Here the philosophical roots of the CA manifest itself.

A presentation of Sen's CA must include an explanation of the meaning of some key concepts: "well-being", "agency", "functioning" and "capability".[29] It also requires discussing three related topics stressed by the approach: first, the multidimensionality of ends and the differences among persons, and thus, the need for a multidimensional evaluation of situations (such as poverty, inequality, and development); second, the problem of incompleteness regarding the ordering of ends ; and, third, the consequent need for practical reason to deliberate about ends, either through personal reflection on the individual level or through public discussion at the social level.

Sen proposes a fourfold classification of the possible ways of assessing human advantage stemming from the intersection of two different classifications. According to him, on the one hand, we can draw a distinction between the assessment of the person's well-being and the person's agency. On the other hand, we can distinguish between the assessment of the achievement and of the freedom to achieve. Hence, we have four possibilities (see Table 1): 1. to assess the achievement of well-being, 2. to assess the achievement of agency, 3. to assess the freedom to achieve well-being, and 4. to assess the freedom of agency. These different kinds of evaluation apply to different situations (Sen 1993: 35-6, 2009: 287).

Table 1. Sen's four possibilities for assessing human advantage

	Well-being	Agency
Achievement	1. Well-being achievement	2. Agency achievement
Freedom to achieve	3. Well-being freedom	4. Agency freedom

Let us elaborate a bit about these possibilities. For Sen, on the one hand, well-being is a state of a person that goes beyond material welfare or the "standard of living" (Sen 1993: 37). This obviously means that, for him, the concept of well-being goes beyond material wealth or opulence (1999a: 19). On the other hand, for Sen, agency includes other-regarding concerns that do not operate through our personal well-being, i.e., it also embraces purely un-self-interested purposes. Then, although agency is related to the quality of life, it also includes others' goals and a commitment to actions that do not benefit the very agent himself.

Once having defined these two possible evaluative objectives, namely evaluation of well-being and evaluation of agency, we can distinguish between the evaluation of their achievement or the opportunity that people may have of achieving them (because we can have opportunities but not exercise them). Summing up, we can evaluate human advantage in terms of the achievement of well-being, in terms of the achievement of agency, in terms of the well-being freedom and in terms of agency freedom. Although, as asserted, these different kinds of evaluation are generally suitable for different aims, the spirit of Sen's exposition is that the evaluations that involve freedom and agency are the most complete. Sen (2009: 289) asserts that "while the former [well-being freedom]

[29] For a good survey of Sen's position, see e.g., Sen 1993, Robeyns 2005a, and Walsh 2000 and 2003.

may be of more general interest to public policy (...), it is the latter [agency freedom] that can, arguably, be seen as being of primary interest to the person's own sense of values." Hence, agency freedom has special relevance for Sen. The concept of "agency freedom" "refers to what the person is free to do and to achieve in pursuit of whatever goals or values he or she regards as important" (1985: 203). This concept goes beyond a concept of "well-being-freedom", i.e., the freedom to achieve that what the person believes is conducive to her well-being; agency, as mentioned, is open to the values of the others.

Sen also calls achievements "functionings" and freedoms "capabilities". "A functioning is an achievement of a person: what he or she manages to do or to be" (Sen 1999a: 7). Functioning is an overarching concept that includes what a person is, does and has. Functioning is a fact, not a possibility. It includes freedom as part of the state of the person (e.g., 1999a: 44-45). Sen also distinguishes elementary and complex functionings. Functionings such as being adequately nourished, being in good health, escaping morbidity and mortality, having mobility, are elementary. Functionings such as achieving self-respect, being socially integrated, being happy, taking part in the life of a community are complex (Sen 1993: 31 and 36-7). Sen realizes that these goals are highly heterogeneous.

The plurality of functionings depends not only on their different possible kinds but also on the differences between persons. For Sen, each person is unique and has her personal set of functionings. Causal relations (derived from functionings) are *person-specific* (1985: 196). This is one of his most important points of departure from other approaches, namely the basic heterogeneity of human beings: "Human beings are thoroughly diverse" (1992: 1). This centrality of the human person speaks to us of a highly humanistic approach.

Functionings are related to capabilities. While the combination of functionings reflects the person's actual achievements, the capability set represents the person's "real opportunities" (1992: 31, see also 2009: 231ff.), the possibilities or freedom to achieve (1999b: 75). Sen used this concept for the first time in 1979. He introduced it in the Tanner Lecture "Equality of What?" in order to present an alternative approach to the evaluation of equality distinct from the Utilitarian and the Rawlsian views. In that lecture he spoke of "basic capability equality", regarding "a person being able to do certain things" (1980: 217) –as he recalls in 1993 (1993: 30, footnote 1), as a particular approach to well-being (1993: 30). He then considered basic capabilities as a refinement of Rawls' concentration on primary goods to evaluate equality (an element of "goods fetishism"). His aim was to produce the most complete possible form of evaluation. We have to pay attention to "what a person *can* do rather than what he *does* do" (1980-1: 209). He then added the concept of functionings and re-defined the capabilities of a person in relation to them, as the "set of functioning vectors within his or her reach" (1985: 201). He realized that both concepts were intimately related, "because the extent of the capability set is relevant to the significance and value of the respective functionings" (1985: 202). Sen also noted that "many capabilities may be trivial and valueless, while others are substantial and important" (1987b: 108). In 1989 (54) he explained that valuable capabilities are quite diverse and that they vary from elementary freedoms such as being free from hunger and undernourished to complex abilities such as achieving self-respect and social participation. In his 1993 (41, nt. 32) paper, however, he says, in retrospect, that while he had used the expression "basic capabilities" in his Tanner Lecture (1980), he has not qualified

capabilities as basic or complex in further papers. He provided of a more formal treatment to these concepts in *Commodities and Capabilities* of 1985 (1999a: 6-11).

We then have a plurality of different dimensions for evaluating functionings and capabilities, and the heterogeneity between persons. We are different, and we are free. Given these characteristics of human beings we need to choose and thus to reflect upon our choices. Thus, for Sen the agent is a free and reflective being. He asserts:

> I am using the term agent (...) in its older –and "grander"– sense as someone who acts and brings about change, and whose achievements can be judged in terms of her own values and objectives (1999a: 19).
>
> The people have to be seen (...) as being actively involved –given the opportunity– in shaping their own destiny, and not just as passive recipients of the fruits of cunning development programs (1999b: 53).

For Sen, then, well-being is only one of the motives that guide persons' choices. Agency means a responsible autonomy, an other-regarding way of deciding and acting. It may even lead to acts that decrease our well-being to the benefit of other persons (1999a: 9). Additionally, as John Davis (2002: 483-4) has emphasized, Sen recognizes the role of community and groups influencing personal behavior and even individual identity. However, this emphasis on agency does not imply a neglect of the consideration of well-being. This is still very important, e.g., in matters of public policy.[30] Yet concerning issues of personal behavior, the agency aspect is central (1985: 208). A first central characteristic of this agent is its freedom:

> The capability of a person refers to the various alternative combinations of functionings, any one of which (any combination, that is) the person can choose to have. In this sense, the capability of a person corresponds to the *freedom* that a person has to lead one kind of life or another" (Nussbaum and Sen 1993: 3, italics in the original).
>
> The *capability* of a person reflects the alternative combination of functionings the person can achieve, and from which he or she can *choose* one collection (Sen 1993: 31, my emphasis).

Hence it is clear that freedom is a key notion in Sen's CA. Following Isaiah Berlin (cf. e.g. Sen 1992: 41), Sen distinguishes between negative freedom (to not be interfered with) and positive freedom (to be able to pursue a goal), and claims the necessity of both. Sen conceives development as a process of expanding real freedoms (1999b: 3, 37, 53 and 297). Human capability is an expression of freedom (Sen 1999b: 292). As David Crocker puts it, "capabilities add something intrinsically and not merely instrumentally valuable to human

[30] "It is sometimes desirable", asserts Severine Deneulin, "that functionings and not capabilities constitute the goal of public policy. In some areas, it is sometimes more important to have people function in a certain way than it is to give them the opportunity to function in a certain way. It is sometimes more important to focus on the human good (functionings), rather than on the freedom and opportunities to realize that human good (capabilities)" (Deneulin 2002: 506).

life, namely, positive freedom" (Crocker 1995: 159; see also 183). Positive freedom is what people are actually able to do or to be, "to choose to live as they desire" (Berlin quoted by Sen 1992: 67). This notion of freedom goes beyond the classical liberal conception of freedom. In chapter 12 of *Development as Freedom,* entitled "Individual freedom as commitment" Sen links freedom with a conscious commitment to, among other objectives, disinterested actions. He also speaks about substantive or constitutive freedom (1999b: 33 and 36), and relates freedom to responsibility. This notion of freedom corresponds to Sen's rich notion of agency. As Sen remarks, positive freedom entails taking into account the person's concept of the good (1985: 203). It is freedom to achieve whatever the person decides (1985: 204). This pivotal role of the agent is clear also in Sen's *Inequality Reexamined* where he speaks of "a person's capability to achieve functionings that he or she *has reason to value*" (1992: 4-5, my emphasis). Thus, his conception of freedom assumes an agent with a concept of the good who has the intellectual capacity to value and to choose it. He adds:

> This open conditionality [of the responsible agent] does not imply that the person's view of his agency has no need for discipline, and that anything that appeals to him must, for that reason, come into the accounting of his agency freedom. The need for careful assessment of aims, objectives, allegiances, etc., and of the conception of the good, may be important and exacting (1985: 204).

That is, freedom is not a completely open or capricious notion: its claims have to be carefully appraised. Then, Sen asserts that because we have freedom, we also must have reasons to value the things we choose. This is one motive why practical reason is needed as a key element in Sen's conception. Freedom moves within the frame of a rationale known or defined by practical reason: "freedom must depend on reasoned assessment" (Sen 2002: 5). This reflects the person's freedom to choose from different possible lives and the real opportunities that the person has (1992: 40 and 83). The idea is more refined in *Development as Freedom* where he refers to "the freedom to achieve actual livings that one can have reason to value" (1999b: 73). Moreover in *Rationality and Freedom* (2002), as its title expresses, these two concepts are closely linked. The organization of the volume points to this objective: they "all relate in different ways to the two principal themes highlighted in the introductory essay, namely the demands of rationality and the role and relevance of freedom" (2002: 46). Reason intervenes in the form of reflecting on and deliberating about what to do, "to understand and assess goals and values" (2002: 46): this is practical reason. In sum, another central characteristic of Sen's notion of the agent is its emphasis on reason and the person's capacity for reflection.

As noted, an interesting aspect of capabilities is their ambiguity in both their definition and their election, given the particularities of persons and their situations. Sen positively appraises this feature because it reflects and respects freedom and the differences between persons (1993: 33-34). For Sen, asserting that there is an ambiguity and fuzziness regarding capabilities is not a weakness but a strength. This further implies that it a mistake to look for complete orderings of capabilities (1992: 49). Sen calls this "the fundamental reason for incompleteness" (1992: 49). Indeed, this reflects arguments Sen has previously made that we can only arrive at and use partial orderings of preferences. As John Davis (2010) has recently put it, Sen,

> has devoted years of demanding and exacting work to a critique of the theoretical adequacy of systems of complete choice orderings, often essentially using a kind of *reductio ad absurdum* impossibility logic against them, but more importantly arguing, contrary to a largely unexamined transcendentalist conviction, that incomplete and partial choice orderings can indeed be rational (and may in fact be the very heart of rationality).

This incompleteness applies both at the individual and social levels. Sen allows that maximization is an important dimension of human action: "a person can accommodate different types of objectives and values within the maximizing framework" (2002: 37). However, Sen's concept of maximization differs from the one used in standard economics. For him, maximization neither requires nor implies completeness of preferences (cf. Sen 1997: 746 and 763, 2000: 483, 486-7, 2002: 158ff., 563-565, 2004c: 49). According to Sen, maximization is more like Simon's concept of satisficing (Sen 1997: 768). Thus incompleteness and the need for partial choice orderings reinforce the need for using a type of reasoning such as practical reason involves. Applied to our specific subject, Sen (2002: 622) comments:

> The recognition that the ranking of opportunity and of freedom would tend to be incomplete may cause disappointment to those who want to rank nothing unless it is possible to rank every opportunity set against every other. I have argued here that this expectation does less than justice to the diversity and reach of freedom in general and opportunity in particular. Admitting incompleteness does not make the use of a reasoned partial ordering "imperfect" in any sense. Indeed, the incompleteness may sometimes have to be asserted, rather than conceded.

The kind of decisions that the agent has to make thus entails a broader use of reason than merely instrumental reason. Sen asserts that "rationality cannot be just an instrumental requirement for the pursuit of some given –unscrutinized– set of objectives and values" (1999a: 39). It should also scrutinize these objectives and values. It includes the use of reason to understand and assess goals and values (1999a: 46), that is, practical reason.

We have thus arrived at the intended central message of this Chapter: Sen reintroduces the use of practical reason into economics in the CA. Practical reason determines what capabilities we choose at the personal and social levels. Three important characteristics of the CA thus appear interlinked: incompleteness, multidimensionality and practical reason. The next section about the "problems" in the CA will confirm this message because these problems are problems from the point of view of another form of rationality, not from the point of view of practical reason. From this latter point of view they are characteristics, not problems.

2. Some problems in Sen's CA

Clark (2005: 5-6) suggests that the strengths of the CA may also be considered its weaknesses: Sen's views about the differences among human persons lead to

problems in the identification and evaluation of capabilities –as Sen himself recognizes. He also notes the extreme exigency of the informational requirements of the CA. These weaknesses in the CA culminate in the criticism expressed by Robert Sugden: "it is natural to ask how far Sen's framework is operational" (1993: 1953).

Sen (1993: 32-3) distinguishes between two different evaluation exercises, first choosing the objects of value –functionings and capabilities– composing the "evaluative space," and, second, determining the relative values of those objects. The first evaluation exercise is where the identification problem arises. Here I will consider it from the perspective of Sen's debate with Martha Nussbaum about lists of essential capabilities. Concerning the second evaluation exercise, the problem is the incommensurability of capabilities that leads to an absence of hierarchies or orderings of capabilities within the evaluative space. For Sen, these problems are overcome by practical reason. I will analyze them in turn: first the difficulties involved in the identification of capabilities –the discussion about lists– and then the difficulties involved in determining their relative weights –the incommensurability of capabilities and the absence of hierarchies among them.[31] These analyses and the Aristotelian insights of Section 3 will help us to more accurately identify Sen's position.

2.1. Identification of valuable capabilities: the debate over lists of capabilities

In the debate between Nussbaum and Sen about the capabilities to be sought, Nussbaum argues in favor of a particular list of capabilities that all individuals ought to have, while Sen prefers to leave the matter open (see e.g., Sen 1993, Sen 2004a, Nussbaum 2003). The problem is then this: should we have a list of specific capabilities to guide public policy or should we only shape a formal framework to be filled in later on any given occasion? Sen's answer favors the latter alternative. This is consistent with the context-dependent character of practical matters highlighted in the introduction of this Chapter. He thus reacts against Nussbaum's proposal for defining a list of capabilities as follows:

> I accept that this would indeed be a systematic way of eliminating the incompleteness of the capability approach. I certainly have no great objection to anyone going on that route. My difficulty with accepting that as the *only* route on which to travel arises partly from the concern that this view of human nature (with a unique list of functionings for a good human life) may be tremendously overspecified (...) [T]he use of the capability approach as such does not require taking that route, and the deliberate incompleteness of the capability approach permits other routes to be taken (1993: 47).

Hence, Sen does not define a list of needed capabilities because this would involve an over-specified view of human nature. His view is compatible with different views of the human person and her good. This is consistent with his emphasis on human heterogeneity.

[31] There is also the problem of informational requirements. I will not consider it because it is a technical problem that can be overcome technically.

Given that this discussion began with Nussbaum's claims, let us explain briefly what her position is. While for Sen, freedom is the central capability, for Nussbaum the central capabilities are practical reason and affiliation (sociability). For Nussbaum these two capabilities are "architectonical". They suffuse and organize "all the other functions –which will count as truly human functions only in so far as they are done with some degree of guidance from both of these" (Nussbaum 1993: 266). For her, these two elements are a core part of human nature (see especially Nussbaum 1995a). Freedom, practical reason and sociability are complementary: since we are free we need to use practical reason in a social context. However, for Sen the priority belongs to freedom, while for Nussbaum to practical reason.

For Nussbaum, the role or proper function of government is "to make available to each and every member of the community the basic necessary conditions of the capability to choose and live a fully good human life, with respect to each of the major human functions included in that fully good life" (Nussbaum 1993: 265). Hence, the task of the government cannot be fulfilled without an understanding of these functionings. According to Nussbaum, capabilities are internal and have to be developed or exercised as concrete functionings; they also depend on external conditions which she calls external capabilities. The role of government, then, is "deep [good lives of all the people, one by one] and broad [the totality of the functionings needed]" (Nussbaum 1987: 7, 29 and 1990: 209): this role is to provide the external opportunities to all the people, to avoid institutions that could block capabilities and to encourage people, through education and through the family, to look for internal capabilities (Nussbaum 1987: 20ff.; 1990: 214): "The legislator's total task will be to train internal capabilities in the young, to maintain those in the adult, and simultaneously to create and preserve the external circumstances in which those developed capabilities can become active" (Nussbaum 1987: 25). Nussbaum's government seems to be more paternalistic than Sen's.

