DAS FLUßBETT

Making Ranking Theory Useful for the Social World

By

MIGUEL ANTONIO FONSECA MARTÍNEZ

Submitted to the Faculty of Philosophy in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

Universidad Santo Tomás

2019
To my beloved wife Magaly and Martina my Precious Pride and Joy

Ludwig Wittgenstein

OC.97.

Ihr stürzt nieder, Millionen? Ahnest du den Schöpfer Welt? Such ihn überm Sternenzelt, Über Sternen muß er wohnen.

Friedrich Schiller

An die Freude
Preface

“Depth and triviality are close neighbors in philosophy. Then, however, one might say that one kind of progress in philosophy just consist in the transformation of the profound into the trivial”

(Spohn, 2012, p.555).

Epistemology is, at first glance, a specific field on the realm of sciences. Nevertheless, at the same time, epistemology is a general theory of what humans are doing right or wrong in all sciences. Actually, epistemology is about what are we doing right or wrong rationally in all those different fields of science. In this sense, it is a field devoted to achieving knowledge following certain rational justified principles and models. The key question is thus: why ought to follow such principles and models? And, given this, how to establish better, clear, precise and justified models of reasoning to fulfill this normativity task and challenge?

The present dissertation is thus devoted to answering such questions in the realm of social sciences. The main goal is to establish an ideal model, a methodological tool-box, for the internal or epistemic normativity of the social sciences thanks to this normative reflection. Following the legacy of Wolfgang Spohn (2011), the dissertation wants to study the epistemic normativity of the social sciences, as a central criterion of its identity and demarcation. The epistemic normativity that subjects follow to the precise understanding of social phenomena, is the core of this specific kind of scientific knowledge, and goes beyond the account of empirical methodologies that appeal to an external normativity that is not exclusive used to the treatment of objects and problems relative to the social sciences.
Through an exhaustive analysis of Wolfgang Spohn's *Ranking Theory* (2012), the work wants to define the epistemic foundations of such internal normativity as the background to the ulterior construction of a new ideal model and a tool-box of applications, given the internal or epistemic normativity here proposed, to the realm of social sciences. It is then also a dissertation devoted to methodological entailments given such a model. Thus, the work will show that this epistemological enterprise is an indispensable task to the study of social practices and their scientific study.

Hence, the first step to reach this tasks is to precise how we should work, and how to achieve good, clear and precise models and results. In this sense, the scope of formal epistemology gives us important developments and tools. This approach wants to solve all these problems using formal tools that have their origin in sciences such as logic and mathematics. Therefore, formal epistemology has the same subject matter, that is to say, in brief, the theory of knowledge, an investigates such subject matter with formal devices. Formal epistemology helps us to set a strong ground and to build epistemological models to capture the rational structure of doxastic agent’s epistemic states at a certain given time and, in the other hand, to capture the change of such epistemic states.

Given this state of affairs, belief is the basic core of epistemic states normativity. The function of belief is then to represent accurately and to produce useful states of mind. However, the notion of belief become problematic, because beliefs are dispositional and uncertain; beliefs used to appear to the doxastic subjects in *degrees of belief*. The most important entailment of this conception of degrees of belief is that the problem of truth is equally different between ungraded and graded belief. To establish degrees of certainty useful to solve all the epistemological
problems exposed above requires the development of new formal tools to model and explain such important epistemological tasks.

The mainstream paradigm, in the realm of formal epistemology, with respect to degrees of belief, is the standard probability theory account. For the probabilistic reading, the issue does not have to do with the logical necessity of knowledge, but with the concept of probability. A belief should be modeled not under the mechanics of the deduction, but through a method that allows modeling when such belief is more probable. It can be said that one of the advantages of this approach is the possibility of quantitatively establishing the growth or decrease of the plausibility of the confirmation of a belief given certain evidence. The probabilistic approach allows measuring the models that are made on epistemological problems. In addition, the possibility of talking of conditional probability constitutes a possible model to treat the problem of causality and inductive inference in a quantitative way. One of the most used tools in epistemology that borne from this approach is the so-called Bayesianism. In that sense, standard probability theory cannot justify defeasible reasoning and it’s change on time. The update of information and learning, or, in other words, a certain dynamics and coherence of the change of degrees of belief is possible thanks to the bayesian conditionalization. This derives on degrees of justification. Given a certain amount of background evidence we can fix different degrees of belief and it entails the degree of justification. In other words, the doxastic subject weights the evidence according to certain rules of update. Probability devices are useful to measure and set how the degrees of belief behave in rational ways statically and dynamically. The goal is then to set a rational mechanism of belief behavior.
Rationality is a strong degree to fix credence. However, probability standard theory is a sort of continuum when you cannot fix properly the notion of belief. Several tools of formal epistemology want to solve certain problems of standard probability theory, such as the big problem of the dispositional essence of the notion of belief and the inner fixed character of belief states. Among the most notable variations of the theory of probability, there is the formal epistemology device called ranking theory of Wolfgang Spohn (1988, 2012). This theory arises from the probabilistic approaches, but adds a strong influence of another formal model called the semantics of possible worlds, which is based on the modal logic (Gamut, 2010).

The theory of Spohn emerges as a response to the probabilistic mainstream with respect to justify degrees of belief and non-monotonic reasoning and, in addition, wants to solve another typical epistemological problem, the so-called inductive reasoning. A large part of this kind of reasoning refers to the possibility of project observable patterns to a number of ulterior unobservable instances. The fundamental problem is then the ground that justifies this type of reasoning. The problem has for Spohn a common starting point: the clarification of the nature of the concept of belief, its statics, dynamics and the possibility of establishing properties of knowledge through formal representations of belief (Huber, 2016).

With respect to probability theory, which is unable to represent accurately the notion of belief, ranking theory represents a static and dynamic theory of belief, with the advantage to represent and set a symmetric definition of the notion of rational belief. Is also a theory of degrees of belief and explains then the uncertain character of belief. In this sense, given that degrees of belief are closely related to inductive inference and defeasible reasoning, it is also a theory of this special realms.
Ranking functions are gradings of disbelief. Ranking functions represent that a certain belief is believed or taken to be true to some defined degree. In the other hand, it can represent that a certain belief is disbelieved or taken to be false to some defined degree. The analysis of the conceptual components of knowledge then begins with the study of the belief and its foundations is then the main goal of Spohn’s account. Ranking theory or the so called Laws of Belief of Wolfgang Spohn is a theory on wide issues in epistemology and synthesis and a full account on the theory of belief. The theory provides a normative approach to belief, belief change, belief revision, and provides either a lot of possible applications to issues related to rationality, normativity, causation and decision theory.

I examine deeply the Spohn’s ranking theory, as the ground to develop the goals of this dissertation. I learned a lot of ranking theory and Spohn’s philosophy thanks to close work and advice at Konstanz. I began to investigate on Spohn’s work since 2008 after my first visit to the University of Konstanz and trough this journey I adopt this theory as the most accurate tool to develop the bed of the river, a strong theory on the rationality, to draw a good means-end account for the social world. I argue, thanks to ranking theory, that a strong theory on the rationality allows us to create epistemic models useful to create the social reality and, in the other hand, a methodology tool-box to understand and explained what our collective mind has created.

In this sense, the philosophical applications of ranking theory an how to make it useful for the account of an internal normativity of social sciences are perhaps the most salient entailment of the theory. Applications are, using an analogy, the creation of a toolbox for the specific objectives of this work. The tool of reasons, as functions of transmission of epistemic
justification, is the first and fundamental application. The concept of reason is a sort of warrant or epistemic justification between propositions.

The second tool is the application of ranking theory to subjective normativity or *ceteris paribus* laws. Spohn’s (2012) reading on ceteris paribus laws claims that this subjective normativity is the case when we can obtain normal conditions in a given ontological region. In other words, normal conditions are an epistemic issue related to epistemic agent’s beliefs and reasons given certain background. Doxastic agents belief defeasible a priori certain hypothesis given necessary and sufficient reasons as a ceteris paribus law.

Finally, the account on causation and the origin, position, novelty, and fortune of Spohn's proposal is remarkable. Causation theory and applications are the synthesis of the whole system of epistemic tools, and off course the principal and rich tool to the tasks of the dissertation.

This structure given by ranking theory allows us to set an epistemic normativity proposal driven by the formal rules of doxastic rationality. In this sense, the laws of belief become the rock-bottom and structure of the rationality. Spohn treats two main topics with respect to a well accurate grounding for an epistemological normativity frame with respect to our inference *switching yard: perception and a priori belief states*. Off course, the link and goal related to these two aspects is the achievement of knowledge, that is to say, at least, true belief. In that sense, the achievement of true belief in a normativity perspective is then addressed to the conception of a justified belief. Hence, the first problem to deal with is the concept of justification; this task will reveal the origins of justified belief and the right path to a normative picture of knowledge.
In the other hand, the epistemological normative frame is completed by the a priori structures of our cognitive system. A priori structures are another type of epistemic justification and normativity that seems to be independent of experience. Spohn’s *dynamic apriority* bets for a flexible conception of apriority that could match with different doxastic states of the mind. Apriority is a dynamic notion related to our conceptual development and to the structure of rationality itself. Truth-conduciveness of reasons is then the key to achieve an apriority normativity given a coherentist background with respect to the notion of truth.

Given all these strong epistemological machinery of ranking theory, the dissertation finally can start to develop a novel account that wants to achieve the goal to make ranking theory useful for the social world. This development wants to throw light to certain foundational and methodology aspects of social science and would to be capable to be useful for philosophers and empirical social scientists. The idealized model of rationality developed by ranking theory is then applied to some important aspects of the social world as novel research and methodology *toolbox* for social sciences. This is the first approach of an extended research project; the proposal is then the *riverbed* for an ulterior research project of interdisciplinary applications as a way to test the epistemic conditions model developed in the present work.

Social entities and social action required normative epistemic conditions for the doxastic states of agents and social agents in order to set the ulterior doxastic states of other agents and groups of doxastic agents. To achieve the goal to create social entities and perform collective action, the social world requires that a social agent and its members satisfy a given model of epistemic conditions. Such normativity is thus a sort of ideal or formal theory of the possibility to establish criteria for interactive knowledge.
This theoretical model of epistemic conditions or normativity for the interactive or collective knowledge allows us to enable or disable collective formation of entities and prevent or suggest collective action. Collective knowledge requires to evaluate our beliefs and reasoning as justified or unjustified, and in doing so, we are doing normative judgments about them. As epistemology is a normative discipline, the relation between norms, rationality and reasons is ineluctable.

Thus, there is a sort of twofold normative regulation. In one hand we have the relative regulation with respect to a certain goal (instrumental) and, in the other hand, a regardless prescribing perspective with respect to any goal. Therefore, the principles of logic, or those of probability, and raking theory are the most general norms for belief. No one can be said to belief without these norms. The task is then how to guide, regulate, and implement them as part of our epistemic practices. This argument drives to the following definition: Epistemic norms are necessary and sufficient conditions with respect to an epistemic state if and only if are warranted by a perceptual or a priori justified reason.

Ranking Theory expresses these two general views on normativity and is the rationality model or riverbed here used to achieve the complex means-end to obtain knowledge in the social world.

The first step is to develop this novel epistemic normativity riverbed is to show the link between ranking theory and the so called building blocks of the social reality. In a second moment, we shall see the many tools derived from ranking theory applied to the social world. First of all, the tool of the dynamic of reasons and its entailments, that is to say, the ceteris paribus account to social sciences and a methodology model grounded in causality. Following this, we shall see the normative entailments to the internal normativity of the social sciences and
the paradigm of the internal deliberation for the social sciences. Finally, we will argue in favor of a further research horizon with respect to the present proposal and Artificial Intelligence.

The rhetoric of the present dissertation is therefore constructive; the reader has to hold the breath until the last chapter to see the harvest. However, the harvest is just a starting point for a further inquiry as the whole philosophy used to be, a never ending attempt to transform the profound into the trivial.

Finally, there are many people to thank. First of all, I would like to thank my supervisors Wolfgang Spohn and Juan Carlos Moreno. They were great dissertation directors; their help and wisdom were invaluable. I thank my wife’s patience and detailed comments, and the everyday advice and unflagging enthusiasm of my head advisor Martina Fonseca. I would like to thank my parents and family for their invaluable support and especially to my dear Melquisedec, and the corrections and company of Marcela Fonseca and Mariela Solano. In this sense, the help and encourage of Olga and Manuel Vega were an oasis in the middle of a Roman summer. I thank my colleagues in the University of Konstanz: Jonas Linz, Guillaume Khayat and Albert Dikovich; I learned much from our philosophical and historical discussions, but above all from a shared lebenswelt. In this sense, I thank a shared journey in good company to my colleagues in Bogotá, especially Catalina Duque, Ricardo Palomares, Damian Pachón, Manuel Prada, Alejandro Pérez, Arturo Orrego and Danny Marrero and all the staff of dear professors of the faculty.

The Colciencias-Universidad Santo Tomás and DAAD scholarships were the main economic support of this research, and I want to thank all their staff of people to help me to finish this work, and mainly, to the help and advice of Fredy Santamaría, Modesto Gómez, Rafael
Antolínez and the Welcome Center of the University of Konstanz and the kind head director Frau Hagedorn.

Finally, I know that Lucila, José Luis and Carolina advised me several times, in front of the river, singing like little birds.

Soli Deo Gloria.
## CONTENT

1. **The Internal Normativity of the Social Sciences** ................................................................. 1  
   1.1 Introduction............................................................................................................... 1  
   1.2 The Demarcation of the *Geistes Wissenschaften* ...................................................... 1  
   1.3 Spohn’s Key Difference............................................................................................ 8  
   1.4 The Legacy and the Agenda ................................................................................... 13  
   1.5 The Origins of Ranking Theory............................................................................... 16  
      1.5.1 Formal Epistemology .................................................................................. 16  
      1.5.2 Introducing Ranking Theory ....................................................................... 23  
2. **The Laws of Belief** ............................................................................................................. 27  
   2.1 Introduction............................................................................................................. 27  
   2.2 Traditional approaches to belief .............................................................................. 28  
   2.3 The belief and its objects: The neutral account of Wolfgang Spohn..................... 33  
   2.4 Dynamics of belief: the problem of induction ........................................................ 41  
   2.5 Ranking Theory ...................................................................................................... 46  
3. **Philosophical Applications of Ranking Theory** ................................................................. 57  
   3.1 Introduction............................................................................................................. 57  
   3.2 Reasons ................................................................................................................... 58  
   3.3 Ceteris Paribus Laws............................................................................................... 64  
   3.4 Causation................................................................................................................. 71  
4. **Two Lectures on Epistemic Normativity** ........................................................................... 87  
   4.1 Introduction............................................................................................................. 87  
   4.2 Justification and Perception .................................................................................... 88  
   4.3 A priori structures ................................................................................................... 97  
5. **Making Ranking Theory Useful for the Social World** ..................................................... 108  
   5.1 Introduction............................................................................................................. 108  
   5.2 The Building Blocks ............................................................................................. 112  
   5.3 A Methodology Tool-Box..................................................................................... 116  
      5.3.1 Reasons and Society ................................................................................... 116  
      5.3.2 Normal Conditions in Social Sciences ......................................................... 120  
      5.3.3 Causation in Social Sciences ...................................................................... 124  
   5.4 An Epistemic Normativity Frame for the Social Sciences ...................................... 128
1 The Internal Normativity of the Social Sciences

1.1 Introduction

The present chapter introduces the aim to establish an ideal model of the internal or epistemic normativity for the social sciences. Following the legacy of Wolfgang Spohn (2011), the dissertation wants to study and the internal normativity, or epistemic normativity, as a central criterion of demarcation of the social sciences. The internal normativity that subjects use to the understanding of social phenomena is the core of this specific kind of scientific knowledge and goes beyond the account of empirical methodologies that appeal to an external normativity that is not exclusive used to the treatment of objects and problems relative to the social sciences. Through an exhaustive analysis of Wolfgang Spohn's ranking theory (2012), the work wants to define the epistemic foundations of such internal normativity as the background to the ulterior construction of a new ideal model and a tool-box of applications, given the internal or epistemic normativity here proposed, to the realm of social sciences. Thus, it can be shown that this is an indispensable task to the study of social practices and their scientific study.