One important characteristic of Nussbaum's list is that it has to be complete. She asserts with respect to ten capabilities she lists: "These ten capabilities (...) all are part of a minimum account of social justice: a society that does not guarantee these to all its citizens, at some appropriate threshold level, falls short of being a fully just society, whatever its level of opulence" (2003: 40; cf. also 1990: 225-6 and 1987: 7). They are necessary for each and every person, and all of central relevance. Nussbaum thus argues:

> Sen needs to be more radical than he has been so far in his criticism of the utilitarian accounts of well-being, by introducing an objective normative account of human functioning and by describing a procedure of objective evaluation by which functionings can be assessed for their contribution to the good human life (Nussbaum 1987: 40 and 1988: 176).

Nussbaum's emphasis on a comprehensive role for the state and for completeness accordingly goes against Sen's stress on incompleteness or partial ordering of capabilities. For him, as already remarked, this is an essential fact of human reality.

Notwithstanding Nussbaum and Sen's disagreement, two things should be noted. First, although Nussbaum criticizes Sen for having a 'thin' notion of the

good compared to her own "thick vague conception of the good,"[32] she proposes a rational debate about shared ethical experiences –e.g., of justice or injustice– with the aim of determining the central human capabilities (Nussbaum 1993: [3] and 1995a *passim*). She argues that this consensual character of the debate does not undermine objectivity (1993: 251). This is what she regards as the work of practical reason. Second, although Nussbaum proposes lists of central human capabilities[33], she always qualifies it by saying that she considers "the list as open-ended and subject to ongoing revision and rethinking" (2003: 42), or as "just a list of suggestions, closely related to Aristotle's list of common experiences" (1993: 265).

Thus, on the one hand, for Nussbaum the list is an open-ended set of suggestions. On the other hand, Sen's reluctance towards producing a unique list of functionings for a good human life has also to be "moderated" (Sen 1993: 47; 2004b: 77). Any particular list, such as the 'Aristotelian' sort of list presented by Nussbaum, Sen has argued, may be tremendously over-specified. Sen, however, does not dismiss the possibility of there being "a universal set of 'comprehensive' objectives shared by all" (1995: 269). According to his views on incompleteness and partial orderings, Sen only argues that it is unnecessary to define a complete ordering to arrive at a comparison of capabilities (1995: 269).

Thus Sen is not against lists. Moreover, he clearly thinks that we need lists. He asserts that "there can be substantial debates on the particular functionings that should be included in the list of important achievements and the corresponding capabilities. This valuational issue is inescapable" (1999b: 75). More recently he has stated:

> the problem is not with listing important capabilities, but with insisting on one predetermined canonical list of capabilities, chosen by theorists without any general social discussion or public reasoning. To have such a fixed list, emanating entirely from pure theory, is to deny the possibility of fruitful public participation on what should be included and why (2004a: 77).

On other occasions, however, Sen has defended particular functionings or capabilities as necessary or basic. In *Development and Freedom* (1999b), in "Elements of a Theory of Human Rights" (2004b), and recently in *The Idea of Justice* (2009), he asks where human rights come from. He says that they are primarily ethical demands that by nature may go beyond legislation (2004b: 319). He emphasizes their universality (2004b: 320; 2009: 373), that they have an inescapable non-parochial nature, and that they are meant to apply to all human beings (2004b: 349).

In 1995, David Crocker compared Nussbaum's list of capabilities with the capabilities that Sen has considered basic or necessary. For example, in *Development as Freedom* Sen includes nourishment (1999b: 19 and Chapter 7), health (19), surviving from mortality (21 and Sen 1998), tradition and culture (31), employment (94), political participation (16, 31 and Chapter 6), and literacy (19). Only a few capabilities of Nussbaum's are not included by Sen, for example, 'being able to have opportunities for sexual satisfaction', 'being able to

[32] Nussbaum 1990: 205, 217 –an outline sketch–, 234 and 237.
[33] Nussbaum 1990: 219-225; 1992: 216-220; 1993: 263-265; 1995b: 76-79; 2000b: 78-80; 2003: 41-42; 2006: 392-401.

live with concern for and in relation to animals, plants, and the world of nature,' and 'being able to laugh, to play, to enjoy recreational activities'.

In sum, it turns out that there is not an insurmountable distance between Nussbaum's list and the capabilities that Sen regards as necessary. The difference is in the source of these capabilities. While for Nussbaum this is, from her first writings on this issue, human nature, Sen is reluctant about Nussbaum's characterization of human nature: "this view of human nature (with a unique list of functionings for a good human life)" (1993: 47). He prefers to maintain an open list, as the fruit of the work of practical reason. The problem for Sen is not with a conception of the human being as rational, social, and seeking perfection. The point of disagreement is whether we ought to derive a specific, unique, and complete list of capabilities from those characteristics of the human being. Sen favors incomplete orderings because this is what actually happens in reality in many fields.[34] He asserts that "recognition of the possibility of assertive incompleteness does not reduce in any way the value of scrutiny and investigation aimed at reducing the extent of tentative incompleteness" (2004c: 57). He leaves ample space for practical reason. A "theory of practical reason" (i.e., a theoretical study of practical affairs, or practical science) is necessarily incomplete and inexact. In Section 3 I will provide Aristotelian arguments for Sen's position.

2.2. Heterogeneity and incommensurability

For Sen, the evaluative space is composed of ends that are values in themselves and that are sought as the achievements of the kind of life chosen. He does not attach directly –as opposed to derivatively– importance to the *means* of living or *means* of freedom (e.g., real income, wealth, opulence, primary goods, or resources). For him, these easily measured variables are not part of the evaluative space (Sen 1993: 33).

Otherwise, Sen and Nussbaum (Nussbaum and Sen 1987: 25; Sen and Williams 1982: 19) argue that capabilities are incommensurable, because ends of different character cannot be quantitatively appraised: "Capabilities are clearly non-commensurable since they are irreducibly diverse" (Sen 2009: 240). Incommensurable or non-commensurable means that there is not a unit of measure in common to quantitatively compare the things, e.g., capabilities, considered. This position is the opposite of the Utilitarian view in which "utility" is a common measure that comprehends all kind of ends. Instead, for Sen "we cannot reduce all the things we have reason to value into one homogeneous magnitude" (2009: 239). Once quantitative comparisons are discarded, the only possible remaining comparisons are qualitative ones: "reflected evaluation demands reasoning regarding relative importance, not just counting" (Sen 2009: 241).

The key to the problem is that capabilities are heterogeneous and so there is no common (quantitative) measure with which to evaluate them. In the Annexe written with Foster to the enlarged edition of *On Economic Inequality* Sen asserts that "functionings are robustly heterogeneous" (1997: 203). In the same vein, he has more recently in *Development as Freedom* argued for pluralism of capabilities and against homogeneous magnitudes: "heterogeneity of factors that influence individual advantage is a pervasive feature of actual

[34] See, e.g., Sen 1997: 746 and 763, 2000: 483, 486-7, 2002: 158ff., 2004c: 49.

evaluation" (1999b: 76-7). Martha Nussbaum also maintains incommensurability. She speaks about "heterogeneity and noncommensurability" (2003: 34; see also 1990: 219).

However, despite incommensurability, we still have to make decisions that involve choosing the proportions of each capability we seek, both at the personal and social levels. If that were impossible, the CA would be totally inoperative. Once we have defined the different weights that we are willing to assign to each capability, the problem of evaluation is only technical and informational, and could in principle be overcome by various means (statistics, surveys, and indexes).[35] But the real problem is the definition of these weights. "The focus has to be related to the underlying concerns and values, in terms of which some definable functionings may be important and others quite trivial and negligible" (Sen 1993: 32). Moreover, as soon as the role of freedom in Sen's CA is considered, the limits between elementary and complex capabilities become blurred.

Sen does not propose a general solution to this problem. He maintains that this overall exercise can be performed only in cases in which the list and the weights of the different capabilities on the list are determined through reasoned evaluation (practical reason). As noted, he also embraces this ambiguous situation. He says that there is no a "magic formula" (1999b: 79 and 1999a: 32) and that "there is no 'royal road' to geometry." He adds: "It is not clear that there is any royal road to evaluation of economic or social policies either" (Sen 1999b: 85). That is, there are no general recipes applicable for all cases, but only the possibility of evaluation through practical reason in each situation. He maintains in *Development as Freedom*:

> it is of course crucial to ask, in any evaluative exercise of this kind [partial orderings extended by specifying possible weights], how the weights are to be selected.[36] This judgmental exercise can be resolved only through reasoned evaluation. For a particular person, who is making his or her own judgments, the selection of weights will require reflection, rather than any interpersonal agreement (or consensus). However, in arriving at an "agreed" range for *social evaluation* (...), there has to be some kind of rational "consensus" on weights, or at least on a range of weights. This is a "social choice" exercise and it requires public discussion and a democratic understanding and acceptance (Sen 1999b: 78-9).

It is clear that he is speaking of the exercise of practical reason on different levels, both personal and social. As noted, this goes against general recipes, and has been criticized because it rules out automatically operative solutions. Sen answers these criticisms:

> The connection between public reasoning and the choice of weighting of capabilities in social assessment is important and to emphasize. It also points to the absurdity of the argument that is sometimes presented, which claims that the capability approach would be usable

[35] About the information and interpretation problems, see Sen 1999a: 26-32.

[36] Sen develops the issue of how to do with partial orderings in many writings. A complete order, he maintains, is not necessary. It is a special case within the general case of partial orderings. See, e.g., 1985: 198-9; 1997: Annex; 1999a: 22-32 and *passim*.

> –and 'operational'– only if it comes with a set of 'given' weights of the distinct functionings in some fixed list of relevant capabilities. The search for given, pre-determined weights is not only conceptually ungrounded, but it also overlooks the fact that the valuations and weights to be used may be reasonably influenced by our own continued scrutiny and by the reach of public discussion. It would be hard to accommodate this understanding with inflexible use of some pre-determined weights in a non-contingent form (Sen 2009: 242-243).

Thus, the CA is in fact highly operative in the specific sense of leaving all the work to practical reason. However, the social or economic policy maker needs more information than the individual decision maker. It is not enough to tell him that practical reason will define what to do. Economic and social policies need time to be developed, and in order to design them it is useful to know at least a minimum of relatively stable goals. Without at least a minimum of information or orientation decision making is in danger of remaining sterile. I will come back to this point, proposing the ways in which Aristotle's ideas help Sen's CA overcome these problems and to be simultaneously more operative while respecting human individuality.

3. Aristotle's ideas helping Sen

In the previous section I presented the CA's "weaknesses" or "problems" and Sen's answers to them. In this Section I will introduce some Aristotelian arguments that reinforce Sen's answers. Some of Sen's passages quoted above manifest an influence of Aristotle's thought.[37] My hypothesis is that a stronger reliance on Aristotle's ideas may contribute to further understanding of these mentioned open issues.

First, concerning the problem of the identification of valuable capabilities, I asserted that, 1) given the incompleteness of ends and human freedom, Sen is right to defend an open list of capabilities defined by practical reason for each and every situation, and 2) that Nussbaum's "official list" and Sen's "informal list" are actually quite similar. This leads me to say that although Sen, in principle, rejects closed lists, he would agree to a shorter list shared with Nussbaum and others. Thus I will first explain (Section 3.1) the way Aristotle would address the ambiguity of capabilities (as related to the discussion of lists), and propose some Aristotelian criteria for the identification of capabilities (in Section 3.1.2). As remarked, Sen fears an over-specification of capabilities that could operate against human freedom. It is indeed a sensible fear. I maintain,

[37] I have reviewed the connections between Aristotle and Sen in Crespo (2010). In short, Sen agrees with Aristotle 1) on his conception of the relation between economics, ethics and politics; 2) on his conception of the role of wealth and possessions in a good life, 3) on his conception of *eudaimonia* and 4) about the need to examine the process of choosing the activities that constitute or contribute to *eudaimonia*. Sen also perceives a connection between his concept of "functionings" and the Aristotelian concept of *ergon* and between his concept of capabilities and the Aristotelian concept of *dynamis*. Finally, Sen agrees with Aristotle regarding the non-commensurability or heterogeneity of goods. Concerning differences, Sen does not accept the supposedly Aristotelian conception of a unique objective list of functionings and capabilities defended by Nussbaum.

however, that he would accept an Aristotelian middle ground position. Moreover, this position would increase the operativeness of the CA.

Second, concerning the weights and hierarchy of capabilities, Sen also favors practical reason acting in each circumstance for two reasons: 1) given the incommensurability of capabilities we need practical reason to make decisions, and 2) we should avoid taking as given *a priori* weights or hierarchies because they might be different or contrary to actual individual or social decisions. Could we add Aristotelian arguments for this position? In Section 3.2 I will show how Aristotle's arguments for overcoming the problem of decisions facing incommensurability reinforces Sen's position.

The conclusion will be that re-emphasis of the role of practical reason helps to overcome the problems of identification, incommensurability and the lack of operativeness of the CA, albeit with the cost of renouncing the simplicity of instrumental rationality. I claim, however, that this is what actually happens in real life. We certainly need to apply instrumental rationality, but only after and under the umbrella of decisions reached by practical reason.

3.1. Aristotle on lists

In Section 2.1 I explained the differences between Sen and Nussbaum on the topic of lists of capabilities. I maintained that Sen and Nussbaum are very close regarding central capabilities, but not on principles regarding their determination. On the one hand, for Nussbaum (2003: 42) "the list is open-ended and subject to ongoing revisions and rethinking." On the other hand, Sen's reluctance towards producing a unique list of functionings for a good human life does not rule out the possibility of there being "a universal set of 'comprehensive' objectives shared by all" (Sen 1995: 269). The difference is in the source of these capabilities: the specific - supposedly Aristotelian - conception of human nature necessarily connected with this list of capabilities according to Nussbaum. Sen does not accept that a list of central human functionings and capabilities emanates from a specific conception of human nature (1993: 48; 2004a: 77). Thus I will argue first that this conception of a complete and unique list of capabilities is not Aristotelian. Second, I will propose what I think would be Aristotle's thinking about this topic. This thinking will lead to a middle ground position that would make the CA more operative. However before all this, I will say a bit more about Nussbaum's view of the role of government because, as I noted, this constitutes part of the background ideas against which Sen reacts.

3.1.1. The supposedly Aristotelian list

For Nussbaum, the role of government is to find the means that make the good life possible for all people. This seems to be a faithful interpretation of Aristotle's thinking about the nature of the *polis*. But there are some differences. The first stems from the application of modern political concepts to Aristotle's ideas. We should avoid "the inveterate use of making Aristotle reason with the categories of the interpreter", as Gianfrancesco Zanetti rightly expresses it (1993: 20). Specifically, when Aristotle speaks about education and the role of the *polis* in promoting the flourishing of its citizens, he is not thinking, as Nussbaum asserts, of an "Aristotelian Social Democracy" (Nussbaum 1990). Nor certainly, is he comparing, as Nussbaum does, this "Aristotelian Social

Democracy" with Scandinavian Social Democracies (Nussbaum 1990: 206 and 240-2). Aristotle had neither a "distributive conception" of justice in the modern sense of the expression (1987: 14), nor had he a view of "political planning" (1987: 33 and 1990: 203), nor can we speak properly about an "Aristotelian social program" (1990: 228). When Aristotle speaks about the *polis,* he is thinking of the whole community, as the environment of self-fulfillment, not of modern government. Nussbaum's "Aristotelian Social Democracy" is not, in fact, purely Aristotelian, but at best only inspired by Aristotle. It is this biased or filtered Aristotelian conception of politics that is connected with the list of capabilities proposed by Nussbaum. In fact, at that time she defined herself as a "liberal neo-Aristotelian" (2000a: 106). Her justification of human goods has never been based on metaphysical grounds, but on a political philosophy (2000a: 116). Beginning in 1994, she endorsed a Rawlsian type of political liberalism departing from Aristotle (see e.g. 2000a: 102 and 124). This shift deepened her distance from a metaphysical foundation. In this sense, she might be closer to Sen. However, proposing Scandinavian social democracies might be far from Sen. Thus, Sen's reaction at the Aristotelian phase of Nussbaum may not be so much against Aristotle as against Nussbaum's interpretation of Aristotle. He has recently asserted (2009: 232):

> The capability approach is a general approach, focusing on information on individual advantages, judged in terms of opportunity rather than a specific 'design' for how a society should be organized (...) it does not, on its own, propose any specific formula for policy decisions (...) in judging the aggregate progress of a society, the capability approach would certainly draw attention to the huge significance of the expansion of human capabilities of all members of society, but it does not lay down any blueprint (...)

A second difference between Nussbaum and Aristotle concerning the topic of lists is that for Nussbaum the list has to be complete; she believes all the capabilities on the list are of central relevance. My hypothesis is that Nussbaum's emphasis on completeness derives from her conception of happiness. There are two main interpretations of the meaning of *eudaimonia* (flourishing or happiness) for Aristotle.[38] One interpretation is the "inclusive view" of *eudaimonia* promoted by John Lloyd Ackrill (1980). It holds that *eudaimonia* is an inclusive end composed or constituted out of second order ends, such as capabilities.[39] The other interpretation is Richard Kraut's (1989)

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[38] Aristotle's concept of *eudaimonia* is distorted when translated as happiness, a term that today may have hedonistic or utilitarian resonances, which are completely absent in Aristotle. When Sen came to know Aristotle's ideas, he took care to use the Greek term *eudaimonia*, and not its usual translation as happiness. He is conscious that happiness for Aristotle is a very different thing than happiness for the Utilitarians. It is not a state of the mind, but an activity guided by reason. In *The Standard of Living* he states that "the breadth and richness of the Greek concept of *eudaimonia* may suggest similarly broad interpretations of happiness or pleasure" (both in the paper publication and in the pre-publication version online quoting Nussbaum; Sen 1986: 11 and 1987b: 8). I will use the term *eudaimonia* to avoid confusion.

[39] Elsewhere (Crespo 2007: 376) I explained the Aristotelian distinction between a) ends that can be considered only as means, only pursued for the sake of something else (first-order or instrumental ends), b) ends that are desirable in themselves and also pursued for the sake of the final end (second-order ends), and c) ends which are only desirable in themselves (third-order or final ends: usually known as *eudaimonia* or "happiness"). There I provided the following

who holds that *eudaimonia* is a dominant end different from the second order ends, which are sought not only for the sake of themselves but also for the sake of *eudaimonia* to which they are subordinated. Nussbaum is an "inclusivist". She holds that capabilities are constituent or constitutive of the good life (e.g. Nussbaum 1987: 6 and 7; 1995a: 110). She also uses the verb "constitute" when attributing her list (on this occasion) of functionings to Aristotle: "Aristotle believes that there is just one list of functionings that do in fact constitute human good living" (1987: 10).

From this perspective, all the central capabilities are necessary, because if one is absent, *eudaimonia* would be undermined. On the dominant end view, in contrast, it is not necessary to include all the constituents of *eudaimonia* because the contribution of each capability to *eudaimonia* could change from person to person. The dominant end conception, in fact, is akin to Sen's view of incompleteness. Thus, Sen's reaction concerning lists may be against Nussbaum's interpretation of Aristotle's understanding of *eudaimonia*.[40] This is also consistent with Sen's view that, the most relevant capability is positive freedom, the freedom of a responsible agent who manages decisions and actions through practical reason.

A third difference lies in Nussbaum's assertion that Aristotle thought the list of capabilities should be unique: "Aristotle believes that there is just one list of functionings that do in fact constitute human good living" (Nussbaum 1987: 10). However, to speak of even an 'Aristotelian' list is not correct. Aristotle never proposed definitive lists. Or as Nussbaum herself states (1990: 19), Aristotle's lists are always open lists. For example, his list of the virtues and even his list of the categories of being are only provisional lists. Again, then, Sen's reaction may be a reaction against this interpretation of Aristotle, not against Aristotle.

3.1.2. The true Aristotelian list

What would be Aristotle's position? He maintains there are some basic traits of humanity such as rationality and sociality (*Politics* I, 2), and a clear final end, i.e., the theoretical life (*Nicomachen Ethics* X, 7)), but left open the ways of achieving it. In a nutshell, Aristotle's first response to the topic of lists would be that there are some essential and constant features of the human being, but that the remaining characteristics would have to be ascertained or determined by practical reason and agreed upon by the mutual consent. Those "anthropological constants" entail the human capacity for theoretical and practical knowledge and reasoning, and are oriented towards the human function (or *ergon*): to live in agreement with reason a life of virtues in order to achieve a good life leading to *eudaimonia* (which ultimately consists in the theoretical life). However, these few indications still do not address the inoperativeness of the CA. Yet Aristotle can add more. In Crespo forthcoming I accordingly developed a set of Aristotelian criteria that may produce a further

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example: we study for an exam (i.e. a means to an instrumental end) in order to achieve graduation (a second-order end), in order to be happy (a final end) according to our plan of life (designed by practical reason). Capabilities are second-order ends.

[40] The idea of constitutive capabilities can also be found in Sen, who speaks of a "constitutive plurality" (1987: 2), or of "functions constitutive of a person's being" (1992: 39 and 40), or of the "assessment of constituent elements" (1993: 37), though he probably did not realize the implications of this form of expression.

though not over-specified determination of central human capabilities. In the following paragraphs I offer a summary of these criteria.

Aristotle himself was not comfortable with what he regarded as vague or general ideas. In *Politics* II, 6, for example, he complains about the vague character of Plato's criterion for determining the ideal amount of property in cities: an amount "sufficient for a good life: this is too general", he states. Thus Aristotle wonders "whether it is not better to determine it in a different –that is to say, a more definite– way than Plato" (*Politics* II 6 1265a 28-32). In *Nicomachean Ethics* I, 7, Aristotle introduces the "*ergon* argument" also by complaining about vagueness: "Presumably, however, to say that happiness [*eudaimonia*] is the chief good seems a platitude, and a clearer account of what it is, is still desired" (1097b 22-24). That is, Aristotle is conscious of the need for a more specific definition of the goods that are to be sought in order to achieve *eudaimonia*.

My argument, then, for an Aristotelian middle ground is as follows (cf. Crespo, forthcoming). For Aristotle, good life consists in the cultivation of character through the practice of the virtues, but it also depends upon the presence of certain external goods. Aristotle asserts in the *Politics* that "it is impossible to live well, or indeed to live at all, unless the necessary [property] conditions are present" (*Politics* I, 4, 1253b 24-25). "We have to remember," Aristotle also states, "that a certain amount of equipment is necessary for the good life" (*Politics* VII, 8, 1331b 39-40). These external goods have to be in harmony with the goods of the body and the goods of the soul: "all of these different 'goods' should belong to the happy man" (*Politics* VII, 1, 1323a 26-27)[41]. But, Aristotle adds, "felicity belongs more to those who have cultivated their character and mind to the uttermost, and kept acquisition of external goods within moderate limits" (*Politics* VII, 1, 1323b 1-3). In this way "the best way of life, for individuals severally as well as for states collectively, is the life of goodness duly equipped with such a store of requisites [i.e., of external goods and of goods of the body] as makes it possible to share in the activities of goodness" (*Politics* VII, 1, 1323b 40 – 1324a 1)[42]. However, although the goods of the soul should be more appreciated than the others, this is an "ontological" priority. The temporal priority is the inverse.[43]

What are the material goods that we, members of a community, need and that the city must have or provide?

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[41] Ernest Barker adds the following note on the meaning of happiness for Aristotle: "The word 'happy' fails to give a just idea of the Greek. The word which Aristotle uses here (*makarios*) is perhaps even stronger than a similar word which he uses more frequently (*eudaimôn*); but both words signify the supreme happiness which is of the nature of what we may call 'felicity' –the happiness springing from a full excellence (*arête*) of 'mind, body and estate', without which it cannot exist (p. 280, Aristotle, *Politics*)."

[42] Square brackets in the original are by Barker.

[43] Aristotle asserts: "children's bodies should be given attention before their souls; and the appetites should be the next part of them to be regulated. But the regulation of their appetites should be intended for the benefit of their minds –just as the attention given to their bodies should be intended for the benefit of their souls" (*Politics* VII, 15, 1334b 25-28). First, we need to have a body healthy and satisfied, then, we have to put our appetites in order, and, finally, we need the goods of the soul. Even the man who lives a theoretical life needs external goods: "Happiness [*eudaimonia*], therefore, must be some form of contemplation. But, being a man, one will also need external prosperity; for our nature is not self-sufficient for the purpose of contemplation, but our body also must be healthy and must have food and other attention" (*Nicomachean Ethics* X, 8, 1178b 34-35).

> The first thing to be provided is food. The next is arts and crafts; for life is a business which needs many tools. The third is arms: the members of a state must bear arms in person, partly in order to maintain authority and repress disobedience, and partly in order to meet any thread of external aggression. The fourth thing which has to be provided is a certain supply of property, alike for domestic use and for military purposes. The fifth (but in order of merit, the first) is an establishment for the service of the gods, or as it is called, public worship. The sixth thing, and the most vitally necessary, is a method of deciding what is demanded by the public interest and what is just in men's private dealings. These are the services which every state may be said to need" (*Politics* VII, 8, 1328b 5-16).

Food is basic for Aristotle: "none of the citizens should go in need of subsistence" [*trophês*: food] (*Politics* VII, 10, 1130a 2). He proposed a system of common meals funded by contributions depending on the wealth of citizen. He also emphasizes the importance of clean water and air.[44]
Additionally, for Aristotle the best form of political regime "is one where power is vested in the middle class" (*Politics* IV, 11, 1295b 34-35). Thus, "it is therefore the greatest of blessings for a state that its members should possess a moderate and adequate property" (id., 1295b 39-40). At the same time, Aristotle is against "over-assistance":

> the policy nowadays followed by demagogues should be avoided. It is their habit to distribute any surplus among the people; and the people, in the act of taking, ask for the same again. To help the poor in this way is to fill a leaky jar... Yet it is the duty of a genuine democrat to see to it that the masses are not excessively poor. Poverty is the cause of the defects of democracy. That is the reason why measures should be taken to ensure a permanent level of prosperity. This is in the interest of all the classes, including the prosperous themselves (...) The ideal method of distribution, if a sufficient fund can be accumulated, is to make such grants sufficient for the purchase of a plot of land: failing that, they should be large enough to start men in commerce or agriculture. Notables who are men of feeling and good sense may also undertake the duty of helping the poor to find occupations –each taking charge of a group, and each giving a grant to enable the members of his group to make a start" (*Politics* VI, 5, 1320a 30 – 1320b 9).

It is clear then, that for Aristotle we need first a set of material goods that although they do not themselves constitute the good life, are necessary to achieve it.

Provided that we have access to these material goods, the good life leading to *eudaimonia* is a life of virtue (*Nicomachean Ethics* I, 10, 1100b 9-10). The virtuous man, i.e., the man who rightly exercises his practical reason, knows how to combine the goods that are at hand, even when something is lacking, in

[44] "This [provision of good water] is a matter which ought not to be treated lightly. The elements we use the most and oftenest for the support of our bodies contribute most to their health; and water and air have both an effect of this nature" (*Politics* VII, 11, 1330b 10-14).

order to be happy. Therefore practical reason and virtue are the keys to *eudaimonia*. Accordingly, since the *polis* has the aim of achieving the *eudaimonia* of its citizens, "the true end which good law-givers should keep in view, for any state or stock or society with which they may be concerned, is the enjoyment of partnership in a good life and the felicity [*eudaimonías*] thereby attainable" (*Politics* VII, 2, 1325a 7-10). Thus, law-givers have the development of virtue of the citizens of the polis as their chief concern. In the *Nicomachean Ethics* (II, 1, 1103b 3-6) Aristotle consequently asserts that "legislators make the citizens good by forming habits in them, and this is the wish of every legislator, and those who do not effect it miss their mark, and it is in this that a good constitution differs from a bad one."[45]

However, for Aristotle the ways available to legislators for fostering citizen's virtues are mainly indirect: education and law. Laws are obeyed by virtuous people. People are not virtuous if they have not been well educated since youth; but education has to be supported by laws: "The law bids us practice every virtue and forbids us to practice every vice. And the things that tend to produce virtue taken as a whole are those of the acts prescribed by the law which have been prescribed with a view to education for the common good" (*Nicomachean Ethics* V, 2, 1130b 23-27). It seems that laws have priority. But virtue is necessary to enact good laws.[46] In sum, there is a virtuous circle between virtue, education and law.[47]

Let us summarize Aristotle's ideas. First, as previously mentioned, the human being has the capacity for theoretical and practical reason (which implies freedom), is a social being, and has *eudamonia* as the end of life.[48] The life of virtue –the good life– leads to this end, and requires external goods. Law-givers have the role of helping each individual achieve this end. They accomplish this by fostering each as self-sustaining but also by insuring that people have certain external goods needed for living a healthy life. The indirect ways of fostering virtue and an adequate use of practical reason by the citizens are education and law. Beyond this, Aristotle also favors the promotion of family, education, friendship, care of children and of old people, creation of work, sports, arts, religion, charity and, especially, virtues of all kinds.

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[45] For Aristotle, political institutions are designed to achieve the *eudaimonia* of the people. "The end and purpose of a polis is the good life, and the institutions of social life are means to that end" (*Politics* III, 9 1280b 39-40). Aristotle extensively develops the different ways of electing assemblies, magistracies, courts and the participation of people in the life of the polis (*Politics* IV, 14 and ff.). These institutions can be called into account by the citizens (*Politics* VI, 4, 1318b 29).

[46] He asserts: "The greatest, however, of all the means we have mentioned for ensuring the stability of constitutions –but one that nowadays is generally neglected– is the education of citizens in the spirit of their constitution. There is no profit of the best of laws, even when they are sanctioned by general civic consent, if the citizens themselves have not been attuned, by the force of habit and the influence of teaching, to the right constitutional temper" (*Politics* V, 9, 1310a 12-18).

[47] Aristotle discusses whether education has to be public or private. For him private education "has an advantage over public, as private medical treatment has (...) It would seem, then, that the detail is worked out with more precision if the control is private; for each person is more likely to get what suits his case" (*Nicomachean Ethics* X, 9, 1180b 7-12). Nevertheless, for Aristotle, the legislator must be concerned with education; parents must try to educate their children when the city does not do it and also the reverse.

[48] These actually are Cartwright's capacities for the social realm and might be used as general principles of every socio-economic machine.

We can extract from these ideas a short list of what it seems fair to term capabilities:

i. Having the basic means for sustaining life.

ii. Being able to sustain oneself not through "over-assistance," but through one's own property and work

iii. Access to education.

iv. Access to law and justice.

v. Being able to participate in the political system.

vi. Being able to undertake initiatives concerning personal aims such as family, education, friendship, arts, religion, charity and, especially, virtues of all kinds.

Let us now go back to Sen to see what Aristotle's thinking adds to the CA.

3.1.3. Back to Sen

Would Sen agree with this Aristotelian list of capabilities? As noted, Sen has defended some functionings and capabilities as necessary or basic. In *Development and Freedom* (1999b), in "Elements of a Theory of Human Rights" (2004b), and recently in *The Idea of Justice* (2009), he asks where human rights come from, and says that they are primarily ethical demands that by nature go beyond legislation (2004b: 319; 2009: 363). The underlying ethical claims of human rights survive open and informed scrutiny (2009: 358). He asserts their universality (2004b: 320; 2009: 373), that they have an inescapably non-parochial nature, and that they are meant to apply to all human beings (2004b: 349). In *The Idea of Justice* (2009: 365-6) he maintains that "human rights are ethical claims constitutively linked with the importance of human freedom." Sen strongly defends the so-called "second-generation rights" (economic and social rights) against a number of different criticisms (2009: 381-5). He asserts (2009: 385) that "the exclusion of all economic and social rights from the inner sanctum of human rights, keeping the space reserved only for liberty and other first-generation rights, attempts to draw a line in the sand that is hard to sustain." The only condition he puts on incorporating these rights is that they be agreed to by a general – though not necessarily universal– reasoned and impartial scrutiny (2009: 385-6). He maintains that "in the absence of powerful contrary arguments coming from well-informed and reflective critics, a presumption of sustainability tends to be made" (2009: 386). The conclusion is that Sen accepts some capabilities as universal, as they are not convincingly and generally rejected by a reasoned and impartial scrutiny.

What are these capabilities for Sen? In *Development as Freedom* Sen stresses the importance of freedoms as nourishment (1999b: 19 and Chapter 7), health (19), surviving from mortality (21 and Sen 1998), tradition and culture (31), employment (94), political participation (16, 31 and Chapter 6), and literacy (19). He also distinguishes between the "constitutive role" and the "instrumental role" of freedom in development. Concerning the former, he asserts (1999b: 36):

> The constitutive role of freedom relates to the importance of substantive freedom in enriching human life. The substantive freedoms include elementary capacities like being able to avoid such deprivations as starvation, under-nourishment, escapable morbidity and premature mortality, as well as the freedoms that are associated

to being literate and numerate, enjoying political participation and uncensored speech and so on.

Concerning the "instrumental role" of freedom he stresses the effectiveness of freedoms of different kinds as a means to generally promote freedom. He specifically mentions political freedoms, economic facilities, social opportunities, transparency guarantees and protective security (1999b: 37-38). To argue for these freedoms, however, does not imply fixed, complete and universal capability orderings. The heterogeneity of freedoms and persons remains intact in Sen's conception and thus, "there will often be arguments to go in different directions" (1999b: 33). For Sen, the importance of enumerating freedoms is to draw attention to important aspects of human development, each of which deserves attention. It must be clarified that Sen uses the terms "freedoms" and "capabilities" almost interchangeably (see, e.g., 1999b: 18-19). Capabilities are impossible without freedom because they are ends freely decided.

The conclusion is that Sen does not only agree with the Aristotelian list but he even goes beyond it. The advantage in focusing on Aristotle's list is that Aristotle provides extensive arguments for the constituents of the list. Consider, again, then, the problem of incommensurability given the heterogeneity of capabilities. Once we have identified a list of capabilities, how do we decide how much effort –concern, time and funds– should we devote to each one of them?