1.2 The Demarcation of the Geistes Wissenschaften

One of the most important tasks of philosophy is to establish the limits and the authenticity of a scientific conception of the world. Philosophy aims to ground and problematize the methods from which science can obtain knowledge about the world. Hence, from the set of elements that constitute what we can call reality, that is, the set of objects that sciences treat with, we can identify two perspectives that establish the demarcation criteria for the constitution and the validation of the scientific knowledge.
First, there are the objects of study of the *natural sciences*. Its distinctive features are described by the set of special disciplines that have physics as a reference, and whose correlates are close to the objects, which do not require the intervention of any subject for their existence, and which are tied to the construct of empirical beliefs and objective measuring of evidence as Searle claims:

We can see the distinction between the distinctions clearly if we reflect on the fact that we can make epistemically subjective statements about entities that are ontologically objective, and similarly, we can make epistemically objective statements about entities that are ontologically subjective. (…) Mountains and molecules, exist independently of our representations of them. However, when we begin to specify further features of the world we discover that there is a distinction between those features that we might call intrinsic to nature and those features that exist relative to the intentionality of observers. (Searle, 1995, pp.8-9)

In second place are the so-called *social sciences* that have as a correlate and objects of study the set of individual and collective products of the human mind (Spohn, 2011, p.1).

Therefore, a task of the highest relevance for philosophy is to establish solid foundations to obtain genuine knowledge in social sciences. However, at first glance, we can think with authenticity what kind of interest *society* can have for philosophy and not allow that work of expertise to social scientists. It can be said that these blurred boundaries between the approaches of sociology and philosophy about the nature of society and its specific ways of obtaining knowledge are based on the *normative character* of the human activities that the second discipline reveals (Miller, 2014). Such correspondence of human norms and behaviors, within
the framework of a scientific and rational vision of them, is then the starting point of this account of the philosophy of the social sciences.

Such research is the case long before the existence of special or particular sciences. We can talk of the birth of this reflection in early modernity with the philosophy of Descartes (1641). The object of the physical sciences would be linked to what was called \textit{res extensa}, and paradigmatically the so-called \textit{res cogitans} would be related to the sciences of the mind or human sciences. Although the causal relationships between these two types of substances, and the ontological and philosophical revision of the proposal, turned it into an obsolete reading, it nonetheless established an indelible hallmark on the development of western philosophy and epistemology.

Even today there is evidence of Cartesian dualism, mainly in the debate about consciousness. It is thought that explaining the human sciences consists of dealing with the manifestations of consciousness. The knowledge of these phenomena is centered on the studies on consciousness that try to integrate it into the causal nexus of all nature or to understand the phenomena of consciousness as derivatives of biological processes (Spohn, 2011, p.2).

In a second moment, after the emergence of particular sciences in the eighteenth and nineteenth century, methodological criteria of demarcation are suggested as a possible solution to the problem of the specificity of knowledge in social sciences. The emphasis of the investigation that corresponds to this time is synthesized pertinently by the proposal of Windelband (1884, p.11-13).
For the classification of the disciplines directed to knowledge of reality, it is a present customary to distinguish between natural sciences (Naturwissenschaften) and humanities (Geisteswissenschaften): in this form, (...) So we may say that the empirical sciences seek in the knowledge of reality either the general in the form of the natural law or the particular in the historically determined form (Gestalt). The one comprises sciences of law, the other sciences of events; the former teaches what always is, the latter what once was. If one may resort to neologisms, it can be said that scientific thought is in the one case nomothetic, in the other idiographic.

The founder of the school of Baden formulated the principle of methodological demarcation differentiating between nomothetic and ideographic disciplines. According to this, the physical sciences proceed nomothetically, since they seek to subsume the phenomena of which they are responsible under general laws, for a later explanation. On the other hand, the human sciences, or ideographic, describe regularities in particular provinces and generally unrepeatable reality.

The methodological demarcation criterion proposed was part of a debate that reached an important moment in Dilthey's proposal (1883) for a hermeneutics as a methodology of the human sciences.

The human sciences as they exist ans as they are practiced according to the reason of things that were active in their history contain three classes of assertions: descriptive and historical statements (…) theoretical generalizations about practical contents (…) and evaluative judgements and practical rules. (Dilthey, 1883, SW.I, p.78)
Its fundamental idea is that the human sciences should seek understanding, through the hermeneutic method of interpretation, to solve the epistemological problems that arise from the task of understanding. The center of hermeneutic understanding consists of a linguistic and historical understanding that is directly related to language as an essential feature of the humankind and its products.

This methodological dualism suffered strong criticism in the twentieth century. In the first place, faced with the difference between nomothetic and ideographic, logical empiricism raised strong criticisms of this principle of demarcation. In this regard Wolfgang Spohn says:

Single events are scrutinized everywhere, in astronomy and geology, etc., just as well as in historical or economic studies, and the attempt to generalize is undertaken everywhere; certainly, there are economic laws and perhaps even laws of history. One may suggest that the types of laws are different. (Spohn, 2011, p. 2)

Regarding the differentiation that defines the social sciences as hermeneutical sciences, we can affirm that this methodological principle of demarcation has been approached by perspectives such as the indetermination of Quine's translation:

Language is a social art. In acquiring it we have to depend entirely on intersubjectively available cues as to what to say and when. Hence there is no justification for collating linguistic meanings, unless in terms of men’s disposition to respond overtly to socially observable stimulations. An effect of recognizing this limitation is that the enterprise of translation is found to be involved in a certain systematic indeterminacy. (Quine, 1960, p. viii)
In the other hand, another important account is the behavioral approach of Davidson's interpretation:

What is the reason between a reason and an action when the reason explains the action by giving the agent’s reason for doing what he did? We may call such explanations rationalizations, and say that the reason rationalizes the action. Rationalization is a species of ordinary causal explanation. (Davidson, 1963, p. 685)

Finally, the proposal of the pretended naturalization of the semantics of Grice (1957) and his followers is another remarkable claim with respect to hermeneutics approach. Grice asserts in that sense:

An utterer is held to intend to convey what is normally conveyed (or normally intended to be conveyed), and we required a good reason for accepting that a particular use diverges from the general use (Grice, 1957, p. 387)

All these premises leads to say that, in overall, the hermeneutic philosophy can be said that there are difficulties in its foundation, because:

From an ordinary language point of view, opposing understanding to explanation is an unhappy move; since that opposition does not exist. In the relevant context, the two terms are often exchangeable. The sciences strive to understand nature just as human studies strive to understand men; cells are objects no less to be understood than texts. (Spohn, 2011, p. 3)

Finally, as the definitive response of the 20th century to the Cartesian dualism, and its legacy of a methodological division of the natural and human sciences, the philosophy of consciousness
has attempted to naturalize the study of it through methods of empirical explanation of the phenomena of the mind (Papineau, 2002). Not only has interpretation been naturalized, but also in some methodological studies of the natural sciences, understanding has been recognized as a normative criterion. Likewise, the mentioned naturalization program of semantics, thanks to psychology, and this thanks to behavioral studies, leads us to the debate on human action as a possible criterion of demarcation or methodological unification for science:

As a consequence, the issue was thrown back at the basic level where it belongs, i.e., to the question how to conceive of human action. There is no more basic level at which a principled difference between natural and human science could emerge; and reversely, if the difference cannot be perceived already there, the case is very likely to be hopeless. However, this is the level at which methodological dualist suffer their most dramatic defeat. (Spohn, 2011, p. 4)

This debate arises as to the antagonistic reading between dispositionalists and causalists regarding human agency. Ryle (1949) posits this opposition as fundamental for the explanation of human action. Hempel (1962) and mainly Davidson (1963) reduce the dispositionalist explanation to specifically causal proposals. This, which is the principally accepted position, (Schlosser 2015), then seeks a methodological unification in virtue of the naturalization of philosophy:

The philosophy of action provides us with a standard conception and standard theory of action. The former construes action in terms of intentionality, the latter explains the intentionality of action in terms of causation by the agent’s mental states and events. (Schlosser, 2015, p. 1)

In front of this ontological and methodological unification, a new path is proposed that does not follow the classic problems of the traditional methodological division that we have described
in general terms, nor to naturalization and methodological reductionism. This alternative, which
is part of the current debate that seeks a dialogue between naturalism and normativity as criteria
for a methodology of the social sciences: “Paying due attention to the normative dimension of
human societies is indispensable for an adequate account of us humans as social beings”.
(Risjord, 2016, p. 5) Risjord’s proposal is then condensed in the proposal of Spohn (2011):

Single events are scrutinized everywhere, in astronomy and geology, etc., just as well as in
historical or economic studies, and the attempt to generalize is undertaken everywhere; certainly,
there are economic laws and perhaps even laws of history. One may suggest that the types of laws
are different. (Spohn, 2011, p. 2)

1.3 Spohn’s Key Difference

Spohn's moderate vision is framed in the naturalization of normativity as a demarcating
criterion of the methods of the social sciences. After developing throughout his career an
epistemological analysis framed in the so-called formal epistemology that ends in the collection
of his work called Ranking Theory (2012), Professor Spohn discusses the problem of the criteria
of demarcation of science from the concept of normativity discussed in an epistemological key.
The following is his proposal:

There is a principled methodological difference between the natural and human sciences. The
basic point is that human sciences are shot through with normative considerations in an
irreducible way in which natural sciences are not. (Spohn, 2011, p. 4)
The concept that would allow a methodological element of demarcation is then the normative component that prevails in the human sciences and that springs from an analysis of the rationality and agency of human beings:

Usually, the realm of normativity is decomposed into two parts, which are, of course, interrelated. One part relates to our actions: what should we do? The other part relates to our beliefs: what should we believe? Thus the realm of the normative basically divides into theoretical and practical issues. (Spohn, 2011, p. 4)

Normative discourse expands as theoretical normativity to matters such as good or bad inferences; Relationships and differences between determinism and probability, etc. Equally, there would be normative principles of practical reason as the maximization of utility normativity; game theory; rational decision theory, etc. In addition to these, certain criteria of ethical normativity:

More salient than all such norms of rationality are the more substantial ethical norms about how to lead a good and virtuous life and moral norms of justice, fairness and peaceful coexistence, norms that may enter legal codes or may be used as critical instances against positive law. (Spohn, 2011, p. 6)

Following Hart (1961), Spohn assumes that there would be an external and internal perspective on the subject, that is, two general forms that subsume both the theoretical and practical features of normativity: “Law nor any other formal social structure can be understood without an appreciation of certain crucial distinctions between two different kinds of statements, which I have called internal and external and which can both be made whenever social rules are observed”. (Hart, 1961, p. v)
From the first, the rules that a subject adopts in a community are established. A norm in this sense can be understood as a certain type of conventional regularity of behavior that supports model structures of exchanges of beliefs and desires in specific communities. Lewis claims: “Convention turns out to be a general sense of common interest; which sense all the members of the society express to one another, and which induces them to regulate their conduct by certain rules”. (Lewis, 1969, p. 4)

Normativity and convention, in wittgensteinian key, is either grounded in the theory of Bloor:

There are two competing schools of thought about the nature of rule following. One is usually called individualism; the other collectivism. For the individualist, a rule in its simplest form is just a standing intention; for the collectivist, it is a shared convention or social institution(...) I shall defend a collectivist account. (Bloor, 1997, p. ix)

The external perspective understands these norms as empirical facts related to empirical investigations that allow us to find the norms that regulate a community. The internal normativity is thus of another kind because:

The difference shows up already in the peculiar ambiguity in calling a norm valid, that it is to be accepted. The latter claim cannot be empirically confirmed or disconfirmed; it is subject to normative discourse where it may get approved or disapproved. (Spohn, 2011, p. 5)

In a general sense, the norms indicate what is right and wrong. The normative consideration of their beliefs and actions is inherent to human beings; this refers to having an internal perspective on normativity. The point is that there is always something to explain in the case of doing something right or wrong. And the nature of this explanation consists in being guided by
reasons that, while not always subsumed to logical necessity, being tied to plausible elements of validity, this does not prevent them from being, in the full sense of the word, reasons that establish the criteria internally. Thus, internal normativity determine an external normativity; “what is important is that normative discourse is not merely a matter of confessions, it is governed by (often defeasible) reasons, and it is fallible and open-ended” (Spohn, 2011, p. 6).

The normativity is an element that is found in all the scientific disciplines, but in the case of the human sciences, this criterion of demarcation is constituted by virtue of the nature of the internal normativity that is required for it. Let us quote the argument of Spohn's reading about the meaning of normativity as a principle of demarcation:

Indeed, all disciplines are infected by so much normativity. The point is that only the human sciences are entangled with normativity in a special and much more far-reaching way, namely simple because only the human sciences deal with objects, namely us humans, that have an internal normative perspective (...). The crucial question now is: Can the human sciences do so by restricting themselves to the external perspective, from which normative phenomena and may be studied accordingly? The crucial answer is: No, they cannot. Merely in order to do their empirical work properly they have to actively engage into normative theorizing from the internal perspective (or listen to those thus actively engaged). That is, they have to do something no natural science has to do; they have to leave their empirical home and enter foreign terrain, i.e., normative discourse, in order to properly cultivate their home domain. (Spohn 2011, p. 7)

All this because there is a strong asymmetry when we pursuing to achieve an account for human activities. Humans are susceptible to normative considerations that guide our actions. From this the need to theorize normatively:
The idealized theory applied and amended in empirical research should not merely collect what the community presently thinks is right; it should state what is right, something that can be inquired only from within the internal perspective, even though only the limit of normative inquiry is definitive. (Spohn, 2011, p. 9)

The reflection on the internal normativity is thus directed to be an ideal theory that constitutes the criteria and mode of implementation of the external norms. This idealization is empirically adapted in a progressive way by correcting the general theory of a model of internal normativity with additional theories that correct it in the adaptation to beings, that is to say, imperfect as humans. Professor Spohn clarifies this particular:

Ideally, we would implement the norms, though actually we are imperfect. And as with any idealized theory, we need additional error theories correcting the idealized theory and making it empirically more adequate, thus explaining also deviations from the ideal. This is why we have the asymmetric explanation situation. (Spohn, 2011, p. 8)

The ideal theory of internal normativity is not only responsible for affirming through a data collection what a community believes is right or good; an internal theory of normativity must say what it is to be correct, something that could only be investigated, as they say, from an internal perspective relative to the human being and its structure of rationality. Thus, the changes and structure of society and of any other product of the human mind could be grasped more easily if one realizes what is right or wrong, in relation to the conception of fundamental concepts that guide as a horizon to collective action. Therefore, the difference between natural sciences and social sciences comes from the need to theorize normativity from an internal perspective. Professor Spohn remarks on this conclusion:
We have the normative perspective and have to respect it as an empirical ideal in doing empirical human studies. Hence, even from the empirical third person perspective one is committed to the normative first person perspective. One cannot do well in the former without engaging in the latter; you cannot complete empirical psychology and thus the other human sciences without engaging in normative considerations—something not required in the natural sciences. So, ontological unity in terms of suitable supervinience relations does not prevent there to be a principled methodological difference. (Spohn, 2011, p. 12)

But why should we appeal to this type of idealized theories to carry out empirical research? Spohn's answer is divided into two dimensions. In the first place, he affirms that the norms adopted by a community are a matter of fashion; the possibility of establishing declarative norms tied to ideologies, power structures, etc., makes them contingent in a strong sense (Spohn, 2011, p.9). Second, they constitute historical explanations, for example: “They [norms] are only historic explanations why some countries drive on the right and not on the left or have a proportional instead of a majority voting system” (Spohn, 2011, p. 9).

Since these forms of external normativity are contingent, the dynamics of our internal normativity can be understood as the set of efforts to find guidelines on what should be correct by appealing to rationality as a source of high standards. An ideal theory would allow an ideal to which the normative dynamics can be approached thanks to an empirical correction that shows errors and corrections.

1.4 The Legacy and the Agenda

The ideal theory of internal normativity is then a proposal that assumes the need to be filled with content. Professor Spohn's proposal then suggests an epistemological principle of
demarcation without mentioning any particular internal ideal theory that accounts for the criteria that support such normativity for the social sciences. Precisely the legacy of Spohn is the possibility of establishing an ideal theory, or model, of the internal normativity.

This theory can be expressed in another way as a model of epistemic normativity that establishes the criteria of what is correct, or incorrect with respect to an empirical investigation of the products of the human mind. From the perspective of the first person, the normativity is related to the way in which the subject and his mental products are understood. Therefore, a theory of an internal normativity is thus a normative epistemological theory.

Since epistemology deals mainly with the problems of knowledge, the first step in constructing an ideal theory of the internal normativity of the human sciences is to establish epistemic normativity. For this, and following the legacy of Professor Spohn, this work will explore the ranking theory (Spohn, 2012), the account that aims to establish the laws of justified rational belief as the fundamental input to establish a foundation, a rock-bottom for the internal normativity of the social sciences and thus, for the construction of an ideal model that gives foundation to the methodology of the social and human sciences.

Therefore, the question that follows is: why choose Spohn's theory? In the first place, Spohn's theory is a proposal that attempts to summarize in a single work most of the epistemological problems of the contemporary philosophy in a synoptic way. Spohn's work traces a theory of belief, establishes the laws that shape its statics and dynamics as well as proposes a theory of rationality, inference and its relations with the problem of induction and causality (Huber, 2012). On the other hand, based on it, Spohn set the laws of rationality and builds a theory of
perception, justification and apriority normativity highly relevant to the present tasks. Spohn's theory is highly relevant, novel and eager to prove:

Ranking theory has been developed into a comprehensive, formal epistemology in over 600 pages, that is able to provide a normative account of the dynamics of beliefs and non-monotonic reasoning. In fact, its originator claims that the study of ranking functions is the study of beliefs, that ranking ranking theory delivers the dynamic laws of beliefs, and that it is the legitimate sister of probability theory. (Skovgaard-Olsen, 2014, p.70)

Secondly, Spohn's legacy consists of a continuum between the formulation of his ranking theory and the possibility of constructing an ideal theory about the internal normativity that is projected as a novelty within the framework of the philosophy of the social sciences, allowing to open a new theoretical field of applications of epistemological concepts to the construction of social reality (Zahle, 2016).

Beyond this, Spohn's theory is a pivot susceptible of criticisms and complements that can result in the first steps for the formulation of an ideal theory of internal normativity for social sciences, which is what is intended in this research.

Thus, the problem of the present investigation is presented synoptically in the following way: How the epistemic foundations, condensed in Wolfgang Spohn's ranking theory, allow the formulation of an internal theory of normativity that delimits methodologically the production of knowledge of the social sciences?

The first step to achieve this goal is to set the ground of the research, that is, to analyze and introduce the origins and fundamentals of ranking theory.
1.5 The Origins of Ranking Theory

The ranking theory is the result of more than thirty years of philosophical work that became a reality in Spohn’s publication of *Ordinal conditional functions. A Dynamic Theory of Epistemic States* (1988). The frame of this development is the so called Formal Epistemology, an alternative epistemology approach of which Spohn is founder and protagonist. Given this, it is necessary to mention first this novel field of research.

1.5.1 Formal Epistemology

Epistemology is the philosophical discipline that is responsible for the study of knowledge and justified belief; epistemology problematizes and searches for the foundations of knowledge, its structure, and limits. Its main problems are related to the possibility of establishing necessary and sufficient conditions to knowledge, what are the sources of knowledge, how do we understand the concept of justification and what makes these criteria really justify our beliefs by converting them into knowledge:

When we discuss the nature of justification, we must distinguish between two different issues:
First, what do we mean when we use the word justification? Second, what makes beliefs justified? (Steup, 2014, 2.1)

Within the different epistemological accounts and proposals, the ranking theory is framed in the so-called formal epistemology. This approach wants to solve all these problems using formal tools that have their origin in sciences such as logic and mathematics (Hendricks, 2006).
Therefore, formal epistemology has the same subject matter, that is to say, in brief, the theory of knowledge, an investigates such subject matter with formal devices. The first device or tool used is the type of logic of Frege and Russell (Douven and Schupbach, 2017, p.1). Thus, its starting point can be placed in the use of first-order logic as a resource to explain, construct and defend philosophical theories about the nature of knowledge at the beginning of analytic philosophy:

A satisfactory definition of scientific law, a satisfactory theory of confirmation or of disposition terms ( and this includes not only predicates ending in “ible” and “able” but almost every objective predicate, such as “is red”), would solve a large part of the problem of counterfactuals. Conversely, a solution to the problem of counterfactuals would give us the answer to critical questions about law, confirmation, and the meaning of potentiality. (Goodman, 1954, p.3)

A typical example is Nicod's criterion (1930) for testing scientific hypotheses:

Nicod's Criterion: a universal generalization is confirmed by its positive instances (as long as no counter-instances are discovered) \( \forall x \ (Fx \supset Gx) \) is confirmed by \( Fa \land Ga \), \( Fa \land Ga \), by \( Fb \land G \), etc. (Weisberg, 2016).

One can think, following this criterion that the rational proof of a scientific hypothesis is simply the reverse of a deduction, as follows:

\[ \forall x \ (Ex \supset Nx) \]

\[ Ea \]

Therefore: \( Na \)

So, the reverse model is:
Therefore: $\forall x (E(x) \supset N(x))$

In this sense, it entails that by finding an object $x$ the hypothesis implies the prediction $N(x)$. Generalizing the proposal the central issue is that the hypothesis is confirmed when the predictions are corroborated. We are then modeling the prediction through the logical implication as a formal tool. This deductivist approach has suffered strong criticism because it does not allow the establishment of models related to knowledge, hypothesis, and theories with respect to relative degrees of satisfaction of truth. From this arises the necessity to appeal to a probabilistic approach (Weisberg, 2016). The genealogy of probability is sketched precisely by Douven and Schupbach in the following quote:

Probability theory dates back further, with Christian Huygens and the Port Royal logicians (in collaboration with Blaise Pascal) laying the groundwork in the mid-seventeenth century. Jacob Bernoulli, Thomas Bayes, and Pierre-Simon Laplace made important contributions in the eighteenth century, and with Bruno de Finetti (1937/1964) and Andrey Kolmogorov (1950), probability theory received its contemporary form. (Douven and Schupbach, 2017, p.2).

For the probabilistic reading, the issue does not have to do with the logical necessity of knowledge, but with the concept of probability. In the previous case, for example, a hypothesis should be modeled not under the inversion of the deduction, but through a method that allows modeling when such hypothesis is more probable. The formal tool required then is a standard theory of probability, which starts from a function: $P(A) = x$. Its constituent axioms are the following:
1. For any proposition $A$, $0 \leq P(A) \leq 1$.

2. For any tautology $A$, $P(A) = 1$.

3. For any logically incompatible propositions $A$ and $B$, $P(A \lor B) = P(A) + P(B)$ (Weisberg, 2016).

The second required element is a conditioned probability that goes a little beyond the absolute probability described:

**Definition:** The conditional probability of $B$ given $A$ is written $P(B|A)$, and is defined:

$$P(B|A) = \frac{P(B \land A)}{P(A)} \quad (\text{Weisberg, 2016}).$$

For our example, it can be said that one of the advantages of this approach is the possibility of quantitatively establishing the growth or decrease of the plausibility of the confirmation of a hypothesis given certain evidence. The probabilistic approach allows measure the models that are made on epistemological problems. In addition, the possibility of talking of conditional probability constitutes a possible model to treat the problem of causality and inductive inference in a quantitative way. One of the most used tools in epistemology that borne from this approach is the so-called Bayes theorem:

**Bayes Theorem:** $P(H|E) = P(H) \times P(E|H) / P(E) \quad (\text{Weisberg, 2016}).$

Its philosophical importance comes from the strength it has to be able to symbolize and model different problems and epistemological criteria, among them the possibility of theoretical adjustment, the novelty of prediction and the priority of calculated plausibility (Weisberg, 2016). The Bayes theorem is a strong tool for the quantitative confirmation of epistemological problems.
since it allows modeling the causality and the induction through a certain form of abduction, that is, by the possibility of evaluating the causes by the effects, as is patent in the formula.

In very synoptically terms, the use of these devices is committed since the beginning with the goal of every analytical approach to clarify the arguments given these tools. However, the final shape of this young approach is modeled thanks to the modal logic developments of Kripke:

But it was only after a proper semantics had been developed for modal logic (mainly in the work of Saul Kripke) that they started using logic to analyze epistemological concepts. Following Jaako Hintikka’s pioneering work in “Knowledge and Belief” (1962) came the rise of modal epistemology, which seeks to analyze knowledge, justification, and related notions in terms of what goes on, not just in the actual world, but also in various nonactual worlds, in some, sense, close to the actual one. (Douven and Schupbach, 2017, p.2)

These are nowadays perhaps the most extended and useful accounts to model knowledge. Nevertheless, probability theory is more flexible, doubt to the fit between its structure and the fact that human reasoning is related to uncertainty. Probability theory allows us to deal with degrees of belief. That insight was patent by certain studies in the 1980’s:

The insight that a full understanding of human thinking and rationality requires taken seriously a graded notion of belief received much of its impetus from work in psychology starting in the 1980’s. Until then, it had been the received view among psychologists that a good reasoning is a matter of obeying the laws of logic. Psychologists have noticed that much of our non-mathematical reasoning can be good, despite being uncertain and defeasible. Accordingly, they claim that the standards of rationality for such reasoning are not provided by a monotonic logic but must be sought elsewhere. (Douven and Schupbach, 2017, p.3)
In that sense, standard probability theory cannot justify defeasible reasoning and its change on time. The update of information and learning, or, in other words, a certain dynamics and coherence of the change of degrees of belief is possible thanks to the bayesian conditionalization rule:

For Bayesians, probabilities are inherently subjective at least in the sense that they are interpreted as a particular epistemic subject’s degrees of (rational) belief. Bayesians require that an agent’s degrees of belief be statically and dynamically coherent. The epistemic agent has a stock of background knowledge, and that agent’s degrees of belief to be (statically and dynamically) coherent, must be fixed by these known propositions in such a way that they satisfy the axioms of probability. (Douven and Schupbach, 2017, p.6)

This derives on degrees of justification. Given a certain amount of background evidence we can fix different degrees of belief and it entails the degree of justification. In other words, the doxastic subject weights the evidence according to certain rules of update. Probability devices are useful to measure and set how the degrees of belief behave in rational ways statically and dynamically. The goal is then to set a rational mechanism of belief behavior. We can define the criterion of this agenda thanks to the classical Lockean Thesis:

Lockean Thesis (LT): It is rational to believe x (categorically) if and only if it is rational to believe x to a degree above a certain threshold value y, where y is then typically assumed to be close, but unequal to 1. (Douven and Schupbach, 2017, p.19)

Rationality is a strong degree to fix credence. However, probability standard theory is a sort of continuum when you cannot fix properly the notion of belief. Several tools of formal epistemology want to solve certain problems of standard probability theory, such as the big problem of the dispositional essence of the notion of belief and the inner fixed character of belief
states. Among the most notable variations of the theory of probability, there is the formal epistemology device called *ranking theory* of Wolfgang Spohn (1988, 2012). This theory arises from the probabilistic approaches but adds a strong influence of another formal model called the semantics of possible worlds, which is based on the modal logic (Gamut, 2010).

The theory of Spohn emerges as a response to the probabilistic mainstream with respect to justify degrees of belief and non-monotonic reasoning and, in addition, wants to solve another typical epistemological problem the so-called inductive reasoning. A large part of this kind of reasoning refers to the possibility of project observable patterns to a number of ulterior unobservable instances. The fundamental problem is then the ground that justifies this type of reasoning. The problem has for Spohn a common starting point: the clarification of the nature of the concept of belief, its statics, dynamics and the possibility of establishing properties of knowledge through formal representations of belief (Huber, 2016).

Spohn begins his proposal, originally called *ordinal conditional functions* in Spohn (1988), from the explanatory problems of the Bayesian model on the nature of belief and theories about the changes of belief, mainly Alchourrón, Gärdenfors and Makinson (1985). Thus, the way to obtain a good notion of belief and its changes is to represent the doxastic states of an agent through a ranking function (Huber, 2012, p.584).
1.5.2 Introducing Ranking Theory

In the frame of formal epistemology ranking theory is a theory of belief revision. The object of the theory is related to the mechanism that allows an ideal doxastic subject to organize and hierarchically classify their degrees of belief in time and revise such beliefs given new information or evidence. The theory is devoted to ideal doxastic agents because of certain important warrants. First of all, the theory does not want to treat with computational or physical limitations of doxastic agents such as people or computers. In the second place, because, given its normative and counterfactual nature, the theory wants a wide ontological scope of application. Hence, ranking theory is an ideal model of a theory of belief.

The first difference with respect to standard approaches is its qualitative character:

Belief revision theory models belief as a qualitative attitude towards sentences or propositions: the ideal doxastic agent believes a proposition, or she disbelieves the proposition by believing its negation, or she suspends judgment with respect to the proposition and its negation. This is different from the theory of subjective probabilities, also known as Bayesianism, where belief is modeled as a quantitative attitude towards a proposition: the ideal doxastic agent believes a proposition to a specific degree, her degree of belief or credence, for the proposition. (Huber, 2016, p.3)

Nevertheless, the ranking theory appeals to numbers in order to adequately model the agent’s belief states with respect to the several revisions of such states. In that sense, ranking theory is an advance of the AGM theory of belief revision. AGM theory represents the old beliefs of a certain doxastic subject, at a given moment, thanks to a belief set of sentences of a formal language, and
model the change with an entrenchment ordering of these sentences. The goal of AGM is to set how firmly x holds the beliefs in her belief set.

The entrenchment ordering is twofold. First, there is the case of expansion. In such a case, the new evidence does not contradict the old belief set of sentences and just add new information. The second case is revision. Here the evidence shall contradict the old belief set. Huber explains AGM belief revision as follows:

AGM theory has important properties as maximality, minimality, dominance, conjuctivity, and transitiveness. According to the first tautological sentences are always believed and we never give them up because of consistency. Minimality expresses that there are sentences that the doxastical subject does not believe and do not belong to the set at the beginning of the whole process. The rest properties can be modeled as follows:

“For all sentences A, B and C from L:

1. if A ≤ B and B≤C, then A≤C Transitivity
2. if A B , then A≤B Dominance
3. A≤A∧B or B≤ A∧B Conjunctivity”

(Huber, 2016, p.5).
Given this background Spohn (1988; 1990) responds with the proposal of a qualitative conditional belief theory that assigns numbers to the different propositions of ranking functions. And here it is the first advantage of ranking theory with respect to AGM theory. Ranking functions deal with propositions:

Instead of taking the objects of belief to be sentences of a formal language it in both more general and more convenient to take them to be propositions of some field or algebra over a set of possible worlds W. Here it is the relevant definition. A set of subsets of W, \( A \subseteq A(W) \) is an algebra over W if and only if

i) The empty or contradictory set \( \emptyset \) is a proposition in \( A \).

ii) If \( A \) is a proposition in \( A \), \( W/A = \neg A \), is also a proposition in \( A \), and

iii) If both \( A \) and \( B \) are propositions in \( A \), then the union or disjunction of \( A \) and \( B \) is also a proposition in \( A \). (Huber, 2016, p.21)

In non-formal language the axioms make clear that in ranking theory the doxastic subject should to believe the tautology evident in the proposition W. In the second place, she should disbelieve the empty proposition, that is to say, the contradictory proposition with maximal strength. Finally, she should disbelieve \( A \cup B \) if and only if she disbelieve both \( A \) and \( B \) disyunctors.