3.2. "Practical comparability" as a way of overcoming incommensurability[49]

Now, I will explain the Aristotelian contribution concerning the second evaluative problem: how to assign weights among capabilities given their heterogeneity and incommensurability.

3.2.1. The Aristotelian Conception

The commensuration of second order ends (ends that are desirable in themselves and also pursued for the sake of the final end, as for example capabilities) is a classic topic of discussion in philosophy from Aristotle to the present. Commensuration is a type of comparison. "To compare" is to specify the similarities and differences among different things. According to Aristotle, this can be done, first, quantitatively (e.g., to a greater or lesser extent); second, in a quanti-qualitative way, by a comparison of the intensity or degree of the quality (e.g., bluer or colder); and finally, by "comparison of priority" (e.g., better or happier). Comparison is the *genus* and the other concepts are the *species*. However, for the sake of clarity I adopt the label "commensuration" for the first way of comparing and "comparison" for the other two.

3.2.1.1. Commensuration

According to Aristotle, commensurable things can be compared through a common unit of measure which they share. He states in the *Metaphysics* (X, 1, 1053a 24): "the measure is always homogeneous with the thing measured ... that

[49] This section draws on Crespo (2007).

of weight is a weight, that of units a unit." Thus, "number is not predicated of that which is not commensurate (*me symmetros*)" (V, 15, 1021a 5-6).

A characteristic of commensuration according to Aristotle is that when we commensurate we do not take into account the ontological differences between things but only consider things as undifferentiated: "with numbers we suppose that what are equal and completely undifferentiated are the same" (XIII, 7, 1082b 7-9). In addition, "in the case of indivisibles (*atomoi*), one is not prior, another posterior" (III, 3, 999a 12-3). In terms of the current definitions of measurement scales, this comparison by quantity or commensuration includes absolute scales –the ratio between a magnitude and its standard unit– and ratio scales –the ratio between two magnitudes of the same kind– as weight in kilos or price level, respectively (cf. Boumans and Davis 2009: 140).

3.2.1.2. Comparison by intensity or degree of quality

According to Aristotle a quality can be a quantity *per accidens*, and thus can be expressed quantitatively. He notes: "Strictly speaking, only the things which I have mentioned [number, time, space, etc.] belong to the category of quantity: everything else that is called quantitative is a quantity in a secondary sense (*katà symbebekós*, *per accidens*). It is because we have in mind some one of these quantities, properly so called, that we apply quantitative terms to other things" (*Categories* VI, 5a 36 - 5b1). Furthermore, he adds: "Qualities admit of variation of degree. Whiteness is predicated of one thing in a greater or less degree than of another" (*Categories* VIII, 10b 26). But the range of qualities has limits: while quantity does not admit an opposite, quality does (blackness and whiteness, goodness and badness) (*Categories* VI, 5b 11 and 8, 10b 13). That is, within some qualities we may establish an ordinal scale. Some authors consider this as commensuration and others regard it as comparison. According to Aristotle, it is more appropriate to understand it as a comparison: "Thus it is not all qualities which admit of variation of degree. Whereas none of the characteristics I have mentioned [i.e. to have degrees] are peculiar to quality, the fact that 'likeness' and 'unlikeness' (*ómoia kai anómoia*) can be predicated with reference to quality only, gives to that category its distinctive feature" (*Categories* VIII, 11a 15-6). The Latin translation of *omoios* is *par* (like), which is the origin of the Latin verb *comparare* and the English verb "to compare". That is, when we claim that a particular robe is whiter than another one, we are actually comparing. On the other hand, from the point of view of quantity, something can be said to be equal (and to a greater or a lesser extent). This kind of comparison is called in terms of measurement scale definitions an ordinal scale (cf. Boumans and Davis 2009: 140).

However, we may take an additional step. We may assign numbers to the degrees of qualities. This may be more or less precise depending on the quality in question. It is much simpler with whiteness than with goodness. Therefore, we can compare the different degrees of qualities, and in some cases we can (though imperfectly) also express the ordinal scale by a ratio or absolute scale, attributing numbers to the ordinal ranking (cf. Boumans and Davis 2009: 140).

3.2.1.3. Comparison by priority

In *Categories* V 3b 33 – 4a 9, Aristotle asserts that "one man is not more a man than another, as one pale thing is more pale than another and one beautiful

thing more beautiful than another (...) Thus substance does not admit of more and less". That is, if we consider only the undifferentiated substance the only thing we can do is to enumerate, but not compare by a ranking. In terms of measurement scale definitions this is a nominal scale. Per se, the things comprised in this scale are at the same level: as Boumans and Davis (2009: 140) assert, "it would be absurd to rank gender." The relevant question here is: when and how can we reasonably rank nominal categories, as second-order ends, namely, capabilities?

Aristotle argues against Plato's monistic conception of the good: "of honour, wisdom, and pleasure, just in respect of their goodness, the accounts are distinct and diverse. The good, therefore, is not some common element answering to one Idea" (*Nicomachean Ethics* I, 6, 1096b 22-5; cf. also *Politics* III, 12, 1283a 1ff). However, Aristotle is only signalling here that there is no "common element" between these goods. They are goods in themselves and no one can be considered better than the other. They are all goods but in this case good is not a common measure: they are actually different goods. According to his thought, this discards commensuration and comparison by the intensity or degree of the quality but not comparison by priority: in specific situations, their contribution to *eudaimonia* may be different. This is something that is appraised and defined by practical reason.

The task of practical reason is to appraise the contribution of each different end to the desired final end in each situation; it assesses the actual situation against the blueprint of our plans of life in order to make the required particular, context-dependent decision. The desired final end is the point of reference adopted by practical reason in order to compare and compose the hierarchy (or ranking) of the different ends. I labelled this particular ability to compare by priority "practical comparability." This comparison applies to the different things predicated by analogical –not univocal– terms. As stated, honour, wisdom and pleasure are goods; however they are different. In this example the term and good is used analogically.[50] We are relating *logoi* by means of another *logos* (Flannery 2001: 99). The criterion for the ranking is not a common measure of the realities ranked, but an external reality: happiness or development in a particular situation calls for a specific priority of goods or capabilities. As Elizabeth Anderson puts it, "we reject commensuration in favour of hierarchy, when the function of a comparative value judgment is to accord a higher status rather than a greater weight to a good in deliberation" (1997: 105). This kind of value judgment is a practical judgment.

In order to clarify this, it should first be said that this hierarchical ordering often changes: Taylor (1997: 182) describes the "kairotic element or context as follows. During some parts of our life we might prioritize some ends over others. But such a choice can change afterwards. To use an art metaphor, a painter may fill in his/her sketch later, finish the picture by taking practical decisions on the concrete colours and forms. Alternatively, s/he may paint a separate work alongside the original sketch. The sketch, however, remains or is an earlier version of the later picture. The former, then, is like a cautious person practically comparing and defining how to achieve his general plan of life.[51]

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[50] On the multivocal character of the good, see Irwin (1991), 539-40.

[51] This example originated in a suggestion Henry Richardson made. It highlights Aristotle's idea of filling in (*anagrapsai*) the sketch (*perigraphon*) of the human good (*Nicomachean Ethics* I 7, 1098a 20-1).

Second, any hierarchical ordering is relative to specific decisions. When I was writing these lines, I asked a friend (who is a judge) about his procedure for comparing conflicting values in order to solve legal dilemmas. His answer was: first, this comparison is not quantitative; second, there are always good reasons to decide for or against one ordering over another and, finally, that this solution is "reasonable" (one of the best words to express practical rationality).

Then, third, this procedure is rational. To be reasonable is not to be irrational, but to be rational in the human field, sometimes including some feelings and emotions. The decision made is not always exact, and it may be contested. But, quite often, this is in line with the general appraisal. Everyday affairs, including its economic aspects, are resolved in a similar way to that described by my friend the judge. This human capacity of comparing what is not commensurable is indeed admirable. In Wiggins' words,

> [Individual agents] can deliberate, in the light of the good and the possible, about ends, about the constituents of ends, and about the means to ends. Somehow, despite the intractability and uncertainty of the subject-matter of choice, agents do arrive at judgments about what is worthwhile or what can or cannot be done in pursuit of what. And somehow, from out of all this, they arrived at shared, partly inexplicit norms of reasonableness (Wiggins 2002: 373-4. See also Taylor 1997: IV-V).

Fourth, we should emphasize that we are not always making "extreme decisions" and solving dilemmas. Most of the time, our alternatives are reasonably compatible: for example, bringing forward some of them and postponing others. The practical definition is to assign weights to the alternatives given their relevance in specific situations. In other occasions, we decide rather automatically, just because we are used to doing things in a certain way. We do not need to think in terms of our plan of life all the time and can often privilege more down-to-earth goals.

Fifth, the fact that our hierarchies may change does not imply that our different ends are completely substitutable. On some occasions they may be: I can postpone dinner to help a friend finishing her work. However, eating cannot be endlessly adjourned. In his praise of friendship Aristotle notes that "when men are friends they have no need of justice" (*Nicomachean Ethics* VIII, 1, 1155a 26). However, friendship without justice risks falling into favouritism: it is not completely replaceable by justice. That is, ends are heterogeneous and are not fully substitutable for each other. They need to be harmonized according to the deliberations of our practical reason. We need to be healthy, nourished and adequately dressed, but before we can achieve a degree of satisfaction in these ways we try to incorporate other goals such as knowledge or friendship in certain needed 'doses'.

Suppose, then, someone were to object: incommensurability is only a philosophical theory and we waste our time considering it, since if we are actually able to decide, how can our ends be incommensurable?" The answer is that although incommensurability entails a theoretical problem in decision-making, the problem is only theoretical. We sort out this problem by means of practical reason. In terms of measurement scales theory, we convert a nominal in an ordinal scale for a specific situation and can then try to assign numbers to our rankings. These rankings and assignments are only a parameter that must

be adjusted for each occasion. These orientations, however, may be useful. Moreover, we need to build useful orientations of this kind. They even may be highly useful for the work of practical decision making. In the next Chapter, I will argue that the Human Development Index (HDI) is useful for development policy in just this way.

3.2.2. Back to Sen

Sen clearly distinguishes the problem of identification of capabilities –lists– from the problem of ranking them (1993: 33). The incommensurability of capabilities makes it difficult to make practical decisions about them even once defined, and we do not seem to have anything more than an intuitive hierarchy. However, we can also perceive that these capabilities are related and that they do not appear as in a Maslow (1954)-type pyramid, i.e., the more basic capabilities absolutely conditioning the more complex. A mix of all them is always necessary, even for satisfying the more basic capabilities. How do we decide on this mix if we cannot commensurate? Here Aristotle's "practical comparability" as a way of overcoming the problem of incommensurability comes onto the scene. This is the path that Sen follows. He states that the selection of the weights can be resolved only through reasoned evaluation (Sen 1999b: 78), and defines rationality "as a discipline of subjecting one's choices – of actions as well as of objectives, values and priorities– to *reasoned scrutiny*" (2002: 4, my emphasis). Sen agrees with Aristotle regarding the non-commensurability or heterogeneity of goods. Although he does not quote specific passages from Aristotle's work on this topic, the idea of incommensurability that he employs is the same as Aristotle's.[52] This is also clearly held in Nussbaum and Sen 1987 (25). In addition, the related concepts defined by Aristotle are antecedents of the concepts used in measurement theory regarding scales. The ordering of capabilities in measurable scales, despite its possible limitations, is a way of increasing the operativeness to the CA. This will be illustrated in the next Chapter in the discussion of the Human Development Index.

Sen's answer to the problem of evaluating incommensurable capabilities leads us to the field of practical reason. He usually uses the verb "to compare" referring to the ways of evaluating choices of capabilities (Sen 2009: 233, 240, 243). I repeat a quotation from *Development as Freedom*:

> it is of course crucial to ask, in any evaluative exercise of this kind [partial orderings extended by specifying possible weights], how the weights are to be selected. This judgmental exercise can be resolved only through reasoned evaluation. For a particular person, who is making his or her own judgments, the selection of weights will require reflection, rather than any interpersonal agreement (or consensus). However, in arriving at an "agreed" range for *social evaluation* (...), there has to be some kind of rational "consensus" on weights, or at least on a range of weights. This is a "social choice" exercise and it requires public discussion and a democratic understanding and acceptance (Sen 1999b: 78-9).

[52] And also of Mill: see *Utilitarianism*, Chapter II.

In Foster and Sen (1997: 205) they employ the word 'reasonable' in a way typical in the realm of practical reason: "How are the weights to be selected? This is a judgmental exercise, and it can be resolved only through reasoned evaluation. In making personal judgments, the selection of the weights will be done by a person in the way she thinks is reasonable."

One might think that this is too vague. Yes, it is vague. But as Sen insists there is no "magic formula" (1999b: 79 and 1999a: 32): "this may be called the 'fundamental reason for incompleteness," (1992: 49). This character of the human affairs is frequently emphasized by Aristotle. The passages often cited by Sen from the *Nicomachean Ethics* (I, 7) speak about "an outline of the good; for we must presumably first sketch it roughly, and then later fill in the details". Another typical passage from Aristotle concerns the case of Milo, the wrestler, who, according to Aristotle, was a prudent man eating 6 kg of meat and drinking 6 liters of wine each day because that was the measure proportionate to him (*Nicomachean Ethics* II, 6, 1106b 5). That is, in the practical realm things are relative to the agents, without at the same time being relativistic.

Sen (2009: 41-42) seems on strong ground when he asserts that "the actual procedures in pursuit of objectivity may not be always clear, nor spelt out, but as Putnam argues, this can be done with clarity if the underlying issues are adequately scrutinized." This scrutinizing work is a task of practical reason (see Sen 2009: 41). He also states (with Foster):

> It is not so much a question of holding a referendum on the values to be used, but the need to make sure that the weights –or ranges of weights– used remain open to criticism and chastisement, and nevertheless enjoy reasonable public acceptance. Openness to critical scrutiny, combined with –explicit or tacit– public consent, is a central requirement of non-arbitrariness of valuation in a democratic society" (Foster and Sen 1997: 206).

It is not necessary to call referenda for every decision. There are some constitutional values, a lot of laws generally yet accepted, and the work of the executive and legislative powers that should be exerted conscientiously.[53] Additionally, there are shared pre-democratic values. Some of them are expressed in Constitutions while others, such as honesty, fairness, trust, or responsibility, are ethical virtues ordinarily recognized. All these elements contribute to the work of practical reason.[54] Summing up, Sen's view of how to compare heterogeneous capabilities is Aristotle's answer.

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[53] On this processes, see Davis and Marin 2007.

[54] It is interesting to quote Alkire on how NGOs evaluate decisions which compare different possible projects (2002: 285): "An assessor who was comparing two activities aimed at capability expansion could base his or her decision on the following information: 1. a social cost-benefit analysis, which accounts for all economic costs and benefits that can be accurately estimated; 2. the description of positive and negative changes in valued functionings from the holistic impact exercise (...); 3. the ranking values of the most significant functionings and their associated dimensions of value, which identify the relative strength of the impact in the eyes of the beneficiaries (...); 4. qualitative ranking values of these impacts by facilitators; 5. the degree and kind of 'participation' and self-direction exercised in the activity; 6. further information from standard assessment tools and activity history." At the same time, she warns against not taking into account the different dimensions involved in the decision. She looks for a harmonious set of purposes and orientations, but recognises that a decision has to be made that might not be the best: (Alkire 2002: 77).

As yet mentioned these decisions will always include capabilities of different kind –basic and refined– in different degrees. People do not just eat: they do it in a human way which entails at least a minimum of refinement. If not, they behave (and sometimes regrettably they do) like animals. Davis (2009: 421) states referring to the human capability space:

> We might say it constitutes a kind of "inverted pyramid" that is unbounded and continually widens at the top with an ever increasing number of differently valued complex capabilities, and narrows at the bottom where there exists a relatively small number of more homogeneous universally valued basic capabilities.

This is a nice analogy. We should not forget that Sen suggested the evaluation of equality by capabilities in confrontation with John Rawls' focus on primary goods (see Sen 1980: 213 and ff.). For Sen, these primary goods are only means, not ends (Sen 1989: 47 and 1990). Most of Rawls' primary goods are shared also by animals, they are biological. Primary goods are necessary conditions for life; however, if we do not remember that they are only a part of a plentiful life we risk to resign ourselves to a poor level. Otherwise, considering the whole space of capabilities helps to take into account both primary goods and the other goods contributing to a really human life. Taking Maslow's (1954) idea of a pyramid of needs helps us to establish how elementary and complex functionings are placed in a hierarchical or proportional order. The characteristics or features of capabilities or freedoms, however, lead us to invert Maslow's familiar pyramid, which is larger at the base and narrow at the top. On the bottom of the inverted pyramid there are well determined basic needs; on the top of the pyramid there is an almost infinite gamut of possible freedoms or capabilities according to different plans of life. These latter in some instances reflect the nature of the capability itself and in other instances reflect the nature of the individual.[55] This characterization of the components of the capability space helps us to understand Sen's thinking and expose the work of practical reason: a harmonization through comparison, not maximization through commensuration.