Given this axioms ranks are grades of disbelief. Here it is the mechanism or functions as presented by Huber:

“A proposition \( A \) is disbelieved just in case \( A \) is assigned a positive rank \( k(A) > 0 \). A proposition that is not disbelieved is assigned rank 0, but this does not mean that it is believed. Instead, belief in a proposition is characterized as disbelieve in its negation: a proposition \( A \) is
believed just in case the negation of A, \( \neg A \), is disbelieved, \( k(\neg A) > 0 \). An agent suspends judgment with respect to a proposition (and its negation) if and only if, both the proposition and its negation are assigned rank 0” (Huber, 2016, p.22).

And it is the same with respect to a conditional rank \( k(A \mid B) > 0 \). As this explanation shows ranks are numerical but the difference with probabilities is the measuring scale. Probabilities are measured in an absolute scale and cannot fix the degree of credence. Ranking functions are the norms of how a subject should organize beliefs and conditional ones at a given time and how she re-organize or revise that set of propositions given new information or evidence. Such a normativity theory then is committed with consistency and wants to achieve and hold true beliefs.

Therefore, the horizon of truth and knowledge is the agenda and the goal of this normative theory. In the following chapters, we will see how Spohn constructs this useful theory and presents the challenge to use it as a device to find the laws of belief.
2 The Laws of Belief

2.1 Introduction

One of the fundamental problems of epistemology is to determine the nature of the foundational concepts of our doxastic attitudes. The analysis of the conceptual components of knowledge then begins with the study of the belief and its foundations. Ranking Theory or the Laws of Belief of Wolfgang Spohn (2012) is a theory on wide issues in epistemology and synthesis and a full account on the theory of belief. The theory provides a normative approach to belief, belief change, belief revision, and provides either a lot of possible applications to issues related to rationality, normativity, causation and decision theory. Wolfgang Spohn’s theory and work have received outstanding honours like the *Lakatos Award in Philosophy of Science* (2012) of *The London School of Economics and Political Science* and the *Frege Prize* (2015) of the German *Gesellschaft für Analytische Philosophie*. Ranking Theory is already applied to certain fields like AI (Goldszmidt and Pearl, 1996), Psychology of Reasoning (Olsen, 2014), Semantics (Benkewitz, 2016), (Hass, 2016), Pragmatics (Huber, 2016), Logic (Kupffer, 2016), (Müller 2016) Rational Cooperation and Theory of Choice (Nida Rümelin, 2016), etc. All these facts lead us to understand ranking theory as a milestone in contemporary analytic philosophy; this seminal work has still a lot of applications to other branches of philosophy. In that sense, the present work wants to use ranking theory as a sort of epistemic foundation to the analysis of the internal normativity inherent to the social sciences. This chapter is devoted to introduce Ranking Theory or the Laws of Belief. This general presentation will serve as a powerful foundation and tool to the ulterior development of an account to the internal normativity of social sciences.
2.2 Traditional approaches to belief

The first traditional definition of belief is that to believe is *take it to be the case*, that is, *regard it as true*. This definition has its origin in the pioneer epistemological reflection of Plato in the *Theaetetus*: “Knowledge is true judgement with an account (meta logou aléthé doxan)”. (Plato, 1965, T1. 201d-210a) When we talk about *take it*, we think about the ability *to represent* a doxastic state in the mind. The belief is then related to its objects as it traces a link between which it is said believed and a proposition. It can be said that a doxastic subject S has a propositional attitude A, which in this case is to believe in a statement expressed by a proposition P that draws a certain state of affairs (Schwitzgebel, 2011, p.14-24).

*Definition 2.1:* S A (believes) that P.

From this structure emerges a philosophical position called *representationalism*, which includes belief as to the mental representation of a proposition. Our mind stores the content of a certain proposition and, accepting it as true, constitutes it in what we call belief:

We claim that the mayor distinction is that, while both connectionist and classical architectures postulate representational mental states, the latter but not the former are commited to a symbol-level of representation, or to a language of thought. (Fodor, 1988, p.3)

Beliefs are something like the language of thought, the set of representations we have and that allow us a certain relationship and behavior with respect to the world. To have beliefs is thus to construct an integrated collection or associative system of representations of propositions that allow one to situate epistemically in a certain way, and to have patterns of behavior in the world:
A natural system of representation is not only one in which the elements (like the elements of certain systems), have a power to indicate that is independent of the interest, purposes, and capacities of any other system, but also one in which, the functions determining what these signs represent are also independent of such extrinsic factors. (Dretske, 1988, p. 62)

The propositional attitude, that is, to believe, is correct if and only if P is true.

Definition 2.2: S A (believes) that P if and only if P is true.

While representationalism asserts that the belief system is the language of thought, such a belief system becomes patent mainly in natural language, and from this, it follows that its interpretation is situated in the correspondence that exists between the belief system and a linguistic and semantic system (Blomson, 2012).

On the other hand, the dispositional and interpretational approaches understand belief as sets of patterns of observable behavior, that is, susceptible to interpretation by an external agent. "The system has the particular belief that P if its behavior conforms to a pattern that may be effectively captured by taking the intentional stance and attributing the belief that P." (Schwitzgebel, 2015, p.1.1)

Definition 2.3: S A (believes) that P if and only if S has a certain behavior disposition D connected to P.

This vision coined mainly by Dennett (1978-87-91) shows us that to believe in something is to conform to certain patterns that overflow physical forms of prediction of the behavior of the subject to whom beliefs are attributed (Dennett, 1991). By this same route, Davidson
characterizes the attribution of beliefs to a practice. From the postulates of the indeterminacy of the translation of Quine (1960), Davidson thinks that to attribute beliefs to a subject would consist of reconstructing or rather interpreting the set of statements that a doxastic subject utters, and showing why these make sense, by virtue of a set of observable patterns of behavior in a given environment:

I follow Quine in supposing that even if we narrow attention to verbal behavior that reveals when, and under what conditions, a speaker gives credence to a sentence, there is no direct way of sorting out the roles of belief and meaning in explaining that credence. Eliciting separate accounts of belief and meaning requires a theory that can bring to bear on the interpretation of each sentence and its accompanying attitudes the contribution of further data. Only by studying the pattern of assents to sentences can we decide what is meant and what believed. (Davidson, 1984, p. xvii)

Another reading, which in fact in some authors overlaps with the previous ones, is functionalism about mental states and particularly beliefs. Functionalism conceives beliefs as a mental state that is constituted in a particular form, due to its causal relationship with sense data, the behavior itself, and other types of mental states, including other beliefs:

The most important classes of things with which we have direct acquaintance are our own sensations, which we may be said to understand, and facts or characteristics or relations of sense data or meanings, which we may be said to perceive. The objects of knowledge and belief I shall term propositions. (Putnam, 1975, p.49)

In this respect Schwitzgebel refers: "As Milkan, Papieneau and others have suggested, it seems that one to say is to be in a state that fills a particular causal role, and it seems quite another to say that beliefs
are states that represent how things stand in the world "(Schwitzgebel, 2015, p.2.1). Such a view opposes the understanding of belief as a mere internal structure of the mind or brain. The theses of this perspective can be defined as follows:

**Definition 2.4:** S A (believes) that P if and only if P is directly caused by a perceptual stimulus E (under normal conditions).

**Definition 2.5:** S A (think) that P if and only if S believes that Q then (causes) P.

Different perspectives deny a strong existence of the concept of belief. *Eliminativism* affirms that the only value that belief can have is to understand it as a wrong thesis of the history and development of the philosophy of mind and neuroscience, in the way of certain theses of Ptolemy and Newton in the field of physics. The concept of belief is a way of saying of folk psychology that would be appeased when a strong scientific thought expresses the true consistency of what is called mental processes (Churchland, 1981). *Instrumentalism* also denies a strong existence of the concept of belief, but gives it a certain form of conditioned subsistence. This view states that thinking about belief attribution is simply a practical and useful matter for certain determined purposes. It is thought that beliefs are part of unnecessary ontological inflation; the beliefs are in this interpretation a sort of creations of our imagination or fictions. Dennett configures an instrumentalism that allows a certain form of subsistence to the beliefs denominating them useful fictions (Dennett, 1991: 29). Affirms in this sense: "Centers of gravity are real because they are (somehow) good abstract objects. They deserve to be taken seriously, learned about, used (...) I have claimed that beliefs are best considered to be abstract objects rather like centers of gravity "(Dennett, 1991, p.29). Beliefs are certain types of tools built with
the function of capturing the structures and nature of ontologically stronger phenomena.

Regarding this issue and its relationship with previous perspectives, Dennett clarifies:

Fodor's industrial-strength Realism takes beliefs to be things in the head - just like cells and blood vessels and viruses. Davidson and I both like Churchland's alternative idea of propositional-attitude statements as indirect "measurements" of a reality diffused in the behavioral dispositions of the brain and body. (Dennett, 1991, p.245)

In the conference entitled "What is present to the mind?" Davidson defines synoptically this vision that is strongly linked to the dispositionalist and interpretationalist theses.

We know there is no contradiction between the temperature of the air being 32 ° Fahrenheit and 0° Celsius; there is nothing in the relativism to show that the properties being measured are not real. Curiously, though, this conclusion has been repeatedly drawn (...) Yet in the light of the considerations put forward here, this comes to no more than the recognition that more than one set of one person's utterances might be equally successful in capturing the contents of someone else's thoughts or speech. Just as numbers can capture all the significant features of another person's thoughts and speech in different ways. This fact does not challenge the reality of the attitudes or meanings thus reported. (Davidson, 1989, p.10)

The previous collection of definitions drawn from the current debate on the subject and its main points of view, leads us to a diverse, conflicting and unfinished view on the nature of rational belief and its objects. This configures the need to establish an alternative that establishes the nature of the belief and its objects, to fulfill the purpose of this work, that is, a neutral route that allows us to represent what a doxastic attitude is and the objects with which It is related, without requiring the vast task to synthesize, reconcile, take strong commitments or say the last
word on the matter. This neutral route then becomes a provisional instrument that would later present us with the possibility of locating the proposal presented here in the geography of the debate and, perhaps, pointing out the epistemological and ontological commitments that can be derived in this regard. The alternative that will be used as a tool is the conventional theory about the belief and its objects of Wolfgang Spohn.

2.3 The belief and its objects: The neutral account of Wolfgang Spohn.

One of the main objectives of Spohn's Ranking Theory is to establish a general theory of belief; a theory of the degrees of belief or certainty, for a later bet on the nature of knowledge (Spohn, 2012, p.2). Spohn's proposal arises from an important distinction regarding the formation of beliefs and their nature. This refers to the difference and relationships between the so-called inferential beliefs and non-inferential beliefs. In other words, this is the problem of induction and, in the other hand, the problem of the foundations of belief. A general theory of belief would then be composed of these two dimensions or epistemological components.

First, the dimension that refers to base or non-inferential beliefs has two classical traditions that establish the source of belief in *a priori principles* and, on the other hand, *empirical principles*. The first tradition is related to the possibility of having *a priori* beliefs as epistemic foundations and, on the other hand, the second tradition affirms as a foundation of belief to perception, thus speaking of observational beliefs as an epistemic foundation. The epistemological problem in relation to this dimension thus consists in establishing the norms or criteria that allow defining the *statics of the belief*. 
The second dimension is related to the typical philosophical problem inherited from Hume's thought (1740), namely, what is the nature of induction as a form of reasoning. Spohn states the problem of induction in the following way:

This is the problem about which expectations about the future on the basis of our beliefs about the past, which general beliefs to entertain on the basis of our singular observations, which beliefs about the non-observed to infer from our beliefs about the observed-i.e., general, which beliefs to infer from our basic, non-inferential beliefs. (Spohn, 2012, p.3)

The inductive reasoning scheme would be, according to Spohn, a certain type of function that projects from a first doxastic state a new possible doxastic state. The reading of Spohn raises the problem of induction as "(...) the search for reasonable strategies of changing or revising one's beliefs in the light of new evidence" (Spohn, 2012, p.4). The epistemological problem in relation to this dimension consists in establishing the norms or criteria that allow us to define the dynamics of the belief.

In this sense, a general theory of belief could account for these two dimensions if two fundamental questions can be answered: "Which laws or rules hold for the dynamics of doxastic states, and how are the initial doxastic states from which the dynamics start to be characterized?" (Spohn, 2012, p.6).

A theory about belief should motivate the philosopher to establish what normative criteria work for a dynamic and a static account of belief. This would be the first step to talk later about a normative perspective of rationality. Therefore, an analysis of the dynamics and statics of the belief would provide a state of the objects over which it is believed, that is, the entities over which doxastic attitudes are possessed.
Spohn's proposal affirms a neutral strategy, at least in the beginning, to develop this task; strong ontological commitments on the nature of the belief will be derived from a formal and therefore conventional analysis of such dimensions. The bet is thus to construct the formal building that allows to analyze the belief in its dynamics and statics, that is, a theory of formal representation of beliefs (Huber, 2016). Spohn then begins his standard definition of belief in the following way:

Our representation of the objects of belief is entirely standard. They are propositions, and propositions are represented as sets of possibilities from a given space of possibilities. Basically, the neutrality is achieved by being totally silent on the issue of what a possibility is. The underlying space of possibilities is primitive and always denoted by W. Propositions, then are subsets of W and denoted by A, B, C, D, and E, with or without subscripts. Hence, propositions are what the probability theorist calls events, a usage that I avoid here since it is colloquially and philosophically inappropriate. (Spohn, 2012, p.17)

Spohn illustrates the formal apparatus with the following example:

Let W be the set of all possible global weather courses in 2009, i.e., continuous sequences of global weather states from the beginning to the end of the year 2009. Formally, this is just some very rich set. Now, meteorologists are not interested in each and every detail of these weather courses. Suppose rather they have established a fine grid of weather stations over the earth and are only interested in the values measured at these station every hour. So for each station and every hour in 2009 they consider the possible temperature at s and t (...) Now all these variables should indeed be variables in the formal sense, for instance, the proposition that the temperature in Konstanz at 12 pm on 1 August 2009 is 32º C should be a proposition over W. (Spohn, 2012, p.19)
The set $W$ represents all the possibilities of belief, focus on a given doxastic subject and at a certain time, in the manner of the meteorological station of Konstanz, at a certain time, of a certain date. When the subject believes that the proposition according to which $32 \, C$ is true, at a certain time, this possibility is updated as a subset of $W$, excluding the possibilities of its complement, that is, the other possibilities of $W$.

*Definition 2.6:* It is believed (B) that A by subject s and at time t, $Bst \, (A)$, if and only if all possibilities in $\neg A$ are excluded (by subject s and at time t) (Spohn, 2012, p.21).

The conventional and neutral character of this account is to understand beliefs as propositions and sets of possibilities.

The conventional formal apparatus includes, given the above, an important component of modal logic and the semantics of possible worlds. When Spohn talks about sets of maximized possibilities and possible worlds centered as subjects in a certain time and space, he is necessarily appealing to this formal tool. Spohn tentatively uses the concept of *possible world* as a formal representation and does not take part in the debates on the ontological commitments of the semantics of possible worlds:

This book defends modal realism: the thesis that the world we are part of is but one of a plurality of worlds, and that we who inhabit this world are only a few out of all the inhabitants of all the worlds. (Lewis, 1986, p.vii)

Spohn interprets the possible worlds as centered doxastic possibilities, as is evident in 2.6. Affirms about it: "Rather we need centered worlds as doxastic possibilities. Here a possible world may be understood as
a triple \(<w, s, t>\) consisting of a possible world \(w\), a subject \(s\), and a time \(t\), both existing in \(w\)." (Spohn, 2012, p.22).

The function described above thus fulfills the objective of relating a doxastic subject, at a certain time, with a proposition. We can then think the act of believing, as the exclusion of possibilities, as the ability to judge through language, of assenting to a certain truth function (Carnap, 1947). Spohn comments on this topic: "Certainly the most natural answer is that believing one out of a set of possibilities to obtain just means assenting to a given description of this set of possibilities; speech is the foremost manifestation of belief." (Spohn, 2012, p.23). The conditions of possibility of this manifestation in the language are related to normative criteria that warrant inferential and perceptual relations. In addition, as the way to make the belief patent is a linguistic issue, the normativity extends to a minimum of communicative principles and commitments:

For a proposition to be true is for it to be assertible, where this means not capable of being asserted but correctly assertible; assertible, that is, in accordance with the relevant semantical rules, and on the basis of such additional, though unspecified, information as these rules may require (…) True, then means semantically assertible and the varieties of truth correspond to the relevant varieties of semantical rule. (Sellars, 1963, p.101)

This normative pragmatics account is very close to Spohn’s theory. Robert Brandom’s “Make it explicit” is indeed a remarkable foundation of Spohn’s proposal:

This is an investigation into the nature of language: of the social practice that distinguish us as rational, indeed logical, concept mongering creatures-knowers and agents (…) The result is a new kind of conceptual role semantics. It is at once firmly rooted in actual practices of producing and
consuming speech acts, and sufficiently finely articulated to make clear how these practices are capable of conferring the rich variety of kinds of content that philosophers of language have revealed and revealed in. The natural world does not come with commitments and entitlements in it; they are products of human activity. In particular, they are creatures of the attitudes of taking, treating, or responding to someone in practice as committed or entitled. Mastering this sort of norm-instituting social practice is a kind of practical know-how, a matter of keeping deontic score by keeping track of one’s own and others commitments and entitlements to those commitments, and altering that score in systematic ways based on the performances each practitioner produces. The norms that govern the use of linguistic expressions are implicit in these deontic scorekeeping practices. (Brandom, 1994. p.xii-xiv)

The disposition to judge, as an exclusion of possibilities, is an exercise of counterfactual reasoning, insofar as it is related, as it was said, to the semantics of possible worlds as sets of possibilities. The propositions that patent the belief do not necessarily have as a correlate a concrete world of facts that are the case, in the manner of the *Tractatus* (Wittgenstein, 1921), but to various possible worlds with intensional or epistemic referents. Spohn states in this sense: "If we conceive of objects of belief as sets of possibilities, then we really conceive of them as pure contents. A pure content is nothing but a truth condition; a set of possibilities is true if and only if the one and only current possibility is a member of it "(Spohn, 2012, p.25).

These sets of possibilities are unsaturated functions using Fregean terminology:

We thus see how closely that which is called a concept in logic is connected with what we call a function. Indeed we may say at once: a concept is a function whose value is always a truth value. (Frege, 1892, p.183)
Spohn, following Frege, thinks that it is not necessary to establish particularly the references or objects of a function to understand the sense of it (Fonseca, 2009). Given this, we can define the objects of belief, as sets of possibilities, as follows:

**Definition 2.7:** The set \( \Omega \) of possibilities is true if and only if the current possibility \( A \in \Omega \).

However, regarding this definition, a problem arises since the updating of an epistemic possibility requires a mental representation tied to the possibility of assent and, from this it follows that there may be various representations linked to the same proposition. This is to say:

Having a belief is somehow having a mental representation in the belief mode (and not, say, in the mode of a desire or a supposition), which will usually be a conceptual representation, if that is too unclear, a linguistic representation; this is finally, something remove determine. The belief is then endowed with content only because of this representation is somehow related to the content or because of the sentence representing the belief has a truth condition. (Spohn, 2012, p.25)

Spohn solves the problem by reaffirming that a belief is not a matter inherent to the representational content, but a normative disposition that becomes a counterfactual exercise of assent to a truth function. It is only linked contingently with linguistic and behavioral provisions. Spohn's conventional proposal thus suggests a *general form* of belief.

To sum up, the Spohn’s conventional reading (neutral) understands the belief as:

i. Beliefs are epistemic possibilities and epistemic possibilities are possible worlds like Lewis’s possible worlds: "They are kantian noumenal worlds, though not unknowable or even unconceivable, but simply initially unknown and unconceived. Such a Lewisian possible world, and only such a world, presents a complete manifold of experience to us; such a world contains everything that can be experienced (...) Our current field of experience is the current universe of
course. However, for all we know, that universe might be different from what it actually is; very different totalities of experience might confront us. Therefore, we have to envisage other totalities as well. So, as I say, doxastic possibilities are Lewisian possible worlds "(Spohn, 2012, p.27).

ii. The belief as exclusion of possibilities is a counterfactual test: "Now what does it mean to believe a proposition construed in terms of such possibilities? That is, what does it mean to exclude such a possibility? It means undergoing a vastly counterfactual test "(Spohn, 2012, p.28). After setting a possible world centered on a doxastic subject, and observing it in an idealized way, the experiment is carried out to consider epistemic alternatives that allow to rationally fix exclusion, that is, belief. Spohn explains it in the following way:

Explanation 2.8: A doxastic possibility \((s, t)\) is a doxastic alternative of \(s^*\) at \(t^*\) iff the maximally experienced and considered judgment about \((w, s, t)\) is compatible with the doxastic state of \(s^*\) at \(t^*\), i.e., iff that judgment is only an expansion, but not a revision of this doxastic state. The possibility is excluded by \(s^*\) at \(t^*\) iff it is not a doxastic alternative of \(s^*\) at \(t^*\). And the proposition \(A\) is believed by \(s^*\) at \(t^*\), i.e., \(B_{s^*t^*}(A)\), iff it contains all doxastic alternatives of \(s^*\) at \(t^*\), i.e., iff all possibilities in \(-A\) are excluded. (Spohn, 2012, p.29)

It can be said that if all the counterfactual revisions of such a possible epistemic world simply lead to the expansion of a belief and thus give it more strength, the matter does not constitute a problem. However, a review of \(w\) constitutes the beginning of the exclusion process.

iii. To believe, given a counterfactual test, is to take it to be true: "There is another answer: A belief is true if it survives the further experience and belief formation (in the world we are living in). All (or most) of our beliefs are somehow premature or risky or fallible. We claim them to be
true; this is what it means to have them. And that claim consisted in the expectation that we ultimately do not receive any reasons to withdraw that belief" (Spohn, 2012, p.29).

iv. To be true refers to two notions of truth: "There are two notions of truth, the correspondence notion and its family and the one implicit in (2.6) that is often called the pragmatic notion of truth or described as ideal ascertainability or ideal justifiability." (Spohn, 2012, p.29). Spohn defends the account, according to which, the notion of truth as correspondence is adequate to speak of possible worlds in the style of Wittgenstein, that is, worlds where facts correspond to propositions about the real world. However, for possible Lewisian worlds, where one does not have as a correlate of correspondence to sets of objects of facticity, a pragmatic notion of truth is more appropriate, given the dynamics inherent to those objects of belief (Spohn, 2008) and (Fonseca, 2012). This will, therefore, allow us to speak of degrees of certainty based on measures of plausibility of the doxastic states.

v. Therefore, the propositions are the objects of the belief, as unsaturated truth bearers.

In this way, already sitting a conventional and neutral definition of the belief and its objects, which is related to the formal instruments already pointed out and limited, Spohn begins the task previously proposed to build a theory about the belief in two axes or fundamental perspectives, namely, its static and its dynamics. Thus, Spohn start’s his work to the task of constructing a theory related to the dynamics of belief.

2.4 Dynamics of belief: the problem of induction

The first idea that should be treated when talking about a dynamics of belief is precisely the possibility of change in the doxastic states. Such changes result mainly from a characteristic that
is inherent to them, namely that finding a maximized certainty with respect to an object of belief is usually difficult to obtain. The counterfactual test enunciated above is an exercise that the doxastic subjects practice frequently due to the difficulty of establishing certainty on many subjects. Spohn says:

First, there was always the idea that belief inevitably comes in degrees of certainty, and that the ideal of maximal certainty, if it exists, is rarely achieved. It was unclear, though, just how to measure uncertainty. (Spohn, 2012, p.32)

Hence the difficulty of measuring the exclusion of possibilities described in the previous section is just because the belief is presented in degrees of certainty. The challenge that arises then is to establish methods of measuring degrees of certainty, to constitute the exclusion of possibilities that ulterior fix a belief. The key notion in this sense is the notion of probability. She appears in the argument because the measure would consist in modeling plausible degrees of certainty. Therefore, the theory of probability has become the formal mechanism, pioneer and founding to talk about the measuring of degrees of certainty for doxastic states. Spohn then begins his argument for a theory about degrees of certainty following the paradigm of probability theory. Affirms in that sense:

“(…) probability theory contains the most sophisticated ideas concerning the dynamics of doxastic state (…) As I have emphasized, this is my paradigm theory, and even though I will present ranking theory as a genuine and fruitful alternative, I will develop it in a close parallel to this paradigm.” (Spohn, 2012, p.33).

The formal tool required as a guide for Spohn's theory is a standard theory of probability, which starts from the following definition:
Definition 2.9: A function: \( P(A) = x \) is a measure of probability if and only if it is constituted from the following axioms, namely:

1. For any proposition \( A \), \( 0 \leq P(A) \leq 1 \).
2. For any tautology \( A \), \( P(A) = 1 \).
3. For any set of logically incompatible propositions \( A \) and \( B \), \( P(A \cup B) = P(A) + P(B) \).

The idea then is to treat the degrees of certainty in the same way as relative frequencies are treated. In addition, to be able to correctly model the changes of beliefs, one can resort to another tool proper to the theory of probability, that is, conditional probability. For our case, it can be said that one of the advantages of this approach is the possibility of quantitatively establishing the growth or decrease of the plausibility in the confirmation of a hypothesis given certain evidence. The definition of conditioned probability is:

Definition 2.10: The conditional probability of \( B \) given \( A \) is \( P(B|A) \), and is defined as:

\[
P(B|A) = \frac{P(B \cap A)}{P(A)}
\]

One of the most used tools in epistemology is the so-called Bayes Theorem. Its philosophical importance comes from the strength it has to be able to symbolize and model different problems and epistemological criteria, among them the possibility of theoretical adjustment, the novelty of prediction and the priority of calculated plausibility (Weisberg, 2016). The Bayes Theorem is a

---

¹ “Definition 3.1: Let \( A \) be an algebra over \( W \). Then \( P \) is a probability measure on \( A \) iff \( P \) is a non negative, normalized, and (finitely) additive function from \( A \) into \( \mathbb{R} \), the set of reals, i.e., iff for all \( A, B \in A \):
\( 0 \leq P(A) \leq 1 \) (non-negativity)
\( P(W) = 1 \) (normedness)
If \( A \cap B = \emptyset \), then \( P(A \cup B) = P(A) + P(B) \) (additivity)” (Spohn, 2012, p.33).
² Definition 3.2: Let \( P \) be a probability measure on \( A \), let \( A, B \in A \) and \( P(A) > 0 \). Then the conditional probability of \( B \) given or conditional on \( A \) as
\( P(B|A) = \frac{P(A \cap B)}{P(A)} \).
if \( P(A) = 0 \), \( P(B|A) \) is undefined ” (Spohn, 2012, p.34).
strong tool for the quantitative confirmation of epistemological problems, since it allows the modeling of causality and induction, as is evident in the definition:

**Definition 2.11:** The Bayes Theorem is defined as:

\[ P(A|B) = \frac{P(A) \times P(B|A)}{P(B)} \]

In a specific sense, Spohn describes the importance of Bayes' Theorem for its purpose as follows:

The importance of this theorem lies in the fact that since its discovery it received a dynamic interpretation and thus served as the first dominant model of belief change. The dynamic interpretation is this: The posterior probability \( P(A_k|B) \), as it was called, of some hypothesis \( A_k \) given some evidence \( B \) is proportional to its prior probability \( P(A_k) \) and to the likelihood \( P(B|A_k) \) of the evidence \( B \) under the hypothesis \( A_k \). The proportionality factor is given by the prior probability \( P(B) \) of the evidence \( \text{(...) This interpretation is not fully dynamical, since there is only one probability measure mentioned in the theorem and no points of time.} \) (Spohn, 2012, p.36)

What can be said then about the dynamics of belief in probabilistic terms is made explicit in Bayes' theorem, namely, that the dynamics of belief can be understood in terms of conditionalization. For our case, we can define the conditionalization from Bayes, like this:

**Definition 2.12:** The probability \( P \) of a first state of belief \( (A) \), conditions the subsequent probability \( P' \) of the state of belief (given an evidence with \( (P(E)>0) \), if and only if \( P'(A) = P(A|E) \).

---

\(^3\) \text{“Theorem 3.5: (Bayes Theorem) Let } A_1, \ldots, A_n \in \text{A partition W, let } B \in A, P(A_i)>0 \text{ (i= 1,…,n), and } P(B)>0. \text{ Then for each } k \text{ in } (1,\ldots,n), P(A_k|B) = P(B|A_k) \cdot P(A_k)/P(B)” (Spohn, 2012, p.36).
From the formal apparatus that is put into play, Spohn gives us the first law on the dynamics of belief that, according to his words, states:

Then the dynamic law of simple conditionalization states: (3.8) If \( P \) characterizes the doxastic state of some subject \( s \) at time \( t \) and \( E \) is the total evidence or information \( s \) receives between \( t \) and \( t' \), then the doxastic state \( P' \) of \( s \) at \( t' \) is the conditionalization of \( P \) w.r.t. \( E \) (Spohn, 2012, p.37).

The information contained in \( E \) reduces the space of possibilities of \( W \), that is, the maximized set of possibilities of belief, towards \( E \). The counterfactual test that was required in the previous section is demonstrated through this procedure of conditionalization where we can exclude the possibilities outside of \( E \), to fix with greater plausibility or greater degree of certainty our states of belief. Here we should ask ourselves: why not be happy just with probabilistic epistemology? Spohn answers about the particular:

Let me try to pin-point the source of trouble. It is, I believe, that Bayesianism does not have the notion of belief, \( B \), by merely has the notion of degrees of belief. However, only beliefs are doxastic attitudes capable of being true, and we are used to speaking of the justification of beliefs rather than of the justification of subjective probabilities. Hence, if Bayesianism misses beliefs, it misses all the things related to belief and, worst of all, knowledge. Smallwonder that the traditional epistemologists finds Bayesianism useless (Spohn, 2012, p.44)

The epistemology based on a probabilistic perspective is therefore insufficient, although we can say that it is fundamental. The problems faced by the theory of probability mainly refer to the paradoxes that it suffers. The most famous is the lottery paradox. If one has evidence (sufficient) to bet that one lottery ticket is a loser, but the evidence justifies the conclusion about each other ticket or almost all tickets. Therefore, one concludes that no ticket will win. However,
in a fair lottery, everybody knows that always there is a winner. Theories of degrees of belief could avoid these difficulties. Kvanvig (2010) remarks on this topic:

The fundamental reality according to probabilists, is degree of belief, and if a cognizer in the lottery situation assigns a subjective winning probability of $1/n$ to each ticket in a $n$-ticket fair lottery, those probabilities are consistent. (Kvanvig, 2010, p.29)

Spohn believes that his theory can fill these gaps and provide a better approach to the dynamics of beliefs:

What is my conclusion, then? We do want an account of belief $B$, of acceptance, of taking a proposition to be true, or whatever may express the same notion, which applies not only to tautologies and other maximal certainties, but also to contingent propositions. Probabilistic epistemology is unable to provide such an account, as the lottery paradox forces us to recognize. Hence, the only choice left is to develop such an account independent of probability theory. (Spohn, 2012, p.46)

The ranking theory can be understood then as an extension of the Bayesian epistemology that aims to overcome the problems that have been exposed. Next, we will synthetically present Spohn's ranking theory, his attempt to overcome these obstacles, and the way he traces, from its formalization, the laws of the dynamics of belief.