[55] In Crespo 2009 I develop some characteristics of capabilities related to their place in the capability space. Thus, "mapping" the capability space allows us to understand the differences and the interconnections between distinct capabilities and the necessity of paying attention to both levels: basic and refined. This helps us to understand the *rationale* of Sen's approach. We need basic capabilities but with an eye to refined capabilities. Homogeneous capabilities project heterogeneous freedoms. We need means in order to achieve capabilities. The insularity of basic capabilities is overcome by the latitude of complex freedoms. There are complementarities between rights and responsibility. We must pay attention to the whole pyramid but respecting the differences of level. Given the more insular, homogeneous and necessary (basic/elementary) character of basic freedoms, they must have priority over the higher. They imply rights and should be always present. Given the more connected, heterogeneous and free character of refined freedoms the role of the authority in society must be to promote or foster them, but to leave their specific determination to each person. Basic capabilities are conditions that allow the development of practical reason. We need some objective goods in order to carry on a free development.

3.3. Some conclusions regarding the Aristotelian contribution to the CA

The projected objectives of this Section were to show how Aristotle's ideas might help to overcome some open issues in the CA. These issues were first, how to define specific capabilities given their plurality, and second, how to choose among capabilities and to assign weights to them given their incommensurability. Answers to these issues would provide more specific criteria for the work of the policy maker.

Individual decision making and the democratic process that define and rank the capabilities are both "open ended". This has a pro and a con. Both procedures are highly respectful of the singularity and freedom of the human person and the particularities of societies: they must be praised for this. However, they also leave us in an "under-determined" situation: they do not produce general criteria for decision making, i.e. recipes, for all the situations. This apparent weakness is rooted in the very nature of the practical realm. Nussbaum argues for a determinate list of capabilities while Sen complains that this proposal risks over-specification. I suggested that Nussbaum´s list, as a list of necessary capabilities composing a happy life is indeed over-specified from an Aristotelian perspective. I also hypothesized that her claim for a complete and unique list stems from her "inclusivist" view of *eudaimonia*, while Sen's concept of incompleteness fits better with a "dominant end" view of *eudaiomonia*.

However, to only say that we deliberate on social objectives through practical reason might be too little for the work of a policy maker. Based on Aristotle's ideas, then, I presented a short list of capabilities. The legitimacy of this list is grounded in its generality: it is based on general anthropological characteristics. It includes basic and refined capabilities. The Aristotelian argument for the inclusion of some basic capabilities is that they are a requisite or condition for complete human fulfillment. This complete fulfillment, however, also needs political institutions, education and law that prepare persons to freely develop their possibilities. I thus claim that the Aristotelian short list facilitates the operationalizing of practical reason and the capability approach. It overcomes the inexactness where it should be overcome and it respects it where it should be respected. It also respects the whole spirit of the Aristotelian conception of human fulfillment and the Sen's conception of human development, a fulfillment and a development that go beyond mere material necessities and that determines these necessities without restricting freedom.

Concerning the second open issue of the CA that Aristotle's ideas might help to overcome, i.e., the incommensurability of capabilities, I suggested in Section 3.2 that "practical comparability," a procedure based on Aristotle's ideas, appears as a way of overcoming it.

4. Capabilities and capacities

Let us briefly consider the connection between the two main theoretical concepts used in this and the previous chapter, i.e., Sen's concept of capabilities and Cartwright's concept of capacities. Essentially, Sen's capabilities are what Cartwright regards as capacities in the human world. I explain two ways in which this is the case. First, it is suggestive that both authors, Cartwright and Sen, employ very similar concepts (capacity/capability) and that both authors link these concepts to closely related Aristotelian concepts, i.e., nature (*physis*)

for capacities and potentiality (*dynamis*) for capabilities. Thus Cartwright asserts with respect to *physis*:

> Still, I maintain, the use of Aristotelian-style natures is central to the modern explanatory program. We, like Aristotle, are looking for 'a cause (*aitia*) and principle (*arché*) of change and stasis in the thing in which it primarily subsists' [the definition of nature (*physis*) in Aristotle's *Physics* II, 1, 192b22], and we, too, assume that this principle will be 'in this thing of itself and not *per accidens*' (1992: 47; 1999: 81).

Nature, as Cartwright holds with Aristotle, is a stable –not *per accidens*– principle or cause. This is why she indiscriminately speaks about natures or capacities (which are for her stable causes), and in her book *Nature's Capacities and their Measurement* (1989) maintains that capacities or natures are powers. Sen asserts with respect to *dynamis*:

> the Greek word *dynamin*, used by Aristotle to discuss an aspect of the human good (sometimes translated as 'potentiality'), can be translated as 'capability of existing or acting' (...) (1993: 30, footnote 2: see also 45 footnote 41).

As also explained in Chapter II, the meaning of the Aristotelian concept of potentiality (*dynamis*) is capacity, faculty or power. For Aristotle, potentiality is a principle of change (*arché*; *Metaphysics* 1046a 4-6). Potentiality or capacity (*dynamis*) is the dimension of nature related to the source of its actuality. Aristotle also distinguishes between two types of capacities (*dynameis*): not rational and rational. Rational capacities imply the intervention of deliberate decisions of agents (*Metaphysics* 1048a 7-15). Sen's capabilities are rational capacities in themselves: capacities of, e.g., being free from hunger and undernourishment, achieving self-respect and social participation. This is a first sense in which capabilities are capacities.

There is a second sense in which capabilities are capacities. When Cartwright speaks about explanation in terms of causes in science she refers to the four Aristotelian causes (1989: 219-224). Final cause triggers the action of the other causes. This can be said of all effects but is especially clear in the human realm. People have reasons to act. Thus capabilities are also capacities, because they are the final causes or reasons to act in personal and social actions. I agree with Nuno Martins (2006: 672) when he interprets Sen's notion of capabilities as a specification of the ontological category of causal power. He asserts: "Sen's approach is not just the 'capability approach to *welfare* economics', but the *capability (or causal powers) approach to economics* as a science, an approach where the emphasis is on potentiality, freedom and openness" (2006: 680). Similarly, John Davis (2002: 490) maintains that "in Sen's framework, capabilities can be thought of as powers that individuals can develop." According to Smith and Seward (2009: 216) "capabilities *are* causal powers (a '*power to*') that provide the *potential* to realize particular functionings." They also argue that they are like tendencies that do not act deterministically. These characteristics fit with the nature of the practical realm and with Cartwright's conception of causes.

To summarize, Cartwright's capacities are then internal powers of things acting as stable causes, and Sen's capabilities are Cartwright's capacities in the

sense of being faculties or possibilities but also in being rational and free causes of the human realm.

5. Conclusion

The CA has three essential characteristics: the heterogeneity of persons and their capabilities, the incompleteness of the ordering of those capabilities, and thus the need for practical reason or public discussion to deliberate about our capabilities and their hierarchy. This situation stems from human freedom and diversity, and can be managed by a reflective agents exercising practical reason.

We should add that institutions are a way of giving a material embodiment to the outcomes of practical reason thus stabilizing the relevant causal relationships. In this sense, the link established in Section 4 between capabilities and capacities can be very useful. The idea that capabilities are capacities reinforces the idea of building socio-economic normative machines. These machines would overcome the problems raised by the social world: they insert stability and thus predictability into the world. In this way they secure the work of practical reason.

This conclusion leads us to the next Chapter. This Chapter proposes we manage practical affairs by building models which originate in normative policies. These policies would shape socio-economic normative machines. The objectives of these policies would be capabilities chosen with the aid of practical reason. Capabilities as final causes thus provoke adequate arrangements to achieve them. Thus, these socio-economic machines will be the embodiment of the effective work of practical reason.

Chapter IV: Socio-Economic Machines and Practical Models: The Human Development Index (HDI) as a Case Study

1. Socio-economic machines
2. The HDI
3. Some problems with index numbers and the HDI
4. Theoretical and practical reason in the HDI
5. Conclusion: The HDI as a blueprint for a normative socio-economic machine of human development

In this Chapter I will first propose a possible combination of the conceptual tools presented in the previous Chapters: Cartwright's capacities, nomological machines and my own concept of socio-economic machines and models, based on Cartwright, on the one hand, and Sen's capabilities, on the other hand. In Chapter III (3.1.2) I arrived at a list of some constant human capacities or "anthropological constants" and at a "short list" of capabilities. I also noted that Sen's capabilities are like Cartwright's capacities both in themselves and as ends (stable final causes) in the human field. I will come back to these coincidences, to their specific content and to their consequences in the final Chapter.

The plan of this Chapter is as follows. After presenting in Section 1 the proposal for a normative machine and model of capabilities, I will then provide a case study of one, the Human Development Index (HDI) of the United Nations Development Program. This will serve an example of how to combine theoretical and practical reason in Economics. I will show that the HDI has a number of underlying technical and practical assumptions.[56] Not all of them, however, are usually or sufficiently explained. Theoretical reason needs to enter into play in order to define the terms involved, and practical reason in order to argue and justify prudential decisions. In Section 2, a history and description of the HDI will be provided. Then in Section 3, the difficulties with index numbers and, specifically, with the HDI will be explained. In Section 4, the underlying practical assumptions will be manifested. The conclusion (Section 5) will be that the HDI is an adequate model for the construction of an effective socio-economic normative machine for promoting development, but that it could be improved, *inter alia*, by adding a procedure for deciding on many of the practical aspects involved in it. Given the efficacy of the model and of the machine, it is highly important to carefully define the concepts involved and to adopt reasoned and widely accepted processes for making practical decisions. The goals of the machine must actually consist in the components of real human development. The normative model should include all the relevant arguments and information needed to construct a socio-economic normative machine which permits the effective work of practical reason in order to attain purpose in each place and situation.

[56] As in the rest of this work the term "practical" is not used here in the sense of pragmatic but of a prudential reason, decision or action.

1. Socio-economic machines

Chapter II proposed an extension of the set of conceptual tools developed by Cartwright. Specifically I suggested the following definitions and classifications of Cartwright's nomological machines (NM):

- Natural Machines: they are real configurations of stable causes (i.e., capacities) that link phenomena. In the absence of disturbing or interfering causes, these machines always produce the same results. This is why they underlie laws; from this comes their qualification as "nomological". We find them especially in the physical realm.
- Practical Machines: they are stable arrangements of capacities designed to get results, e.g., a product or a social goal. In the first case the reasoning of the builder will be mainly technical and in the second case mainly practical. Both uses of reason, however, are intermingled in a greater or lesser degree in all human actions. I do not call them nomological because the result is not a law but a product or a conduct. Thus, socio-economic machines are a subset of practical machines.

In addition, for Cartwright, models are the blueprints of NMs. Given the previous classification of Cartwright's machines, we can distinguish theoretical (or explicative) models and practical (or productive or prescriptive) models:

- Theoretical (or explicative) models only aim to represent a given concatenation of phenomena, physical as well as human. They do not try to change a situation or to produce a result: they are only theoretical (in the Greek sense of the verb *theorein*, i.e., to contemplate). Thus, the use of reason that intervenes in explicative models is theoretical reason.
- Practical models are the designs or blueprints of mechanisms meant to produce intentional results. Theoretical reason provides the concepts and the knowledge for the relevant capacities for both cases. Work of adjustment or the right combination of these capacities is needed. This work may take time and calls for the participation of all three uses of reason because we need to refine concepts, capacities, and the rules of their combination. According to the projected result they mainly use practical or technical reason. Models can and should be improved. This is why they change and evolve. Socio-economic models are a subset of practical models.

In Chapter I, I characterized technical and practical reasons in relation to the sciences. While the realm of the technical possesses an exact character, the practical realm is inexact. In Chapter I, I also explained the meaning of exactness and inexactness. An exact statement is a universal statement, i.e., it applies to all the cases, because it refers to something that happens always. An inexact statement is a general, not universal, statement, i.e., that applies in most but not all the cases, because it refers to things that happens in most cases. In the case of, e.g., mechanical products, we can isolate disturbing causes and obtain the intended result in all the cases. In the case of social goals, it is difficult to isolate the disturbing causes, because we are in the realm of freedom. Freedom inserts, by definition, a factor of unpredictability. It inserts goals or ends (real causes or phenomena –in Woodward's 1989 sense) that might not be aligned with the intended goal or end. Although we can have complexity also in the physical realm, human complexity includes this unpredictable factor. Additionally, the human realm is a realm of reflexivity and lack of control, as Cartwright (2007b: 42) argues.

The only way to manage the human future, subject as it is to these characteristics, it is to transform the practical aspects of human or social action

in technical way, fixing ends and means, and calculating the best allocation of the latter into the former. This has been an ancient desire of human beings. The earliest testimony to this ambition is expressed in Plato's dialogue *Protagoras*. He looks for a procedure of choice that would save us from the contingency of "luck". Aristotle realized that customs and routines are means that help to consolidate a predictable tendency (see, e.g., *Nicomachean Ethics* VII, 10, 1152a 26-7). Social pressure, laws and organizations produce predictable behaviors. All these means are often gathered under the label of "institutions" in a broad sense. Institutions are then socio-economic machines that produce the intended results.

The alignment of qualitatively different ends is facilitated by the reduction of their different qualities into a common quantity. Numbers are homogeneous and pragmatic. As Theodore Porter (1995: 86) asserts, "numbers are the medium through which dissimilar desires, needs, and expectations are somehow made commensurable." Expressing realities in numbers facilitates decisions. Porter (1995: 8) also states, "quantification is a way of making decisions without seeming to decide." How, then, could we reduce choice about qualitative features to a quantitative calculation? This is the question raised by Plato. He asked: what science will save us from the unpredictable contingency? and he answered: "the science of measurement" (*Protagoras*, 356e). Human beings strive for security, and measurement helps to promote it. Martha Nussbaum accurately notes that:

> What we need to get a science of measurement going is, then, an end that is single (differing only quantitatively): specifiable in advance of the *techne* (external); and present in everything valuable in such a way that it may plausibly be held to be the source of its value (Nussbaum 2001: 179).[57]

Institutions apply standards, procedures and measurement devices. Once the crucial step of making practical definitions is advanced, institutions establish technical processes to achieve them. Given that often these technical aspects impact on practical aspects, the process of designing technical proceedings is not accomplished directly but requires further adjustments.

Among these technical tools, index numbers provide a straightforward homogeneous representation of multiple factors. This homogenization, however, has its limits. In Chapter III, I stressed Sen's insistence on defending human individuality, i.e., heterogeneity. However, we have to reach a middle ground position: there is a trade-off between the realism of considering human heterogeneity and the feasibility of managing human affairs. Although the reduction of qualitative concepts to quantitative measures will always be imperfect, we need these measures. Numbers conceal complex realities, and relevant meanings are lost in the process of commensuration, but numbers are still very useful. I will return to this point in the next Section.

Note, then, that when making these reductions to numbers, we must recall that ends are plural and incommensurable, and entail values that can only temporarily be hidden. As Sen (1999: 80) contends, "the implicit values have to be made more explicit." Quantitative reasoning is not enough, and thus Sen also stresses the need for using practical reason to scrutinize the ends we aim for

[57] See also Elizabeth Anderson 1993 3.1.

(2002: 39 and 46). Alain Desrosières (2008: 10) expresses this well, remarking that to quantify implies attaining a consensus on how to measure ("convenir et mesurer"). He adds that "to postulate and to build a space of equivalence allowing quantification and thus measurement is at the same time a political and a technical act" (2008: 13).

Ends –capabilities in Sen's words– are the causes of human and social actions. They can be known by theoretical reason, without making value-judgments. However, as I have explained, this is the realm of unpredictable disturbing causes. The consequence is that, previously, we need to normatively establish and consolidate those ends. The way to achieve this is to build a practical machine.

Designing a model of the socio-economic normative machine must include the practical work of discovering or deciding on its ends or goals. Institutions, Sen recently wrote (2009: xii), "can contribute directly to the lives that people are able to lead in accordance with what they have reason to value." Nobody wants to act in order to attain a set of ends that has not been chosen by him/her. Nobody wants to be an automaton. Every person should participate in a reasoned definition of shared goals, or at least should be informed about them and be free to adhere to them or not. One of the objectives of every policy is freedom itself. That is, there is a field of consensus about objectives and another field of deliberate freedom. Once the work of practical reason is done, we need to define the kinds of institutions needed to accomplish the resulting capabilities/ends, and also try to reduce them to a quantitative measure. This quantitative measure will be a first approximation for the particular situation. A thorough analysis will need to then return to the qualitative capabilities that compose the common measure. As remarked in Chapter I, the increasingly refined level of development of the civilization calls for more subtle analyses than only quantitative ones.

The most general hypothesis postulated in Chapter I was that social science and more specifically economics need to reincorporate theoretical and practical reason. An exclusively technical approach leads to a partial analysis that is far from being relevant and unable to explain real phenomena without distorting them. In Chapter II I analyzed Nancy Cartwright's argument about the nature of capacities, i.e., they are real stable causes that configure NMs, and theoretical reason has a primary role in producing knowledge of these capacities and their relations. In Chapter III, I presented Sen's capabilities approach. Sen is not satisfied with a merely quantitative evaluation of poverty, equality and development. He urges us to take into account the heterogeneity of human persons, their situations and goals. Given that capabilities are the ends of persons and societies and that they are the causes of their actions, they are known and determined by practical reason. In this way, this later use of reason also re-enters into social science. A more specific research question of the thesis posed in Chapter I was: "How do we combine capacities and capabilities and work to achieve certain results of interest to us in life?", and the proposed answer was: "We must understand how practical reason is institutionalized in the world in the sense of being embedded in practices and procedures that allow people to solve practical problems that require the exercise of practical reason." In this Chapter, I argue that we must build a socio-economic machine and the corresponding model to define and determine capabilities (theoretical and practical reason) and look for the best means to attain them (technical reason). The socio-economic machine will produce these wished-for goals. The

construction of this machine calls for a model of it. The HDI is such a model and consequently is a good example of those hypotheses. In the HDI we need to define concepts, to discover or deliberate on capabilities (which are the ends that are determined as dimensions to be considered) and their rules of combination, in order to technically combine them. That is, the HDI uses theoretical, practical and technical reasons. Cartwright's conception of capacities and machines, and Sen's capabilities (that are Cartwright's capacities in the human and social realm) are combined in this model and in the machine that it tries to produce and represent.

In the rest of this Chapter, I will show the working and shortcomings of theoretical, technical and practical reason in the construction of the HDI. Both their strengths and weaknesses help us to know our tools. First, I will briefly introduce the Index. Then I will describe the problems of index numbers in general, and specifically of the HDI. The next section will show its shortcomings from the perspective of theoretical and practical reason. Finally, I will argue that it is a good model that needs refinement. We need to create a socio-economic normative machine that generates development. The HDI, a measurement tool, will be shown to be a useful model for this normative machine. However, it needs improvements. As Keynes said (1973: 296), "Economics is a science of thinking in terms of models joined to the art of choosing the models which are relevant to the contemporary world (...) *Progress* in economics consists almost entirely in a progressive improvement in the choice of models."

2. The HDI

In 1990, the United Nations Development Program (UNDP) published its first annual *Human Development Report* (*HDR*) introducing the HDI. This Index was inspired in Sen's CA, which, asnoted, emphasizes the importance of ends (capabilities) over means (e.g., income). The HDI adopted *measurands* for three specific capabilities: health, education, and a decent standard of life. The *measurands* are respectively life expectancy, literacy and school enrollment, and income. They are combined into the Index to evaluate the level of human development defined in this way across countries or to monitor them over time. Despite its recognized "vulgarity",[58] the HDI provides a better alternative to evaluating a country's development than in terms of its per capita national income. Heavily based on the CA, the HDI's project leader Mahbub ul Haq intended to use the HDI to define a new concept of well-being and to make available measures of well-being based on that conception. Sen, who was one of the principal consultants on *HDR 1990*, at first did not see the point of a crude composite index like the HDI. Haq instead maintained: "We need a measure of the same level of vulgarity as GNP –just one number– but a measure that is not as blind to social aspects of human lives as GNP is" (UNDP 1999: 23). More recently Sen (2009: 226) has agreed:

> The motivations behind the 'human development approach', pioneered by Mahbub ul Haq, a visionary economist from Pakistan who died in 1998 (whom I had the privilege to have as a close friend from our students days), is to move from the means-based perspective of the gross national product (GNP) to concentrating, to

[58] Cf. UNDP, 1999, 23 and Richard Jolly, 2005, 126.

the extent that the available international data would allow, on aspects of human lives themselves.

The HDI specification is the following:

$$(1) H - Index_i = \frac{LE_i - 25\,years}{85\,years - 25\,years}$$

$$(2) LIT - Index_i = \frac{LIT_i - 0\%}{100\% - 0\%}$$

$$(3) ENR - Index_i = \frac{ENR_i - 0\%}{100\% - 0\%}$$

$$(4) E - Index_i = \tfrac{2}{3}(LIT - Index_i) + \tfrac{1}{3}(ENR - Index_i)$$

$$(5) Y - Index_i = \frac{\ln(Y_i) - \ln(\$100)}{\ln(\$40{,}000) - \ln(\$100)}$$

$$\boxed{(6) HDI_i = \tfrac{(H - Index_i + E - Index_i + Y - Index_i)}{3}}$$

That is to say, it is an Index composed in terms of equally weighted three factors: life expectancy (LE), a mix of literacy (LIT) and school enrolment (ENR), and Income (Y) with extreme values defined. As mentioned, these *measurands* are supposed to represent Health (H), Education (E) and Standard of life (Y). The HDI has evolved over the years with efforts to improve its quality and capacity for representing real human development. This refinement stems from the need to answer different external criticisms of the index and on the initiative of the UNDP to improve it. In this sense it is important to consider a "last minute" new, the 2010 *Human Development Report*, published in last November. In the Introduction to the report, Amartya Sen maintains that, although being a "crude" index, the HDI did what it was expected to do: to go beyond commodities and income in the evaluation of development. He adds that "new tables continue to appear in the steady stream of Human Development Reports, and new indices have been devised to supplement the HDI and enrich our evaluation" (UNDP 2010: vi). I will remark some of these improvements in the next section. In the next Section I note some problems related to index numbers and the HDI.[59]

[59] For a review of this criticisms, see Elizabeth Stanton (2007: 16-28) and Izete Bagolin and Flavio Comim (2008: 17-22).

3. Some problems with index numbers and the HDI

As explained in Chapter I (and above in Section 1), practical knowledge is inexact because it does not deal with universal facts which always occur in the same way, but with general facts which occur most times in the same way but not necessarily always. Necessary facts generate universal statements while general facts generate general ones. Given that, by definition, statistics deals with general facts it is clear that its conclusions are inexact in this sense of the term. This does not indicate a weakness of statistics but rather reflects the nature of its subject-matter. For example, an adult literacy of 85% means that 85 of 100 adults know how to read and write, and 15 do not . That is, 85% applies to the whole, not to the particular individuals. The real figures are 100% for literate people and 0% for illiterate people: no person is 85% literate. In fact, the correct policy is not to improve 15% of the literacy of all the people, but to look for the 15% who are illiterate and teach them. The figure of 85%, however, is true about the whole and highly useful, because if we do not know that the literacy rate is 85%, we will not look for the 15% illiterate. The statistician puts into brackets the contingency of the particular case but, at the same time, given that his conclusions are not universal, he is actually considering the contingency. The German philosopher Wolfgang Wieland (1996: 133), referring to statistical regularities thus warns: "these regularities apply to the wholes excluding an immediate application to their individual components."[60] As Keynes asserts in his *Treatise on Probability*, "probability begins and ends in probability" (1921: 356). He then explains "This is due to the fact that a statistical induction is not really about the particular instance at all, but has its subject, about which it generalises, a series" (1921: 411). This does not mean that statistics is not useful for science. Let us hear again from Keynes: "Although nature has her habits, due to the recurrence of causes, they are general, not invariable. Yet empirical calculation, although it is inexact, may be adequate in affairs of practice" (1921: 368). Statistics helps us detect the problem but further more specific analyses are needed to solve it. This is a first quite obvious caution that we have to take into account when dealing with statistics.

We then have to consider problems related to different scales of measurement, as analyzed in the previous Chapter. In short, the different natures of the things we measure call for specific means of measurement.

- First, the quantitative characteristics of things such as length, weight, velocity, sales, can be measured by cardinal numbers by defining a standard unit: meter, kg, km/h, euro, dollar, etc..
- Second, the evolution of these quantitative characteristics can be measured by a ratio between the values compared: for example, for the evolution of the price level, the exchange rate or the value of bonds. We may define a standard value by determining a base period –e.g., the price level for 1960=100– and thus transform the ratio into a cardinal scale. However, the resulting numbers only make sense in reference to that basis.
- Third, we can establish an ordinal scale of qualitative characteristics. This scale constitutes a way of comparing qualities, not of commensurating them. In effect, one picture is nicer than another. However, we can also establish indirect measures of some qualitative things, for example, temperature. Strictly speaking we are assigning a number by defining a standard, e.g., the length of the mercury column is an indirect though useful

[60] On this topic see also the sharp essay of Alasdair MacIntyre (1984: Chapter 8).

representation of temperature and its changes. We can also rank the beauty of pictures or the happiness of nations, for example, by doing surveys and assigning numbers to the answers of people or supposing, for example, that the price of the last sale of the picture is representative of its beauty. This is evidently imperfect, but might also be useful. Keynes states about these kinds of scales:

> When we describe the colour of one object as bluer than that of another, or say that it has more green in it, we do not mean that there are quantities blue and green of which the object's colour possesses more or less; we mean that the colour has a certain position in an order of colours and that it is nearer some standard colour than is the colour with which we compare it (1921: 36).
>
> The objective quality measured may not, strictly speaking, possess numerical quantitativeness, although it has the properties necessary for measurement by means of correlation with numbers. The values which it can assume may be capable of being ranged in an order (...); but it does not follow from this that there is any meaning in the assertion that one value is *twice* another value (...) It follows that equal intervals between the numbers which represent the ratios do not necessarily correspond to equal intervals between the qualities under measurement; for these numerical differences depend upon which convention of measurement we have selected (1921: 46-47).

- There are, finally, other characteristics of beings that cannot be put in an order of greater or lower, i.e., cannot be ranked, such as gender, ethnicity or marital status (see Boumans and Davis 2009: 152), and also, as analyzed in the last chapter, human capabilities.

In considering these different kinds of scales we have consider that, as Patrick Suppes (2000: 550) asserts, "extensive quantity" –or quantity measured cardinally– admits addition, while "intensive quantity –as expressed in ordinal scales– does not admit addition. Thus, we need to transform ordinal scales into cardinal scales in order to have an operative tool. Cardinal scales are more operative than ordinal scales because they allow those mathematical operations that can be performed among numbers. When we have a cardinal scale we can commensurate. However, this reduction presupposes the limitations above.

Specifically when dealing with index numbers, other limitations appear due to their being composed of heterogeneous variables. Different values of variables of different categories –let us say comfort, velocity and security– are transformed into a dimensionless index with values from 0 to 1, to obtain a ranking –let us say, of the attractiveness of cars. We calculate the ratio among the values assigned to each category and the extreme values of each, and then calculate the average of the ratios obtained. We do not have a *measurand* of comfort and another *measurand* for security, but "naked" numbers that can be added that supposedly represent the overall attractiveness of cars. However, one realizes that this is a highly conventional rank based on many assumptions.[61] As Desrosières puts it, we have first a convention and only then a measure. What is incommensurable is made commensurable by adopting a conventional standard

[61] They are non-additive qualities: see, e. g., M. R. Cohen and E. Nagle (1934: 296).

unit for each incommensurable variable, calculating the value of the variables according to these units, and adding a weighted proportion of the values of all the variables (Boumans 2001: 326 and Mary Morgan 2001: 240). This means that we accept *inter alia* the assignment of weights for each variable indicated in the index number formula. This is a key for this conflation. The weight must be the "due" weight (Morgan 2001: 240).[62] This is not easy when the categories to be weighted are qualitatively different (see Banzhaf, H. Spencer 2001). It might be and actually is useful, but we are cannot but be aware that little changes in the composition of the index might drastically change the ranking results. This capacity to handle index numbers might originate deceptive indexes. The way of avoiding the possibility of deception is to clearly show the criteria used to build the index. I think that this shows how technical aspects of measurement are intermingled with judgmental practical aspects: beliefs and values affect technical decisions. Roy G. D. Allen (1951: 100ff.) emphasizes the technical problems involved in the choice of items, the choice of formula and the choice of base periods. However, these technical problems also involve values. Oskar Morgenstern, for example, after expressing his concern about the accuracy of data, considers technical problems, but he also recognizes "that we are here confronted with a political as well as an economic problem" (1963: 192).

As rightly emphasized by Sen, capabilities are incommensurable. In the last Chapter I argued that practical reason is the appropriate way as a way of dealing with incommensurable categories. Through it we can obtain an ordinal ranking by comparison of different capabilities.[63] We cannot commensurate income, longevity and literacy because they are measured in different units. We can only compare and rank them for a specific situation, and say, for instance, that for this country today it is more relevant to increase its income than to put more into education; or say, having reached a certain level of income, the most relevant goal is to increase the level of education. These are practical judgments involving beliefs about priorities of values. There is no way of organizing these judgments without values. What is the meaning of the index number comprising these three dimensions? The index number decides a unique rank stemming from a comparison, makes it legitimate for any country, time and situation; then decides on *measurands* of the dimensions and assigns extreme numerical values to them in order to construct a ratio scale of each dimension; finally it adds the resulting numerical weighted values. In the case of the HDI one third weight is assigned to each variable. We are applying ratios to ordinal categories and adding their weighted numerical values (see Boumans and Davis 2009: 152; Finkelstein 1982: 19). At the same time we are conscious that the result is based on a convention achieved through the exercise of practical reason and public discussion.

Sudhir Anand and Sen (1994: 2) note that there is a loss of information when using an aggregate number (a "scalar") for a set of numbers representing

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[62] She explains (201: 240): "Index number formulae conceived as measuring instruments are based on the strategy of aggregating in a way that allows each individual element to be assigned its due weight in the whole. Such a "weighted average" strategy provides a solution to a general problem in economics, namely that many concepts refer to aggregates of things which may be considered homogeneous in the dimension of prices or money value, but are nonhomogeneous in another dimension, namely amounts consumed or produced. The solution is to use weights to overcome the problem of how to average in a manner that takes account of both amounts and values."

[63] Scales of measurement in the social and behavioral sciences are nominal or ordinal (Finkelstein 1982: 26).

individual circumstances (a "vector"). In the same vein, they (2000) affirm that the domain of the Human Development Report is much wider than what is captured by the HDI. As the first HDI Report affirms, "The index is an approximation for capturing the many dimensions of human choices. It also carries some of the same shortcomings as income measures" (UNDP 1990: 1). This is also emphasized by Sen when he speaks of the HDI as a "measure with the same level of crudeness as the GNP" (1999b: 318, nt. 41).

There is another risk in proceeding in this way, as noted by Ludwik Finkelstein (1982: 11): "once a scale of measurement is established for a quality, the concept of the quality is altered to coincide to the scale of measurement." In the case of the HDI, we then begin to think that development consists in a balanced combination of longevity, literacy and income, which is a poor concept of development.

Another different problem with the HDI is that it uses averages, not distributions, thus concealing possible internal differences. Disregarding internal inequalities implies a particular evaluative position. Anand and Sen consider this criticism but they also contend (1994: 2) that "a distribution-sensitive scalar measure would continue to involve some loss of information, since there is no way of capturing the entire wealth of knowledge embedded in a set of numbers in one real number." A new index included in the last *Human Development Report*, the Inequality-adjusted Human Development Index (IHDI), remedies this defect. As the Report asserts, "the HDI can be viewed as an index of "potential" human development (or the maximum level of HDI) that could be achieved if there was no inequality) while the IHDI is the actual level of human development (accounting for inequality). The difference between the HDI and the IDHI measures the "loss" in potential human development due to inequality" (PNUD 2010: 87, see also 217). It is indeed interesting to analyze these losses and their differences among countries and dimensions.

Further problems with index numbers are technical and related to the accuracy and homogeneity of data. The need for simplicity may go against realism. However, we cannot discard index numbers for these reasons –as long as we remember that technical decisions have an impact on practical issues, and technical problems can be overcome.

Given all these difficulties, why do we adopt index numbers? Because they still are highly useful. We must accept that measuring always imply simplifications. Boumans (2001) explains Irving Fisher's account of Index Numbers and their inconsistencies, as described by Ragnar Frisch, Abraham Wald and Wolfgang Eichhorn. However, as Boumans (2001: 336) remarks, the strength of Fisher's account is not based on his emphasis on theory but on the instrumental or pragmatic usefulness of this tool. In addition, Fisher allowed that it is an imperfect tool. We do not look for a full axiomatic consistency but for the best balance between theoretical and empirical requirements (2001: 316) and for the best possible approximation. The assessment of the satisfactoriness of this approximation goes beyond mathematical consistency (2001: 341). It is a question of reasonable consensus. Boumans (2005: 151) thus asserts: "Practical issues require a different set of rules than axiomatic problems. This means that the rigour applied in solving practical problems will inevitably be different to the rigour in an axiomatic system." We are thus giving up consistency and adopting comparability.

Index numbers, then, are tools for measurement as well as for pragmatic aims. Let us recall Plato's thinking about the usefulness of measurement for

practical purposes. The definition of a practical purpose is obviously not valueless. As noted, the limitations of the HDI have been well recognized and the index defended on practical grounds. Regardless of its limitations, the HDI is a worthy task. This is very well expressed by Paul Streeten (1994: 235):

> It is clear that the concept of human development is much deeper and richer than what can be caught in *any* index or set of indicators. This is also true of other indicators. But, it might be asked, why try to catch a vector in a single number? Yet, such indexes are useful in focusing attention and simplifying the problem. They have a stronger impact on the mind and draw public attention more powerfully than a long list of many indicators combined with a qualitative discussion. They are eye-catching.

Sakiko Fukuda-Parr, who was the Director of the Human Development Report Office between 1995 and 2006, is more skeptical. She thinks that the absence of indicators of freedom leads us to misperceive development as equivalent to social development plus economic growth: "the human development concept has been trapped inside its reduced measure" (2003: 307). Summing up, the HDI has to be taken as no more than a guide to be handled with care and refined through technical improvements and theoretical and practical reason. The policy maker should always be prepared go beyond the simple index and analyze its components in search of possible improvement. This does not imply, however, that we should do away with the HDI. Indeed, the practical aim of the HDI fits perfectly with the idea of it as a normative model for a socio-economic normative machine producing development, a model and a machine that will need continuous improvement. In the next Section I explain the most relevant respects in which I think that the HDI needs improvement.