2.5 Ranking Theory

Ranking Theory then seeks a way of measure of beliefs that overcomes the typical problems of a theory of probability. Spohn formulates a theory that shows degrees of belief beyond the concepts of plausibility of probability that seem more like a continuum where there are no steps
to rest. Our degrees of belief are supported, although on scales, on a floor, in one way or another, firm. It raises the problem in the core of the proposal:

The essential point here is that, on the one hand, there is a deeply rooted tendency to project belief onto some scale of (un)certainty that is naturally interpreted in terms of probabilities. On the other hand, the scale does not really fit; belief is clearly not maximal certainty, but also not any probabilistic degree below the maximum (…) We start out with belief being a yes-or-not affair, and indeed must do so, though we will be led again to degrees of belief, albeit not probabilistic ones. (Spohn, 2012, p.47)

Hence, he begins his theory with a proposal about the conditions for the revision of a state of belief. This comes from the fact that we always have something as believed, and this can be revised later. This first static state of belief has conditions from which a further revision can be given. According to the formal tools at hand we can define a static state of belief as follows:

*Definition 2.13:* A static state of belief is a doxastic state of a subject s at time t under its belief set, that is, $Bst = (A \in A | Bst)$.

There would exist, according to tradition, two fundamental laws that rule a static state of belief. These are the *logical consistency* of belief sets and secondly the need for *deductive closure* of such sets (Hintikka, 1962).

*Definition 2.14:* A static state of belief is a doxastic state of a subject s at time t under its belief set, that is, $Bst = (A \in A | Bst)$ if and only if $Bst$ is consistent and has deductive closure.
There are some criticisms on the subject due to the typical philosophical problem of logical omniscience and the nature of consistency and logical consequence. Spohn states the following reading regarding these problems and the approach of his theory:

Still, logical consequence is undecidable (in the technical sense) Hence (4.2) assumes a belief set to be objectively and a fortiori, subjectively undecidable. What should it mean then that a believe such an undecidable set? This is the real problem behind (4.2), and it concerns (4.1) as well, since logical consistency is also undecidable. How, then, can it be required of rational persons? Was Frege irrational because he firmly believed in an inconsistent axiomatization of set theory? Clearly not. He would only have been irrational if he had stuck to the axiomatization after Russell’s discovery of the inconsistency. But of course he immediately saw the impact of Russell’s antinomy. For this reason one might want to conclude that (4.1-4.2) should be weakened to:

(4.3) Belief sets are believed to be consistent.

(4.4) Belief sets are closed under believed logical consequence. (Spohn, 2012, p.48)

However, remembering that Spohn considers the objects of belief as propositions, and therefore abandons any particular representation, both mental and linguistic, by its mere instrumental and tangent character, the laws of consistency and deductive closure are one of the fundamental bases of his theory. For this, he affirms the need for a doxastic subject to observe these two laws for their formation of sets of beliefs.

Consistency requires the subject to recognize that the actual possibility can never be in the contradictory, empty proposition. And deductive closure requires the subject to recognize that (i) if the actual possibility is in each of two propositions, then it is so also in their intersection, and (ii) if the actual possibility is contained in some proposition, then it is also in any superset. Or
referring once more to representations of truth conditions, we might say that consistency requires
the subject to know that sentences of the form $p \land \neg p$ cannot be true, and deductive closure
requires the subject to know that $p_1, \ldots, p_n$ are true if and only if $p_1, \ldots, p_n$ is true. (Spohn,
2012, p.50)

Thus, these two primitive laws make it possible to establish what Spohn calls the core of a set
of beliefs, that is, the intersection that makes both consistency and deductive closure patent. To
do this, define the core of a belief set as follows:

“Definition 4.5: Let $A$ be an algebra of propositions. $B \subseteq A$ is a belief set iff for all $A, B \in A$:
\[
\emptyset \not\in B
\]
If $A, B \in B$ then $A \cap B \in B$
If $A \in B$ and $A \subseteq B$, then $B \in B$
If $A$ is a complete algebra, the $B$ is a complete belief set iff moreover

For any $B \subseteq B$, $\cap B \in B$

For a complete belief set $B$, $\cap B$ is called its core” (Spohn, 2012, p.50).

The doxastic states of an ideal subject can be represented by a complete set of beliefs or by
their core, that is to say, the intersection of all the propositions believed, given that set of beliefs.
The core demonstrates the consistency and deductive closure of the state. However, why would
we have these conditions as foundations of static belief state of a subject? Such conditions, and
in this sense all the other normative aspects that will be studied, work, following the
interpretation of Huber (2016b) as "hypothetical imperatives that are justified by being shown to
be the means to attaining the cognitive ends they are conditional upon" (Huber, 2016b, p.180).
The justification of these normative principles depends on the purposes of the cognitive agencies
that are to be resolved and seek to objectify the conditions that should be reached for such
cognitive agencies. In this sense, the normative conditions of consistency and deductive closure
do not seek any other cognitive agency than that of maintaining true sets of beliefs. The goal of
getting to the truth and avoiding error is still important to several epistemic agencies. It is worth
saying that the importance of this epistemic agency is highly relevant, above all, as a foundation
for obtaining knowledge, and therefore it becomes Spohn's bet. For the moment you can leave
this brief note on the meaning of the regulations, which will be developed carefully later, and
return to the exposition. The normativity on the principles about the statics of a doxastic state
allows thus the development of a theory about the changes or dynamics of the doxastic states,
from the concept of **conditioned belief**, the center of the Spohn's theory.

We have now come to the key question of this book. What can we say about the dynamics of
doxastic states represented as (complete) belief sets or their cores? Let us make the question
precise: Suppose that s state at t is characterized by the prior core C and that s changes to the
posterior core C' at t. What drives the change? This may have any causes: forgetfulness and
recollections, thoughtlessness, drugs, wishful thinking, exhaustion, etc. However, it was clear all
along that we do not want to examine these kinds of changes, but only changes that are clearly
rationally accessible. This is why we are always considering evidence driving doxastic change.
Let us start with the simple assumption that evidence comes in propositional form. (Spohn, 2012,
p.51)

As we saw in (2.12), the evidence motivates the possibility of simple conditionalization. The
evidence motivates the dynamics of the doxastic states. Thus, following the principle of simple
conditionalization in (2.12) then the fundamental question arises: let E be all the evidence of the
doxastic subject s between t and t', how is the new core C 'rationally subsumed at time t'? Spohn
responds in the following way:
Consider the consistent case first. It is governed by two highly plausible conditions. The first one is:

\[(4.7) \text{ If } C \cap E \neq \emptyset, \text{ then } C \subseteq C \cap E.\]

This says that the posterior state preserves all of the prior beliefs, accepts the evidence as well, and draws all the logical conclusions from combining evidence and prior beliefs. (4.7) thus sets a minimum for the posterior belief set and still allows it to be exceeded. (Spohn, 2012, p.52)

Everything then depends on the acceptance of the evidence $E$. The new core of the state of belief is a subsumption of the state of prior belief conditioning the, we could say prosaically, new evidence $E$. No matter what type of core may be subsequently, this should be consistent.

Many proposals affirm that the change of beliefs can be of a different sort. For example, following Quine (1951) one can connotatively speak of central and peripheral beliefs:

For vividness I have been speaking in terms of varying distances from a sensory periphery. Let me try to clarify this notion without metaphor. Certain statements, though about physical objects and not sense experience, seem peculiarly germane to sense experience and in a selective way: some statements to some experiences, others to others such statements, especially germane to particular experiences, I picture as new the periphery. But in this relation of Germaneness I envisage nothing more than a loose association reflecting the relative likelihood, in practice, of our choosing one statement rather than another for revision in the event of recalcitrant experience. (Quine, 1951, p.vi)

It is believed that the revision of the latter is much more likely than the revision of the former. For example, it would be easier to believe in a priori beliefs, as well as simple laws and
hypotheses, rather than beliefs that refer to accidental facts or complex hypotheses. However, how can we measure such centrality? According to Spohn is not required more than 4.10 as a criterion for the revision of beliefs, this is: “(4.10) If \( C \cap E \neq \emptyset \), then \( \emptyset \neq C \subseteq E \)” (Spohn, 2012, p.52).

The point is that regardless of the transmission of belief from the first state to the second, the disposition of this transition is contained in the previous state. Supporting us again in the example of Quine, we can say that what constitutes the centrality or peripheral character of certain beliefs is the result of the review, i.e. the result of the counterfactual test that was stated above. Thus, the ranking theory could measure the degree of centrality of a set of beliefs. The mechanism through which this measurement is initiated is a selection function that allows defining the transition from a core \( C \) to \( C' \).

“Definition 4.11: Let \( A \) be an algebra over \( W \). Then \( g \) is a selection function for \( A \) iff \( g \) is a function from \( A - \{ \emptyset \} \) into \( A \) such that for all \( A, B \in A - \{ \emptyset \} \):

(a) \( \emptyset \neq g (A) \subseteq A \),

(b) If \( g (A) \cap B \neq \emptyset \), then \( g (A \cap B) = g (A) \cap B \)” (Spohn, 2012, p.54).

The function \( g (A) \) is configured as the core of further belief after accepting certain evidence. Thus, we can return to 2.12 and understand \( g (A) \) as a belief revision scheme that stands out from the traditional probability theory by formulating the so-called simple conditionalization law:

“ (4.12) If the selection function \( g \) characterizes the doxastic state of the subject \( s \) at time \( t \) and if \( E \) is the total evidence \( s \) receives and accepts between \( t \) and \( t' \), then \( g (E) \) is score at \( t' \), so that, \( s \) believes \( A \) at \( t' \) iff \( g (E) \subseteq A \)” (Spohn, 2012, p.55).
This model of belief revision as a sort of counterfactual test allows us to see the structure of how a doxastic subject *choose* their preferred beliefs given a set of beliefs and this model of plausibility. This leads to an important account very useful to the social sciences, as we see later, mainly, for instance to the economy and psychology. Spohn suggests this as follows:

Why were economists so excited about this formal result? Because it showed how to make preferences behaviorally accessible. Preferences were clearly a basic notion of all microeconomic theory, but at the same time a hypothetical construct, a latent variable, as psychologist said, or a theoretical notion, as philosophers said which is not directly observable. (Spohn, 2012, p.57)

But this counterfactual test cannot just eliminate certain beliefs for certain convenience. If you want a rational belief dynamics and ruled by consistency and deductive closure, you need to leave certain other beliefs necessarily. If evidence forces the change of certain doxastic state we must arrive to another belief set with consistency and deductive closure. Spohn proposal leads to an ordered set of possibilities as the foundations of this dynamics of belief. But, how this ordered set is established? Through the concept of ranking functions (Spohn, 1988; 2012):

“Definition 5.5: Let $A$ be a complete algebra over $W$. Then $k$ is an $A$ measurable completely minitive natural negative ranking function iff $k$ is a function from $W$ into $N^+ = N \cup \{\infty\}$ such that $k^+ (0) = \emptyset$ and $k^+ (n) \in A$ for each $n \in N^+$. $k$ is extended to propositions by defining $k (\emptyset) = \infty$ and $k (A) = \min \{ k (w) \mid w \in A \}$ for each non empty $A \in A$; $K(A)$ is called the negative Rank of $A$ ” (Spohn, 2012, p.70).

Ranking theory measure grades of disbelief of an agent through negative ranking function $k$. Spohn explains the formal structure as follows:
“Thus, \( k(A) = 0 \) means that \( A \) is not disbelieved at all, \( k(A) = 1 \) means that \( A \) is disbelieved to the last degree, \( k(A) = 2 \) means that \( A \) is disbelieved to the second least degree; and so on. Hence, \( A \) is believed iff - \( A \) to some positive degree, i.e.: (5.6) \( B(A) \text{ iff } k(-A) > 0 \).” (Spohn, 2012, p.71).

Spohn’s theory is aimed to degrees of disbelief. However, it is possible to translate it into positive ranking functions\( \beta \) for a more intuitive interpretation.

“(5.11) If \( k \) is a negative ranking function for \( A \) and if \( \beta(A) = k(-A) \) for each \( A \in A \), then \( \beta \) is a positive ranking function for \( A \) and vice versa” (Spohn, 2012, p.75).

In this sense, there may also be an equivalence that refers to both a positive and a negative ranking the two sided function \( \tau \).

“Definition 5.12: Let \( A \) be an algebra of propositions. Then \( \tau \) is a two sided ranking function for \( A \) iff there is a negative ranking function \( k \) for \( A \) such that \( \tau(A) = k(-A) - k(A) \), or a positive ranking function \( \beta \) for \( A \) such that \( \tau(A) = \beta(A) + \beta(-A) \), for all \( A \in A \). \( \tau(A) \) is called the two sided Rank of \( A \). (...) A two sided ranking function thus takes positive as well as negative values. The intended interpretation is, of course, that a proposition \( A \) is believed if \( \tau(A) > 0 \), disbelieved if \( \tau(A) < 0 \), and neutral or undecided if \( \tau(A) = 0 \). Indeed, for any \( A \in A \) we have: (5.13) \( \tau(-A) = -\tau(-A) \)” (Spohn, 2012, p.75).

---

4 “Example 5.7, Tweety: A quick example might be helpful here. Look at Tweety, an entity which has acquired some fame in the non monotonic reasoning literature. Tweety has, or fails to have, each of the three properties: being a bird (B), being a penguin (P), and being able to fly (F). This makes for eight possibilities. Suppose you have no idea who or what Tweety is (for all you know, it might even be a car). Then your negative ranking function might be the following one (I am choosing the ranks in an arbitrary, though intuitively plausible way, just as I would have to arbitrarily choose plausible subjective probabilities if the example were a probabilistic one):

<table>
<thead>
<tr>
<th>( k )</th>
<th>( B \cap \neg P )</th>
<th>( B \cap P )</th>
<th>( \neg B \cap \neg P )</th>
<th>( \neg B \cap P )</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>( \neg F )</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>8</td>
</tr>
</tbody>
</table>

In this case, the strongest proposition you believe is that Tweety either not a penguin and not a bird \( \neg B \cap \neg P \) or a flying bird and not a penguin \( (F \cap B \cap \neg P) \) all other possibilities are disbelieved ” (Spohn, 2012, p.71).
Thus, for an appropriate design of a model of the dynamics of belief we need to apply the concept of simple conditionalization to our ranking functions. These are the conditional ranks and the equivalences between functions following the interpretation of Skovgaard- Olsen (2015, p.72):

i. Negative Conditional Rank of B given A: \( k(B \mid A) = k(A \cap B) - k(A) \)

ii. Negative Equivalence with Positive Ranking Function: \( \beta(A) = k(\neg A) \).

iii. Positive Conditional Rank of B given A: \( \beta(B \mid A) = \beta(\neg A \cup B) - \beta(\neg A) \)

iv. Two sided Equivalence with negative and positive Ranking Functions: \( \tau(A) = \beta(A) - K(A) = k(\neg A) - k(A) \)

v. Two sided Conditional Rank of B given A: \( \tau(B \mid A) = \beta(B \mid A) - k(B \mid A) = k(\neg B \mid A) - k(B \mid A) \)

The ranking is thus fixed as a function of ordinal numbers in the following way (See: Goldszmidt and Pearl, 1996):

i. \( A \) and \( \neg A \) are believable (suspension of judgment) = \( k(A) = 0 \)

ii. \( \neg A \) is believable = \( k(A) = 1 \)

iii. \( \neg A \) is strongly believable = \( k(A) = 2 \)

iv. \( \neg A \) is very strongly believable = \( k(A) = 3 \)

v. ...

You also have not just grades or rankings for disbelief but, as we saw, grades of belief and combined grading of disbelief and belief. Using a metaphor, rankings allows us to place (organizing) ideal doxastic agent’s beliefs in a sort of podium at a given moment in time. We cannot use this metaphor with probabilistic accounts. In the same sense, we have grades of
conditional disbelief (belief or both) with a set of rules to update it for a full account of the dynamics of belief.

Obeying the rules of the theory this ideal doxastic agent can thus maintain consistent and deductively closed beliefs, even diachronically, as the grounds of other epistemic goals as good reasons, scientific knowledge, etc. Huber (2016) clarifies this topic as follows:

To the extent that the ideal doxastic agent has this goal, she should obey the norms of ranking theory. It is not that we are telling her what and how to believe. She is the one who is assumed to have this goal. We merely point out the (objectively) obtaining means-end relationships. Of course, if the ideal doxastic agent does not aim at always holding beliefs that are jointly consistent and deductively closed, our response will cut no ice. But, as already mentioned before, that is beside the point: it is mistaking a hypothetical imperative for a categorical one. (Huber, 2016, p.186)

Now we are in the garden of forking paths (Borges, 1941). An in this means-end approach the best choice to our goal is to obey ranking theory imperatives. Therefore, the next step is to study the various applications of ranking theory relevant to the present dissertation.
3 Philosophical Applications of Ranking Theory

3.1 Introduction

In the second step, the guidance question is: *How to make useful this theory for our purposes?* This chapter is then devoted to the philosophical applications of ranking theory and how to make it useful for the account of an internal normativity of social sciences. The totality of this chapter is spent on searching for relevant philosophical applications of ranking theory to achieve the ulterior goal of a general account of the internal normativity of the social sciences. This chapter is, using an analogy, the creation of a toolbox for the specific objectives of this work.

First of all, this chapter will deal with the tool called *reasons*. This is the first application to deal with. Reasons can be understood as functions of transmission of epistemic justification. Given the concept of relevance with respect to ranking functions and conditional ranks, the concept of reason is a sort of *warrant* or epistemic justification between propositions. The chapter will explain the construction and meaning of this application.

In the second place, it will deal with the application of ranking theory to subjective normativity or *ceteris paribus laws*. Spohn’s (2012) reading on ceteris paribus laws claims that this subjective normativity is the case when we can obtain normal conditions in a given ontological region. In other words, normal conditions are an epistemic issue related to epistemic agent’s beliefs and reasons given certain background. Doxastic agents belief defeasible a priori certain hypothesis given necessary and sufficient reasons as a ceteris paribus law.

Finally, the chapter provides an account of the state of the art on causation and the origin, position, novelty, and fortune of Spohn's proposal on the matter, thanks to the development of
ranking theory. In Spohn's words, ranking theory was originally created as a way of foundation for a theory of causality.

3.2 Reasons

The first important philosophical application of the theoretical account of ranking theory consists in to clarify the concept of reason. This topic is necessarily related to the problem of the confirmation of a hypothesis given certain evidence and thus to the concept of relevance. There are two paradigmatic notions of confirmation following Carnap (1962):

According to the first, a hypothesis is confirmed by the evidence if the (subjective or logical) probability of the hypothesis given the evidence is high, where the vague “high” at least means “greater than .5”, but usually something stronger. According to the second, a hypothesis is confirmed by the evidence if the evidence is positively relevant to, or raises the probability of, the hypothesis. (Spohn, 2012, p.104)

The evidential support of hypotheses can change the credibility on such hypotheses. Thus, it is necessary to design models of non-deductive reasoning, like Spohn’s theory, to confirm hypotheses given the concept of relevance. Crupi affirms in this sense:

The point of relevance confirmation is that the credibility of a hypotheses can be changed in either a positive confirmation in a strict sense or negative way (disconfirmation) by the evidence concerned. Confirmation thus reflects an increase from initial to final probability, whereas disconfirmation reflects a decrease. (Crupi, 2016, p.3.3)

Spohn claims that for his theory, translate high probability criterion into ranking theory terms is not adequate. To say that $A$ confirms $B$ iff $B$ is believed given, for instance, $\beta (B|A) > 0$, is not
a positive rank notion of confirmation by firmness, but just a conditional belief as we studied previously. Spohn chooses the alternative notion of relevance as more adequate to his theory. His account of the dynamics of belief is then a good model of confirmation by relevance.

In this sense, to grasp the concept, is better to start talking of relevance in terms of ordinary language statements like: A confirms B, A supports B, and finally, A is a reason for B. Spohn defines thus, from these intuitive notions, relevance as follows:

“Definition 6.1: Let \( \kappa \) be a negative and \( \tau \) the corresponding two-sided ranking function for A, and \( A,B \in A \). Then A is a reason for B or positively relevant to B w.r.t. \( \kappa \) iff \( \tau (B/A) > \tau (B/\neg A) \), i.e., iff \( \kappa (\neg B/A) > \kappa (\neg B/\neg A) \) or \( \kappa (B/A) < \kappa (B/\neg A) \). A is a reason against B or negatively relevant to B w.r.t. \( \kappa \) iff \( \tau (B/A) < \tau (B/\neg A) \). Finally, A is relevant to B or dependent on B w.r.t. \( \kappa \) iff A is a reason for or against B w.r.t. \( \kappa \)” (Spohn, 2012, p.105).

Skovgaard-Olsen (2015, p.76) interpretation leads to the following chart:

i. A is positively relevant to C iff \( \tau (C/A) > \tau (C/\neg A) \)

ii. A is irrelevant to C iff \( \tau (C/A) = \tau (C/\neg A) \)

iii. A is negatively relevant to C iff \( \tau (C/A) < \tau (C/\neg A) \)

The previous model is then constituted as a model of non-monotonic reasoning for the confirmation of both scientific and non-scientific hypotheses. The multiple applications go from the theory of argumentation, through legal issues, to scientific methodology. These matters will be dealt with promptly later in this work. This model of relevance leads therefore to the concept of reason.
Reason can be understood as a function of transmission of epistemic justification. This is to say, transmission of justification from a belief \( A \) to \( B \). Moretti and Piazza claims that:

Transmission of justification across inference is a valuable and indeed ubiquitous epistemic phenomenon in everyday life and science. It is thanks to the phenomenon of epistemic transmission that inferential reasoning is a means for substantiating predictions of future events and, more generally, for expanding the sphere of our justified beliefs or reinforcing the justification of beliefs that we already entertain. (Moretti and Piazza, 2013, p.i)

Therefore, we can understand the concept of reason as a certain warrant or epistemic justification between propositions. To be a reason is to be a certain warrant, support or ground between propositions. Spohn claims that: “In German the point is even a bit clearer. Here “reason” disambiguates into “Grund” and “Vernunft”; and it is just the notion of a “Grund” or “Begründung” that is explicated in Def (6.1)” (Spohn, 2012, p.105). It is clear that Spohn does not use the concept, for instance in the sense of Kant’s reason:

Wir begnügen uns hier mit der Vollendung unseres Geschäftes, nämlich, lediglich die Architektonik aller Erkenntis aus reiner Vernunf zu entwerfen, und fangen von dem Punkte an, wo sich die allgemeine Wurzel unserer Erkenntnis-kraft teilt und zwei Stämte auswurft, deren einer Vernunft ist. Ich verstehe hier aber unter Vernunft das ganze obere Erkenntnis-vermögen, und setze also das Rationale den Empirischen entgegen. (Kant, 1787, A835-B863, p.863)

Ranking theory is then a mechanism to measures the strength of each warrant, that is, its relevance, and thus find reasons.
Now it is necessary to specify more deeply what is \textit{being a reason}. First, \textit{being a reason} is a relationship between propositions (Spohn, 2012, p.105). This comes from the whole structure exposed on the ranking theory and the conventional account on belief previously exposed. Second, this relationship between propositions is \textit{relative} to a doxastic subject, that is to say, possible worlds centered as subjects in a certain time and space. Therefore, \textit{it is not necessary that the different doxastic subjects always agree on their reasons}. Third, there is a clear difference between \textit{being a reason} and \textit{having a reason}. Spohn explains this with an example:

Sadadam’s alleged mobile underground laboratories are reason to believe that he is (on the verge of) possessing weapons of mass destruction. Everyone agreed on this. But only George W Bush and some other statesmen had a reason to believe in the laboratories and hence in the weapons. Moreover, we should distinguish a factive and non-factive sense of having a reason. In the factive sense, the reason must obtain or be true; in the non-factive sense the reason need only be believed. (Spohn, 2012, p.106)

Finally, due to the different roles of ranks, we can distinguish different kinds of reasons:

\textit{“Definition 6.2. Let }k, t, A, \text{ and } B \text{ as in 6.1. Then } A \text{ is a}

\begin{align*}
\text{Supererogatory} & \quad \tau(B|A) > \tau(B|\neg A) > 0 \\
\text{Sufficient} & \quad \tau(B|A) > 0 \geq \tau(B|\neg A) \\
\text{Necessary} & \quad \tau(B|A) \geq 0 > \tau(B|\neg A) \\
\text{Insufficient} & \quad 0 > \tau(B|A) > \tau(B|\neg A)
\end{align*}

\textit{”} (Spohn, 2012, p.107).

These four types of reason relations are grounded in the notion of relevance and in the inner nature of ranks. Spohn explains his novel typology as follows:
“The hopefully suggestive qualifications “supererogatory” and “insufficient” are novel: a supererogatory reason strengthens the belief in something already believed, whereas an insufficient reason weakens, but does not eliminate the disbelief in something still disbelieved. A reason that is not sufficient might still be necessary; “insufficient” is a stronger opposite to “sufficient” than “not sufficient”. The qualification “sufficient” and “necessary” are familiar and fitting. A sufficient reason for B suffices to believe B, whereas a necessary reason for B is necessary to give up disbelief in B. Clearly there is only one way to belong to two kinds of reasons, namely by being a necessary and sufficient reason. Otherwise the categories are disjoint” (Spohn, 2012, p.108).

At this point, we can bring back the notion of conditional rank and talk about conditional reasons and a dynamic of reasons. Spohn defines this dynamic of reasons as follows:

“Definition 6.3: Let $\kappa$ be a negative ranking function for $A$, and $A, B, C \in A$. Then A is a (supererogatory, sufficient, necessary, or insufficient) reason for or against B conditional on or given C w.r.t. $\kappa$ iff, respectively, A is a (supererogatory, sufficient, necessary, or insufficient) for or against B w.r.t. $\kappa_C$” (Spohn, 2012, p.109).

And Tweety strikes back: Given the proposition that $T$ is a bird, this proposition is a reason to believe that $T$ can fly. But, given new evidence like that $T$ lives in Antarctic, the first proposition became a reason against that $T$ can fly.

The reasons can also be classified by their behavior. Spohn calls it their formal structure. First of all, the reasons behave like deductive reasons:

“Definition 6.4: $A \in A$ is a deductive reason for $B \in A$ iff $A \subseteq B$” (Spohn, 2012, p.110).
So, a deductive reason has to be a *sufficient* or *supererogatory* reason given the novel typology of Spohn’s theory. Deductive reasons are not relative to doxastic states and that is why their monotonicity. The other kind of behavior is to be an *inductive reason*. Inductive reasons have to be understood as the complement of the set of deductive reasons. Inductive reasons are portrayed by ranking theory and the dynamic of belief account. But this behavior is not necessarily related to an asymmetric classic inference. This is a very important remark on this topic:

The basic point is that deductive reasons are our prevalent conception of reasons and deductive reasons have a direction; antisymmetric is the only way to revert them. The point can also be expressed more neutrally. Reasons are closely related with (deductive or inductive) inference, and inference appears to be asymmetric. We infer the general from the singular, the future from the past, the unobserved from the observed, we confirm the hypothesis by the evidence. Listing these alleged asymmetries makes clear, though, that they do not hold. Inferences run in any direction; we infer the singular prediction from the general hypothesis, etc. The asymmetry is not in what reasons are, but rather in the reasons we have or get. (Spohn, 2012, p.112)

Another feature of reasons is that we can *weigh reasons*. We are always wondering if we should believe or not certain propositions. The kind of inferences we use is then the way through we can weigh reasons. And in that sense the typology of reasons allows us to weigh reasons following our purposes. However, only deductive reasons cannot be weigh at all, because its inner behavior makes it clear. And that is why perhaps we can leave this dominant model of reasoning for several epistemic purposes.

The deductive validity is not the only criterion to say that reasoning is logically well established. This problem arises when the consequence relation is not only, and necessarily, the logical entailment. When the premises only supports with likelihood, and other things being
equal, the acceptance of the conclusion, nevertheless there are well-supported arguments that offer good reasons for its acceptance. This is evident for instance in everyday reasoning and practical reasoning. Reasoning is in a very important dimension dynamic and non-monotonic or defeasible in essence as Spohn claims in this ranking theory application.

Finally, an important feature of reasons is that belief change is caused by reasons. Of course, we have another kind causes of belief change as limited memory, illness, and many other disturbing factors. But one normativity conclusion from Spohn’s account is that we cannot change beliefs without the force of reasons.

3.3 Ceteris Paribus Laws

Laws of nature are taken as necessary, universal, and truth assertions supporting causation, explanation, and relations of phenomena or counterfactual states of affairs. This paradigm, linked to physics, draws the standard meaning of law in science. However, in other fields, or special sciences there are several generalizations or models that differ from this definition. Some examples are the following:

1. Law of Demand
2. Mendel’s laws

From these classic examples, we can infer that these generalizations are not necessary, universal and truth supporting claims, but, in fact, are useful laws, for instance, in economy and biology sciences. This kind of generalizations needs a ceteris paribus-clause, which means “other things being equal”. Thus, ceteris paribus laws are universal statements with certain
exceptions. John Stuart Mill used this concept properly in that sense, in his account of economy disturbing factors:

Political economy considers mankind as solely occupied in acquiring and consuming wealth(...) not that any political economist was ever so absurd as to suppose that mankind is really thus constituted (...) when a concurrence of causes produces an effect, theses causes have to be studied one at a time, and their laws separately investigated (...) since the law of the effect is compounded of the laws of all causes which determine it. (Mill, 1843, p. vi-9.3)

Mill’s account asserts that there are exceptions or disturbing factors in theories, which often overrides the meaning of laws because laws do not fit with phenomena.

Another definition that brings light on the meaning of ceteris paribus clause is Cairnes’s description of political economy (1888). He says on political economy theories that: The doctrines of political economy are to be understood as asserting, not that will take place, but what or what tends to take place, in this sense only they are true. He claims that: “Ceteris paribus is what would or what tends to take place if normal conditions obtained”. (Cairnes, 1888, p.103) Ceteris paribus clauses on Cairnes view are tendencies of what probably takes place.

In contemporary philosophy of science, since logical positivism until today, definitions of this issue are related to the exclusion of disturbing factors in theories and scientific procedures. Only thorough this exclusion, the ceteris paribus clause, sciences could assert necessity and sufficient relation of phenomena (Nagel, 1961) and (Hempel, 1965). This argument is very problematic when it is applied to social sciences and other specific scientific disciplines. Certain neighbor phenomena in certain theories and models of such disciplines are not absolutely irrelevant or
fixed. Therefore, ceteris paribus laws require a strong analytical approach to define its nature and function.

First of all, following Schurtz, Reutlinger and Hutlemann’s approach (2015), we can differentiate comparative and exclusive ceteris paribus laws. Comparative ceteris paribus laws show that if increase the value of a variable, then the increase of another is directly proportional and equal, that is, being things equal. For instance, increase of a gas temperature leads to increase in volume. In the other hand, exclusive ceteris paribus laws not only needs that the value of variables stays fixed, but also requires to exclude disturbing factors.

Comparative should be restrictive when it is instantiated to a specific class of circumstances or unrestricted when asserts a probabilistic cause for all circumstances:

I suggest distinguishing between two conceptions of cp-law: comparative versus exclusive. Comparative cp-laws require that factors not mentioned in the antecedent or the consequent the law remain unchanged. In contrast, exclusive cp-laws assert the connection between antecedent and consequent only under the condition that certain factors are excluded. (Schurtz, 2015, p.3.1)

Similarly, we can distinguish definite and indefinite exclusive ceteris paribus laws. Definite specifies the disturbing factors excluded from the law. Indefinite consist in a “universal second order condition, which excludes all kinds of disturbing factors to the law, whatever they are” (Schurtz, 2015, p.3.1)

The problem with exclusive ceteris paribus laws is that may fall in trivialization because is so difficult to reach an account of all the excluded factors. The key to resolve the exclusive perspective problems is, in the called semantic conception, to add the missing conditions to the laws (Fodor, 1991). This leads to the following schema of a plausible solution:
A factor C is a completer relative to a realizer R of A and a consequent predicate B iff:

1. R and C is strictly sufficient for B.
2. R on its own is not strictly sufficient for B.
3. C on its own is not strictly sufficient for B. (Fodor, 1991, p.23).