4. Theoretical and Practical reason in the HDI

The claim of this Section is that the HDI presupposes theoretical definitions and practical decisions that are insufficiently explicit and argued, and that a better definition of these concepts and practical arguments should be made in order to improve the quality of the Index and for the sake of a "fairer play."[64] I want to clarify from the onset that I am not saying that theoretical and practical aspects of the HDI were insufficiently studied by the builders of the Index. I cannot know this. What I mean to say is only that these studies have not been sufficiently put on record in the different documents related to the HDI, i.e. in the *HDRs*.

The first practical decision involved in the construction of the HDI is the selection of the dimensions of well-being –education, health and a decent standard of life– and the corresponding measurable variables: life expectancy, literacy and income (this last as a proxy of the other capabilities). The selection seems reasonable but the arguments for it were not developed in the *Human Development Reports*. As Sabina Alkire (2007: 89) asserts referring to poverty researchers, "the problem is that they do not make explicit their reason for

[64] These theoretical and practical insights are part of what Makiko Harrison calls (2002: 37) "outside criteria" needed to operationalize a theory of well-being.

making a particular choice of dimensions." References to this decision appear in the first *HDR*:

> Human development is a process of enlarging people's choices. The most critical of these wide-ranging choices are to live a long and healthy life, to be educated and to have access to resources needed for a *decent* standard of living. Additional choices include political freedom, guaranteed human rights and personal self-respect (UNDP 1990: 1 and 10).
>
> ...at all levels of development, the three *essential* ones [choices] are for people to lead a long and healthy life, to acquire knowledge and to have access to resources needed for a decent standard of living. If these *essential* choices are not available, many other opportunities remain inaccessible (UNDP 1990: 10).
>
> People are the real wealth of a nation. The basic objective of development is to create an enabling environment for people to enjoy long, healthy and creative lives. This may appear to be a *simple truth*. But it is often forgotten in the immediate concern with the accumulation of commodities and financial wealth (UNDP 1990: 9, my italics in the three quotations).

As the last passage says, the definition of these goals appears to be a *simple truth*. But this is not trivial; it has to be argued. The Report also states that its choices are *essential* and that income should permit a *decent* standard of living. The 1993 Report adds:

> The three dimensions of the HDI relate to one or many capabilities that they are expected to capture. Thus, longevity captures the capability of leading a long and healthy life. Educational attainments capture the capability of acquiring knowledge, communicating and participating in the life of the community. Access to resources needed for a decent standard of living captures the capability of leading a healthy life, guaranteeing physical and social mobility, communicating and participating in the life of the community (including consumption) (UNDP 1993: 105).

That is, life expectancy, literacy, enrollment and per capita income are supposed to capture these capabilities. These are, however, only assertions. We need to look for the underlying reasoning.
Concerning life expectancy, the *HDR* 1990 explains:

> The use of life expectancy as one of the principal indicators of human development rests on three considerations: the intrinsic value of longevity, its value in helping people pursue various goals and its association with other characteristics, such as good health and nutrition. The importance of life expectancy relates primarily to the value people attach to living long and well (UNDP 1990: 11).

This intrinsic value of longevity is evidently taken to be a practical truth. Its relation to other goals and their characteristics needs more development.

Concerning knowledge, it is theoretically defined by a practical decision. The *Human Development Report* (UNDP 1990: 12) contends that literacy is the person's first step in learning and knowledge-building, but it recognizes that other variables should also be taken into account (as in fact future reports did by adding enrollment).

Concerning the third key component of human development, "command over the resources needed for a decent life", it is first recognized that taking per capita income as an indicator has strong limitations, because it leaves aside non-tradable goods and services and the distorting effects stemming from exchange rates anomalies, tariffs and taxes (UNDP 1990: 12). The three components chosen (health, education and resources for a decent life) are not the only relevant factors. However, insofar as more variables are added, they will all decline in significance. Further, "the income component of the HDI has been used as an indirect indicator of some capabilities not well reflected, directly or indirectly, in the measures of longevity and education" (Anand and Sen 2000: 86; see also 99 and 100).

Additionally, the use of logarithms for the scale of incomes has two effects: firstly, it decreases the weight of the highest incomes; secondly, the average of the logarithm tends to increase when income is more equally distributed. The first effect entails the decision of lowering the impact of the highest incomes on development (Anand and Sen 2000: 87). The second effect seems to entail a preference for equality (Anand and Sen 1994: 3). Although at a first glance the use of logarithms might seem to be only a technical decision, it has practical consequences.

However, the assumption that income is an indirect indicator of other capabilities (than health and education) is a strong assumption, because it means that income can "buy" these capabilities –which surely assumes a lot– and that their values are lower than education and life expectancy. For example, it is not clear that there is a necessary correlation between income and democracy. As the first *HDR* recognizes, "there is no automatic link between income growth and human progress" (UNDP 1990: 10).

The application of logarithm to life expectancy is even more debatable. Life has an intrinsic value and the last years of the life cannot be considered less valuable than others. Anand and Sen (1994: 5), however, also believe that life expectancy can also be thought to be helpful for other objectives and that reducing inequalities may then be relevant. Individuals would have to be considered as member of groups. In this case, however, the quality of data does not allow for this possible improvement of the Index.

Despite all these limitations, health, literacy and income still seem to be sensible dimensions for assessing human development. Of course, people from some cultures may believe that education or income, and even longevity, are not so important, and value other things– e.g. family links, or religious faith, which cannot be bought. They might indeed consider the Index as expressing the ideals of the western Enlightenment. For example, Seyed Hadi Arabi (2010), basing his arguments on the Islamic philosophers Avicenna and Mulla Sadra, stresses the importance of otherworldly well-being, wisdom and ethical virtue. Thus, we need to consider whether the simplification assumed in erasing cultural specificities might not make the HDI an illegitimate tool. In any case, either to take into account these cultural specificities or not are practical

decisions which need to be argued. As Alkire (2007: 101) says, "in the case of the HDI, the authors assumed that people across cultures, regions, ages, genders, ethnicities, and even across sources of diversity, valued survival, income, and basic education." She calls these suppositions "normative assumptions". However, she warns that the strength of these normative assumptions is deeply limited "unless the authors transparently communicate their assumptions in order to catalyse public discussion or scrutiny of these issues" (2007: 101). Practical reason indicates that decisions have to be made about the variables when building the Index. It is difficult to know whether the decision that was made is the best, but if its basis is "collaborative, visible, defensible, and revisable" (Alkire 2002: 77), it is justifiable. Thus we need to establish a process of decision-making. If not, we have an insufficiently illustrated practical decision: a practical decision without practical science.

The second practical decision was to assign an equal weight to the three variables. This also sounds reasonable but the arguments for doing so were not presented in the Reports.[65] There is only the statement that all three of the HDI components are equally important and thus deserve equal weight (UNDP 1991: 88).

Within the domain of Knowledge the decision to assign two thirds of this part of the Index to adult literacy and one third to the combined gross enrollment is also a practical decision. Given that enrollment implies literacy, the assignment of two thirds to adult literacy entails assigning more relevance to the present than to the future. Concerning enrollment, the decision to give the same weight to primary, secondary and tertiary education also counts as a practical judgment not explained in the Report. Bagolin and Comim identify this assumption as an example of issues not effectively addressed:

> Education represents 1/3 of the index weight. Higher education has the same weight as fundamental education. It is almost frivolous to question if higher education has the same intrinsic value as fundamental education. It is also possible to ask why income, that represents all standard of living aspects, goes through a diminishing returns to scale in the HDI and why the same does not apply to education? Could higher education be considered a basic capability? (Bagolin and Comim 2008: 25)

In addition, the 2009 Report (UNDP 2009: 205-206) recognizes that combined gross enrollment ratios can hide important differences among countries associated with differences in quality, grade repetition and dropout rates. This simplification then has also practical consequences. The last *Human Development Report* has introduced changes in order to improve the consideration of this dimension. Instead of literacy and enrollment as the indicators, it uses the mean and the expected years of schooling. This seems to be closer to the actual situation of education because it implicitly considers the possibility of desertion.

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[65] For Lucio Esposito and Enrica Chiappero-Martinetti (2008: 3) "the act of *not* giving weights – equivalent indeed to the assignation of identical weights to each dimension– is itself a subjective decision motivated by the value judgment that those dimensions are equally valuable. (...) In the literature (...) the possible meanings of the statement 'dimension *h* is more important than dimension *k* have not critically been searched for."

There is an interesting observation from Martha Nussbaum, linked to her criticism of Sen for his reluctance to make substantive commitments. She contends:

> The use of capabilities in development is typically comparative merely, as in the Human Development Reports of the UNDP. Thus, nations are compared in areas such as health and educational attainment. But concerning what level of health service, or what level of educational provision, a just society would deliver as a fundamental entitlement to all its citizens, the view is suggestive, but basically silent (Nussbaum 2003: 35).

In effect, the HDI only determines the extreme values of the variables, and does not define threshold values, analogous to, e.g., the "poverty or indigence lines". This might be legitimate but would entail a detailed explanation of why extreme values are preferred.

In sum, we need to explicitly justify the practical decisions we make. If the values we employ are not rationally founded and established, we can be accused of exhibiting ideological bias. The HDR's first issue explicitly declares that its orientation "is practical and pragmatic (...). Its purpose is neither to preach nor to recommend any particular model of development" (UNDP 1990: iii). However, the HDR continuously uses "should" and "must" constructions: that is, values are present and thus need to be explicitly justified. This justification calls for a definition of concepts and decisions about values, tasks of theoretical and practical reason.

The HDI relies on theoretical definitions and practical decisions that are insufficiently explicit or argued in the Reports. A greater specification of these definitions and the underlying arguments would improve the quality of the Index. As Ingrid Robeyns (2005b) argues, a description of how and why the dimensions used were chosen could be of tremendous value even if it only consumed one short paragraph.

Another index introduced in the 2010 *Human Development Report*, the Multidimensional Poverty Index (MPI), considers more variables. It takes into account multiple deprivations at the individual level in the same dimensions of the HDI: health, education and standard of living. The data for this index come from household surveys. The MPI establishes thresholds for the three dimensions, introducing new indicators. It combines the multidimensional headcount ratio (the proportion of the analyzed population that is under the threshold) and the intensity or breadth of poverty (the proportion of indicators in which the population is deprived). "The basic intuition is that the MPI represents the share of the population that is multidimensionaly poor, adjusted by the intensity of the deprivations suffered" (UNDP 2010: 222).

This index uses Nutrition and child mortality as indicators of health, years of schooling and children enrolled as indicators of education and a series of access to services and assets (cocking fuel, toilet, water, electricity, floor, etc.) as criteria for determining the threshold of the standard of life.

Although the Report does not expand on the reasons for choosing the new indicators and their weights, a linked Working Paper (n. 38) of the Oxford Poverty & Human Development Initiative (OPHI) does. Concerning dimensions, it asserts (Alkire and Santos 2010: 18) that the selection of them has relied on the following mechanisms: *participatory exercises*, use of some *enduring*

consensus, particularly surrounding human rights and the Millennium Development Goals (MDGs), *theories*, as many philosophical or psychological accounts of basic needs, universal values, and human rights, and finally a binding constraint –*whether the data exist*.

In the same vein, the OPHI paper argues, based in a 'reasoned consensus', for the election of indicators and the determination of weights. I celebrate this initiative which responds to some of the critiques and suggestions exposed along this Chapter. I think that this conclusion, far from invalidating the critiques, validates them because it means that the UNDP is actually doing what I was claiming for. However, as the Report recognizes it (UNDP 2010: 118):

> fully realizing the human development agenda requires going much further. Putting people at the center of development is more than an intellectual exercise —it means making progress equitable and broad-based, enabling people to become active participants in change and ensuring that achievements are not attained at the expense of future generations. Meeting these challenges is not only possible but necessary —and more urgent than ever.

Summing up, as a case study, HDI makes clear how theoretical definitions and practical judgments are embedded in technical proceedings. These conclusions will prove to be useful when we turn to constructing the blueprint of the development machine. This is the topic of the next Section.

5. Conclusion: The HDI as a blueprint for a normative socio-economic machine of human development

In Section 7 of the last Chapter and in the first Section of this Chapter, I defined, on the one hand, normative socio-economic machines as stable arrangements of capacities in order to get a particular result. In the case here this result is a social goal: human development. On the other hand, I defined normative socio-economic models as designs or blueprints of normative socio-economic machines meant to produce their intentional results. Theoretical reason provides the concepts and the knowledge of the relevant categories to build such a model. There involves the work of adjustment and right combination of these categories. This work may take time and calls for the participation of the three uses of reason: we need to refine concepts and the rules of their combination (theoretical reason), to deliberate about practical categories (practical reason), and finally to build the index (technical reason). Models can and should be improved. Because of this both normative machines and models are always evolving.

In this Section I will argue that the HDI is a good model for the construction of a socio-economic normative machine leading to human development. However, I will also argue, it needs to be improved in the way mentioned by Robeyns (2005b): adding an explanation of the proceeding followed for deciding on the practical aspects involved in it.

The HDI has the characteristics of a normative socio-economic model. First, the HDI has the evolving character of normative models. As the 1993 HDR makes clear, "the concept of human development is broader than any measure of human development. Thus although the HDI is a constantly evolving

measure, it will never perfectly capture human development in its full sense" (UNDP 1993: 104). On this point, Bagolin and Comim (2008: 25) add:

> The evolution of the HDI showed a remarkable resilience of this index, keeping its original ideas, dimensions and aggregation procedures, at the same time that it showed great flexibility in incorporating sensible criticism and methodological advancements (as illustrated by the HDI related indexes).

This involves the continuous work of theoretical, technical and practical reason to improve the Index.

Second, far from being only a measurement tool, the HDI is above all a normative tool. Despite its imperfections, the Index has been defended in terms of its pragmatic usefulness. The HDI works as a motivator of social and economic policy decisions favoring human development. This was the argument of Ul Haq and of Streeten. A simple number, as even old Plato already knew, often has more impact than a long list of indicators combined with qualitative discussions. In this way, it effectively acts as a model of a normative socio-economic machine.

The rhetorical strength of this simple way of representing development and promoting policy adjustments directed towards it cannot be overlooked. Thus, the improvement of the HDI can be achieved without affecting its attractiveness: the final index number should be more and more refined, but it should continue being a number. Still, as Bagolin and Comim remark "much remains unaccounted and that even after all the technical modifications implemented by UNDP, the HDI has not proved able to reply to the majority of the criticisms that it has received" (2008: 25). The lesson, however, seems to be that we should continue on the path of adjustments and refinements.

One relevant point of improvement, as I argued in the previous Section, is to obtain a more explicit account of the definition of concepts and practical decisions. Where could we place these definitions? Models are not only formulas but also their surrounding definitions and explanations. As Uskali Mäki (forthcoming: 7) asserts, "the role of model descriptions becomes essential." I think that the HDI would gain if the corresponding Reports included a new Section presenting the definitions and values involved together with the arguments for them. This Section might make reference to Annexes, background papers and complementary Indexes, and Sections already included in the Reports.

The design of the HDI, then, needs more work on the definitions and values involved in it. The UNDP should develop rational arguments and advance them. They should be based on strong and widely accepted philosophical bases. The procedure for the acceptance or rejection of these arguments should be clearly established: who, when and how will intervene in this process (scholars, politicians of different colors and countries, general public?). These procedures should be stable, or at least the criteria for their change must be stable. This work will lead to the clearer definition of the components of the HDI, their weights, and make explicit their relation with values of the technical aspects of the index. A report of this process should be included in the HDRs. As Sen (1999: 80) emphasizes, "the implicit values have to be made more explicit."

Sen (2009: xii) also argues that institutions can be important "in facilitating our ability to scrutinize the values and priorities that we can consider, especially through opportunities for public discussion." Davis and Marin conceive democracy as one privileged social *locus* for practical reason: "through allowing and encouraging public discussion, democratic political systems can help the formation of values" (Davis and Marin 2007: 5). The UNDP should be sensitive in some way to these sorts of discussions.

There is a trade-off between the idiosyncratic and individual nature of capabilities and the establishment of a common Index based on common values. That is, there is a trade-off between accuracy and universality-operativeness (see De Langhe 2009). However, there must exist a procedure for reaching an agreement among reasonable people about the values involved and the consequent specification of human development.[66] As Comim argues, we need to establish "procedures for solving the trade-offs, conflicts and inconsistencies between different options" (2008: 164).

I am aware of the difficulties that could be involved in this work. However, although it not an easy task, at least we must try to look for a *reasoned* consensus about values. It is not only or always a matter of voting. They are relevant definitions and decisions entailing previous research out and development of theory. Given that values are involved we have to put them on the table; if not, there will always be reason for criticism. After all, if values are not reasoned we will have unreasoned values, because, as shown, they are always present. Sen (2009: 241) recognizes the difficulties involved in this work but he has hope in the possibility of doing it: "The choice and the weighting may sometimes be difficult, but there is no general impossibility here of making reasoned choices over combinations of diverse objects."

Once clearly concepts are defined and practical arguments are made explicit, we need to define the indirect *measurands* and the technical aspects of the Index. Finally we postulate the corresponding formula. The relation with values of these technical aspects will have been made explicit in the text of the Report.

The annual calculation and publication of the HDI is the last step in producing the normative model and the first input of the socio-economic machine. The most relevant fact is, however, that the HDI is an evolving normative model building a socio-economic development machine and that theoretical, technical and practical reason participate in its construction. This normative model should include all the relevant arguments and information needed to construct a good socio-economic normative machine, i.e. a machine which is the embodiment of the effective work of practical reason in order to attain development in each place and situation. This machine might be different for different countries. Although the reasoned process of defining capabilities and weights might be thorough and lead to rather universal conclusions, the specific culture or situation of country might suggest another combination of objectives. Besides, a country might try to achieve a greater level of disaggregation and to define additional objectives or details. As remarked, for Cartwright, socio-economic machines should be local:

[66] Sen (1992: 117) asserts: "It is not unreasonable to think that if we try to take note of all the diversities, we might end up in a total mess of empirical confusion. The demands of practice, as well as reasonable normative commitments, indicate discretion and suggest that we disregard some diversities while concentrating in the more important ones." The task will be to reason and decide what are important and what are not.

> Each of the countries studied has a different socio-economic structure constituting a different socio-economic machine that will generate different causal relations true in that country and concomitantly different probability measures appropriate for the quantities appearing in these relations (Cartwright 2002: 143).

The HDRs' Section on definitions and values would help to achieve local re-definitions and make if possible to adopt the corresponding measures of social and economic policy. That is, it will help the work of practical reason in the construction of the particular normative socio-economic machines.

The HDI constitutes an example of the type of work performed by practical reason. It sheds light on more general possibilities of it regarding the definition of aims and policies in different communities. In Chapter III (3.1.2), I proposed an Aristotelian list of capabilities to be sought in the context of the Aristotelian *polis*. However, we have to take into account that the Aristotelian polis is not a descriptive but a normative concept. It has never existed with the properties assigned by Aristotle, though we can extract from Chapter II of Book I of *Politics* the desired characteristics of the Aristotelian polis: it is fully self-sufficient, it exists for the sake of a good life, it is possible because men possess "a perception of good and evil, of the just and the unjust". The Aristotelian *polis* promotes a life of virtue for all its citizens, given that this kind of life leads to *eudaimonia*. This was not a description of Aristotle's contemporary cities, but his normative conception of them. He produced this conception by the use of practical reason. We may think that today modern liberal society is far from this Aristotelian ideal. We live in a globalized world, there is no unified conception of the good, and governments do not worry about people's virtues (indeed perhaps people would resist this "paternalism").

However, I think that institutions such as the HDI might originate "modern *poleis*" (the Greek plural of *polis*). Given the nature of the practical realm, especially the special role of context, a local analysis would be appropriate when trying to apply the universal prescriptions implicit, for example, in the HDI. These applications remain, however, within the context of international programs. Today we seek to achieve a harmonization of global principles and policies with local conditions. Institutions such as the UNDP, in fact, seek to work along these lines. Moreover, the fulfillment of each and every individual and the protection of their freedoms are central to the notion of human development: this is the modern *eudaimonia*. The provision of the capabilities implied by the dimensions of HDI originates in concrete functionings, which are the essentially modern *virtues*. All this process is governed by practical reason.

I think that good examples of institutions shaping modern *poleis* are the local offices of the UNDP in different countries throughout the world (http://www.undp.org/countries/). The closest to me is Argentina's office. It produces reports on the HDI and on the Millennium Development Goals as applied to the country. This office has published several reports and it is currently working on or maintaining an advisory role in 80 different projects conducted by state offices or NGOs in different areas of the country. This work is performed in joint cooperation with the central and local governments, and with the advice of key actors of the civil society. For example, the Board of Advisers for the 2009 Report (PNUD, 2009) included the Ministers of Science

and of Education, renowned University professors, a local Minister of Innovation, the President of the National Council of Researchers, a member of the Congress, a famous writer, and the Director of the Buenos Aires office of the UN Commission for Latin America and the Caribbean (ECLAC). The office's technical team is comprised of professionals highly skilled in their field. This report calculates the different indexes included in the UNDP HDR for each individual province of the country. This fine work allows for an analysis of uneven growth of the different dimensions of the indexes and of inequalities between provinces. It looks for causes of these inequalities and proposes remedies. The 2009 Report (PNUD, 2009), for example, indicated that while the health and education dimensions have performed satisfactorily, income growth was found to be comparatively low. It then analyzes the shortcomings in productive innovation and investments (which could be at the root of this slow growth), and proposes changes in the national innovation strategy. It also detected the most acute problems in certain provinces. Other reports focus on education, health, and housing problems. Furthermore, the aforementioned projects analyze specific problems stemming from those conclusions more thoroughly. For example, water contamination in some areas, improving transportation services, medical supply management systems, reform of government offices, primary medical care strategies, assistance to self-run firms, and education for handicapped adolescents. Thus, such institutions have an overarching vision of development needs; they can conduct specific studies; and then, they can propose priorities. They do this rather informally, including actors from different sectors, especially involving the government. These offices can urge the Congress to study certain problems, propose adequate laws and to provide advice on the National budget.

The combination of actors in modern institutions such as the UN, governments and NGOs constitute a modern *polis*. They can and do assess development needs from a local perspective, in cooperation with people in particular areas, deliberate about priorities and help to define concrete actions. In this way this institutional network is concerned with people's happiness, ensures the provision of necessary capabilities, and fosters the free pursuit of other capabilities that particular individuals consider relevant to their happiness (see Chapter III, 3.1.2). Thus, practical reason is concretely embodied in the work of these institutions: all these achievements are the fruit of their work in particular social contexts.

Based on the above analyses, these institutions may have the capacity to build more detailed indexes than the current HDI that are much more fine-tuned to local conditions. This is one of the possible ways in which practical reason contributes. It aids in a process with occasional failures and consequent corrections always trying to foster broad goals of development such as, for example, associated with these indexes. Additionally, these indexes can be disseminated widely by the media thus provoking social participation in their interpretation and understanding. In this way we can institutionalize a socio-economic model at the local societal level defining the capabilities needed or desired by local circumstances. A local HDI could give us a socio-economic machine appropriate to the conditions of a specific area. To design these detailed models we need not only technical competence but also experts from local cultures: the most important definitions of capabilities involve their weights, and decisions about these should be made by the institutions or individuals that represent people at the local level. Institutions thus function as

socio-economic machines that, through practical reasoning, appraise, deliberate and guide decisions about capabilities. As such, institutions embody practical reason, and constitute the modern *poleis*.

Chapter V: Conclusion: Theoretical and Practical Reason in Economics

This brief chapter will recapitulate the path traveled in the thesis, and review its main conclusions. The deep aim of the thesis was to argue for the need to restore the use of theoretical and practical reason in economics. In Chapter I, starting from the requirement of more refined measurement of social and economic development, it was shown how necessary the exercise of theoretical and practical reason are for social science. By theoretical reason we investigate and explain the real causes of events; by practical reason we determine our ends in order to act; by instrumental or technical reason, given our ends, we look for the best way of achieving them. Theoretical reason has mainly to do with the questions "what" and "why", and is concerned with knowledge; practical reason has to do with the question "what is one to do and why"; and instrumental reason with the question "how to do it". In addition, Chapter I also explains why I adopted the Aristotelian conception of these forms of reason: other views disconnect theoretical from practical reason or subsume practical reason in instrumental reason.

The thesis presents Nancy Cartwright and Amartya Sen's thinking as instances of a beginning rehabilitation of theoretical and practical reason in natural and social science. Cartwright speaks about "capacities" as the real causes of events, and thus thinks in terms of the work of theoretical reason in science. Sen applies practical reason to define the "capabilities", freedoms or possibilities of the human persons. Both Cartwright and Sen link these concepts to Aristotelian notions. Thus, the thesis sees Aristotle as an important stimulus for the thinking of Cartwright and Sen, and looks at how we may use their ideas to develop an understanding of theoretical and practical reason that is valuable for solving practical prolems in science and society. This suggested this research question: "How do we combine capacities and capabilities to determine an adequate way of acting in personal and social life?" The answer was that we must institutionalize theoretical and practical reason embedding them in procedures that lead people to solve practical problems thus achieving their ends.

Economists, like many other scientists, follow established pathways without reflecting too much on the meaning of it. Actually, this is not the task of each particular discipline, but of philosophy. But as Hayek (1937: 54) asserted, "from time to time it is probably necessary to detach oneself from the technicalities of the argument and to ask quite naively what it is all about." This is a nice and accurate way of expressing the role of theoretical reason: to know what it is all about. This includes, as something fundamental, knowing the causes of the phenomena we observe. Then, the first step of the thesis was to show that metaphysics matters: technical or instrumental reason is not enough. We need theoretical reason "to know what it is all about".

Cartwright calls "capacities" intrinsic powers, faculties or stable causes stemming from the nature and ends of the reality considered. She maintains that real causes exist, that science must explain causes if it wants to offer real explanations, and that scientific laws can only then be postulated, assuming we find stable arrangements of stable causes (or capacities), i.e., nomological machines. Cartwright's conception of causality is highly suitable for the topic of

this thesis. She believes that causes are real, singular and changing, and that there is a plurality of causes. She takes a position against universalism and determinism. The analysis of the connections between Cartwright with Mill, Anscombe and Aristotle in Chapter II reinforces this view. Particularly, her Aristotelian connections show the deep ontological basis for Cartwright's understanding of causes and her way of knowing them by the use of theoretical reason in the context of an Aristotelian empiricism.

When applying Cartwright's view to social reality we realize that her conception of causality fits perfectly with a world of freedom, complexity, unpredictability, reflexivity and lack of control, and that we thus need practical reason for dealing with the human realm. The difficulties associated with producing knowledge of the social world is acknowledged by Cartwright, and leads her to look at social structures (legal, institutional, psychological) to analyze the local conditions of socio-economic events on a case by case basis, and to thus look for "off-the-shelf" general principles applicable to these events. Though Cartwright does not explicitly propose it, she actually uses a different sort of nomological machine when dealing with social facts. This machine is not "out" there in nature, but is something built by us in order to get certain desired results. It is a stable arrangement of human capacities meant to achieve a socio-economic goal. In the first instance, the reasoning of the builder will be mainly technical and in the second instance mainly practical. Both uses of reason, the technical and practical, however, are intermingled in a greater or smaller degree in all human actions. The building of "socio-economic machines" implies knowing the causes working in concrete situations, which are closely linked with their types of underlying structures. I labeled these machines "practical machines" and I characterized them as normative, multiple and changing. "Practical models" are the blueprints of these machines. By these machines we confer stability on arrangements of human causes and thus allow an effective use of practical reason.

Thus the theoretical approach of Cartwright applied to the social field shows that we need to use practical reason for dealing with this field. We go from theoretical reason to practical reason. This is where we come to Sen's capability approach. Sen's key notions are capabilities, agency and freedom. The key characteristics of capabilities are their incompleteness and their multidimensionality. Sen's CA assesses human advantage by the capabilities available to heterogeneous, free and reflective agents. These capabilities possess different incommensurable dimensions and their ordering cannot be complete. This is a highly realistic picture of the human condition. What, then, is the way to rationally deal with this "space of capabilities"? By practical reason, as Sen himself maintains.

For Sen, the agent is free but not capricious: he is responsible and often other-regarding. This raises the question of how practical reason operates. Is it completely indeterminate or has it limits? Are all the capabilities determined by practical reason at the personal level and by public discussion at the social level? Or, are there some capabilities pertaining to human nature that practical reason should discover? Chapter III tackles these questions by discussing Nussbaum and Sen on the subject of lists of capabilities. The conclusion is that, as Sen argues, Nussbaum's list is over-specified. This is consistent with an Aristotelian point of view. At the same time, Sen asserts the unexceptionable character of a limited set of capabilities, just as Aristotelian practical reason guides us to a short list of capabilities related to a short list of capacities of human social

persons. Humans have capacities for theoretical and practical reason (which implies freedom), they are essentially relational or social, and look for *eudaimonia* (self-fulfillment) as the end of life., It is thus fair to say that people have the following capabilities:

1. Having the basic means for sustaining life.
2. Being able to sustain oneself through one's property and labor.
3. Having access to education.
4. Having access to law and justice.
5. Being able to participate in the political system.
6. Being able to undertake initiatives concerning personal aims, such as family, education, friendship, arts, religion, charity and, especially, virtues of all kinds.

As mentioned above, Sen actually includes capabilities such as these in his lists of substantive and instrumental freedoms. At the same time, although this Aristotelian short list of capabilities is needed for a development of the human being and society according to its nature and ends, there is still considerable room for freedom in the particular way of determining or specifying them. Considering human beings as really human implies respecting their ways of freely specifying their capabilities. We ought not just provide food, but food in its cultural context. We cannot impose specific contents on education but need to facilitate contents adequate to each different group of persons (considering, e.g., nationalities, ethnic groups, religions and gender). We cannot "export" specific political systems but need to help to design political systems as appropriate for each society.

Practical reason is also involved in addressing the problems of evaluating the relative weights of different capabilities posed by their incommensurability. In the first step we cannot commensurate, but we can compare capabilities. A nominal scale can be converted into an ordinal scale by the exercise of practical reason. In spite of the fact that this ordering of capabilities is incomplete, we can arrive at conventions about the numerical weights we assign to different capabilities. All this process is included in the Aristotelian treatment of the topics of comparison and commensuration. Chapter III shows that this is the method followed by Sen.

However, for some critics, the determination of weights we assign to different capabilities through practical reason or public discussion leaves us in a highly inoperative situation. Let me repeat Sen's answer:

> The connection between public reasoning and the choice of weighting of capabilities in social assessment is important and to emphasize. It also points to the absurdity of the argument that is sometimes presented, which claims that the capability approach would be usable –and 'operational'– only if it comes with a set of 'given' weights of the distinct functionings in some fixed list of relevant capabilities. The search for given, pre-determined weights is not only conceptually ungrounded, but it also overlooks the fact that the valuations and weights to be used may be reasonably influenced by our own continued scrutiny and by the reach of public discussion. It would be hard to accommodate this understanding with inflexible use of some pre-determined weights in a non-contingent form (Sen 2009: 242-243).

A theory of *human* development, that is, can only be multi-dimensional, context dependent and normative. If not, it would not be really human.

A last section of Chapter III establishes a bridge between capabilities and capacities, which is important for the next Chapter and for the argument of the thesis. Sen's capabilities are Cartwright's capacities, rational and free final causes, acting in the social world, and they are themselves capacities in the sense of being faculties or the possibilities of human beings. This link between capabilities and capacities paves the way to the proposal of Chapter IV: to manage practical affairs by building models which create normative policies leading to socio-economic development. These policies would shape socio-economic normative machines. The objectives of these policies would be the capabilities people choose with the aid of practical reason. Thus, these socio-economic machines are the embodiment of the work of practical reason.

In effect, Chapter IV, by going back to the last section of Chapter II, proposes building "practical models" as normative blueprints of particular socio-economic machines. These normative devices need institutionalization to work effectively. The Chapter holds that these normative institutional models allow us to develop measures needed in social and economic development. It recognizes the limitations that these measures involve, but it maintains that, given the effective power of numbers, we cannot give up using them under the condition of being cautious. Rather we need to be explicit about our theoretical definition of concepts and the practical arguments for our decisions about capabilities and the dimensions of development chosen.

The Human Development Index (HDI) of the UNDP is presented as an example of a normative blueprint or model for the development of a socio-economic machine. The Chapter treats the HDI as a case study showing the need of inserting theoretical and practical reason into economics. The HDI determines the dimensions of development in order to measure them. This is a practical reason definition. Its pragmatic aim is admitted by the builders of the Index: it has a normative aim. By choosing the *measurands* the HDI also defines the concepts of its different dimensions. Consequently, both theoretical and practical reason intervenes in the construction of the Index. However, as Sen himself allows, the arguments made about the concepts underlying the HDI are not fully developed. We nonetheless need them because, first, only arguments are convincing and thus guarantee stability. We also need such arguments because it is only fair to show how the concepts underlying the HDI were arrived at. We also need such arguments because the HDI is a universal measure and we need to know its underlying assumptions in order to be able to retrace their steps to apply them locally. In other words, given that the HDI is an idealized device we need the information required to "de-idealize" the numbers it produces. This involves the exercise of practical reason.

According to this, what are the categories that must be included in the index, and how must their weights be determined? I argued that the categories must be those included in the short list and that the weights must be defined through a practical reasoning process. Further, a complete and fair appraisal of social and economic development must include attention to the achievability of all these ends by all the individuals of society. The index should also capture important distributional concerns. The weights should be determined through consensus by established proceedings, including allowing periods for revising them. Every country must then study and eventually modify the weights adapting them to their realities in order to promote context-adapted policies.

This case study shows us that theoretical and practical reason are not only necessary but are also actually used in much economic reasoning. The emphasis here is on developing and making explicit the corresponding arguments. This requirement will lead to a refinement of the reasons for practical conventions that are often based on pragmatic motives such as the disposition of empirical data, the restriction of model-building, or simply customary uses. In this way we will combine theoretical, practical and technical reason, through the capacities, machines and models of Cartwright and the capabilities of Sen to get useful results in human society.

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