Also, to resolve the problem in relation to multiple mental states adds that:

Cp (A then B) is true iff either (1) for every realizer R of A there is a completer C such that A and C then B or (2) if there is no such a completer for realization R\textsubscript{1} of A there must be many other laws in the network for A for which R\textsubscript{1} has completers (Fodor, 1991, p.27).

Another perspective to solve the problem is called epistemic. Completion is explanatory and only required *post factual*. This proposal answers the question: why the law was not instantiated?

It is necessary to bring evidence for the existence of the disturbing factor (Pietroski and Rey, 1995). This is the schema for the thesis:

Cp (A then B) is non-vacuously true iff:

1. A and B are otherwise nomological.
2. For all x if Ax then (either Bx or there exists an independently confirmable factor that explains why –Bx).
3. Cp (A then B) explains at least something as assumed in 2. (Pietroski and Rey, 1995, p.92)

An alternative theory to solve the problem is called normality theory. And for this particular case of normality theories, Spohn’s (2012) account on ceteris paribus laws is very relevant and plausible. In this particular theory we can say that ceteris paribus clause means “*other things being normal*”:
My goal will rather be to explain how the notion of a ceteris paribus condition flows directly from the logic of non-probabilistic defeasible reasoning as explicated by ranking theory. If defeasible reasoning really is the basis of the phenomenon, it is no wonder that it is ubiquitous in the sciences, including physics. (Spohn, 2012, p.305)

Ceteris paribus laws are the case when we can obtain normal conditions in our ontological region that is, that conditions are high probable in such ontological region. Another way to think on it is by using the notion of high probable conditions in a certain possible world.

I had emphasized that normality is an indexical or egocentric notion that refers to what is normal to us in our environment. Detached from such a context, normality is not meaningful. Thus detached, we could only say that everything in our environment is extremely exceptional, since the earth is such an extraordinary place in our universe. (Spohn, 2012, p.335)

Thus, in Spohn’s reading, normal conditions are an epistemic issue because an epistemic agent believes something about the normality of conditions. Epistemic dimension is linked with ontological dimension as long as a doxastic agent might believe in certain a priori defeasible relations of phenomena, given certain fixed background.

What I am suggesting, then, is that we give the talk of normal conditions an epistemic reading: normal conditions are the conditions expected or at least not ruled out. This contrast with the trivial reading according to which the ceteris paribus conditions with regard to a given law or hypothesis H are defined as those conditions under which H is true. It contrast with the existential reading according to which ceteris paribus is just an existential quantifier over conditions possibly of a suitable kind (…) It also contrast with the eliminativistic reading, as one might called it, according to which normal conditions is to be replaced by an explicit list of specific conditions under which H holds. (Spohn, 2012, p.313)
The definition of such a priori defeasible condition is the following:

The belief in the reduction sentence \( H= S \) then, \((D \text{ iff } R)\) is defeasible a priori, or, equivalently, it is defeasible a priori that given \( S \), \( D \) is a necessary and sufficient reason for \( R \). (Spohn, 2012, p.323).

Normal conditions are therefore epistemic conditions as a result of a fixed background. Spohn’s remarks on this that:

First, suppose we get more information about the background conditions. We expect to learn that the background is normal, and our experience might confirm this. It might also disappoint this expectation (...) However, what cannot change through this learning process is the conditional belief in the reduction sentence given normal conditions; this relation remains fixed through-out all information about the background. (Spohn, 2012, p.323)

We cannot cleared up all the conditions as the applications required to certify its satisfaction in a wide ontological and metaphysical point of view, as exclusive ceteris paribus theories want to achieve, that is impossible, and that is why we need to explain this through defeasible reasoning. Ceteris paribus laws, in an epistemological way, as hypothesis or a priori defeasible clauses of reasoning, are powerful tools for human knowledge that fixed laws trough the belief in certain \textit{a priori} defeasible normativity of the knowledge of phenomena.

As we have seen, ceteris paribus laws are indeed kinds of normative defeasible reasoning beliefs. Hence, are non- monotonic due to new information should affects its validity. The ceteris paribus laws use to be formulated with a non-strict conditional, or with a default non-monotonic Modus Ponens. Following Schurtz (2015) we can find out two semantic criteria to non-monotonic laws:
1. High probability semantics: An inference of a conclusion conditional from a set of premise conditionals is regarded as valid in this semantics iff the uncertainty of the conclusion conditional is not greater than the sum of the uncertainties of the premises (Schurtz, 2015, p.3.2).

2. Normality semantics: A conditional is considered as true in a ranked-world model iff all lowest-rank A-worlds are B-worlds. An inference is considered as valid in this semantics iff all ranked-worlds-models, which verify all premise conditionals verify the conclusion conditional (Schurtz, 2015, p.3.2).

The Spohn’s account is addressed to the normality semantics. The general schema of Spohn’s normative structures is most clear with the next explanation:

We believe defeasible a priori the hypothesis or ceteris paribus law, as we believe that: given variable S, then D is a necessary and sufficient reason for R and vice versa, or, for instance, We believe Ceteris Paribus that, if x is put into water, then x is soluble if and only if x dissolves.

Necessary and sufficient reasons are ranked-world-models with certain properties as established in the philosophical application of ranking theory to the concept of reason:

\[ A \text{ is a:} \]

\begin{align*}
\text{Supererogatory} & \quad \text{Reason for } B \text{ iff } t(\text{belief in } (B/A) > t(B/-A) > 0) \\
\text{Sufficient} & \quad \text{Reason for } B \text{ iff } t(B/A) > 0 \geq t(B/-A) \\
\text{Necessary} & \quad \text{Reason for } B \text{ iff } t(B/A) \geq 0 > t(B/-A) \\
\text{Insufficient} & \quad \text{Reason for } B \text{ iff } 0 > t(B/A) > t(B/-A)
\end{align*}


As we have seen, sufficient and necessary are not monotonic or deductive reasons. Therefore, sufficient and necessary are not fixed notions. All are relative to certain calculus in a given possible world.

The sufficient and necessary conditions fixed the background linking the probability to the first ranking 0. That is why we can still talking of laws and that is why we are talking of defeasible laws.

Moreover, as Schurtz shows, we can fix the formulation of a law with a default modus ponens with the ceteris paribus clause and with the other aspects of the semantics. In consequence, the Spohn’s proposal of a general form of normality ceteris paribus laws is capable of being used as an a priori model to every kind of defeasible reasoning normativity.

3.4 Causation

Philosophy has been concerned with this topic since the beginning of the discipline itself. However, there are certain milestones in the development of the problem. The Early Greek philosophy, Aristotle and the Middle Age philosophers, claims an objective reality of causation connected with the idea of substance and occasionalism (Aristotle, Met., I, 3, 983 a, 26 a, II, 2. and VII, 8, 1033 b).

The second milestone is Hume’s causal skepticism. Hume (1748) starts a criticism to the necessity of causation. Hume claims:

When we look about us towards external objects, and consider the operation of causes, we are never able, in a single instance, to discover any power or necessary connection; any quality, which binds the effect to the cause, and renders the one an infallible consequence of the other. We only find, that that the one does actually, in fact, follow the other. (Hume, 1748, VII.63).
Hume argues that concepts are just copies of our experiences. Hence, the point, following Hume, is that we cannot have an experience or direct impression of causation; events seem *conjoined* but not *connected*. Cartwright claims on Hume's account:

> Human beings, he believed, are deeply prone to forming habits. So, having observed a regular association between two kinds of events, we come to expect the second when we see the first. Looking inwards at ourselves, we notice this feeling of expectation; we get an impression of it. Our concept of causation, Hume claimed, is a copy of that impression of expectation. All that is happening in the external world that contributes to our coming to have this concept is a regular association of events. The concept itself derives from an impression of our internal state.

(Cartwright, 2014, p.309)

The idea of necessary connection, with respect to causation, is perceived not between events, but between the subject’s ideas (Beebee, 2006, p.85). Hume’s definition of causation is then twofold as follows: “we may define a cause to be an object followed by another, and where all the objects, similar to the first, are followed by objects similar to the second. Or, in other words, where, if the first object had not been, the second never had existed” (Hume, 1748, VII). The first definition leads to the view of causation as regularity and the second is the alternative of probabilistic and counterfactuals accounts of causality.

The regularity view of causation is, following Pilos (2009), the opposite of a classic thesis of *productive* relation linked with causality. To this account, *c* causes *e* if and only if:

i. C is spatiotemporally contiguous to e.

ii. E succeeds in time

iii. All events of type C are regularly followed by (conjoined) events of type E.
This regularity view of causation is thus a set of “(…) patterns among events even if there were no minds around (…) one might think of regularity as the mereological sum of its instances” (Pilos, 2009, p.133). This perspective is based either on certain criticism to Hume’s skepticism and asserts the causality as a mind-independent feature of reality. This account is supported in the supposed existence of regularity in nature.

Since the laws of nature are in a certain sense different from regularities, this account suffers several problems. For instance, the controversy over the example of the succession of day and night sustained by (Reid, 1788) and Brown (1822) makes the problem explicit. Is the day a cause of the night given the regularity’s account premises? These types of counterexamples led to the account of conditions and structures related to causal relations. Mill’s reading defines causes not only as regularities, but as regularities under certain conditions: “The cause then, philosophically speaking, is the sum total of the conditions positive and negative taken together” (Mill, 1911, p.217). Sufficient and necessary conditions show how the regularities that constitute laws of nature are parts of a structure:

Even if we know everything, we should still want to systematize our knowledge as a deductive system, and the general axioms in that system would be the fundamental laws of nature. The choice of axioms is bound to some extent to be arbitrary, but what is less likely to be arbitrary if any simplicity is to preserved is a body of fundamental generalizations, some to be taken as axioms and others deduced. (Ramsey, 1928, p.12)
Therefore, is possible to add to a standard definition of regularity theories of causation that: “c causes e if and only if c belongs to a minimal set of conditions that are sufficient for e given certain laws” (Meinzes, 2017, p.1.1).

Several problems remain since Reid and Brown controversy and the improvements of the theory (Mackie, 1980). The first is imperfect regularities. The classic example is that smoking is a cause for lung cancer; even some smokers do not develop it. The second is the irrelevance of certain regularities. This is a sort of non causa pro causa fallacy for coincidence; to curse someone each time he smokes it is not the actual cause of his lung cancer. Another problem for regularities is asymmetry or a kind of a non causa pro causa fallacy of reverse causation; lung cancer it is not a cause to smoke. Finally, there are spurious regularities. Jeffrey (1969) example is very clear: the drop in barometric pressure and the drop in a column of mercury is a spurious regularity with respect to the effect, to say, the storm. Hitchcock (2018) retakes the example of lung cancer to introduce the notion of probability in causation as a way to fix all these problems: “Thus, smoking is a cause of lung cancer, not because all smokers develop lung cancer, but because smokers are more likely to develop cancer than no smokers” (Hitchcock, 2018, p.2.3).

This general motivation of likelihood is collected by proposals named probabilistic theories. Probabilistic theories of causation are based on one root idea as Cartwright claims:

When a cause is present there should be more of the effect than if it were absent. That is the root idea of the probabilistic theory of causation. If C –type events occurring at some arbitrary time t cause E –type of events at a time t’ later, then we should expect: \( P(E_t/C_t) > P(E_t/\neg C_t) \). (Cartwright, 2014, p.313)
The *relata* of probabilistic causation theories with respect to actual causation are often called *events*. General causal relata are often called *factors*. Events are random variables in a probability space. Hence, causation is thus related with the raising of the probability of an event $e$ given an event $c$. This is the *root idea* common to several approaches to probabilistic causation like Reichenbach (1956), Suppes (1970) and Cartwright (1979).

Reichenbach (1956) introduced several important notions to this reading. First of all, is the notion of *screen off*: If $P(E|A\cap C) = P(E|C)$, then $C$ is said to *screen* $A$ off from $E$. Therefore, $A$ and $E$ are independent. Hitchcock clarifies the matter as follows:

Reichenbach recognized that there were two kinds of causal structure in which $C$ will typically screen $A$ off from $E$. The first occurs when $A$ causes $C$, which in turn causes $E$, and there is no other route or process by which $A$ effects $E$ (...) We might say that $C$ is an intermediate cause between $A$ and $E$. (...) The second type is a common cause of $A$ and $E$. (Hitchcock, 2018, p.2.3)

The second type of screen off is represented by the barometer example upon. A drop in pressure causes the drop of mercury and the storm, but air pressure *screen off* the measure, because this does not affect the occurrence of the storm. In this sense, Reichenbach developed the notion of *common cause principle*. Ultimately this not actual causal relations of two separate events are determined by a common causal probabilistic relationship. Nevertheless, this notion is problematic with respect to the *root idea* of probabilistic accounts. First, in some cases, $c$ and $e$

---

5 Following the explanation of Hitchcock (2018) of CCP: given $P(A\&B)>P(A)\times P(B)$ and neither $A$ nor $B$ is a cause of the other, there will be a common cause, $C$, of $A$ and $B$, satisfying the following conditions:

i. $0<P(C)<1$
ii. $P(A\&B|C)=P(A|C)\times P(B|C)$
iii. $P(A\&B|\sim C)=P(A|\sim C)\times P(B|\sim C)$
iv. $P(A|C)>P(A|\sim C)$
v. $P(B|C)>P(B|\sim C)$. 


can have a common cause and therefore, the root idea is necessary but not sufficient to explain causation. Second, this common causes can rise relations called reverse inequalities given certain contexts that make not necessary our root idea. This is cleared in the so called Simpson’s paradox (1951)\(^6\).

Cartwright (1979) wanted to solve these problems through the notion of background contexts. The core idea is that: \( C \) causes \( E \) iff \( P(E/C \cap B) > P(E/\neg C \cap B) \) for every background context \( B \). Hence, Background context is a sum of variables that in the frame of our root idea, like is patent in the previous formula, become fixed as a kind of constant. Given \( B \) a cause \( C \) must raise the probability of \( E \) in every background context. This position leads to a debate on the scope of the background context and the beginning of certain causal modeling and interventionist approaches.

Another branch derived from Hume’s twofold definition and probabilistic root idea is the approach named the counterfactual theories of causation. These are based on the semantics of counterfactuals made explicit by Stalnaker (1968) and Lewis (1973). We can define it generally following Paul’s reading:

That is \( C \) causes \( E \) because the counterfactual If not \( C \), then not \( E \) is true. To the extent that this is successful, we have a counterfactual analysis of causation (…) Counterfactuals are subjunctive conditionals of the form, if it were the case that \( A \), then it would be the case that \( B \). (Paul, 2009, p.158)

Lewis theory is based in certain asymmetry or over determination of facts with respect to a counterfactual a priori conceptual analysis (Meinzes, 2017). From this point of view, causes are

\(^6\) This is an example from (Melinas and Bigelow 2016) on Simpson’s paradox: \(a/b < A/B \), \(c/d < C/D \), \((a+c)/(b+d) > (A+C)/(B+D)\) or \(1/5 < 2/8 \), \(6/8 < 4/5 \), \(7/13 > 6/13\).
something that makes a difference. Counterfactual dependence between two distinct possible events leads to a causal dependence of two distinct actual events. Hence, events behave with transitivity, this is to say, causal dependence is successful if it belongs to a certain causal chain of actual events (Lewis, 1973, p.563). In that sense, there is either a temporal asymmetry of causal dependence; the present counterfactually depends on the past. (Lewis, 1973, p.567)

Finally, Lewis lecture argues that there is no space for backtracking counterfactuals or certain preempted potential causes because the premises of transitivity and actual causal chains make clear that potential causes are related with the counterfactually concept of dependence but not with actually causes. That is why: “Causal dependence is sufficient for causation but not necessary: it is possible to have causation without causal dependence” (Menzies, 2017, p.1.2).

Lewis actual causation is then based on the transitivity closure of counterfactual dependencies. The problem with this chain of events is that the effects not always depend counterfactually on their causes and not even directly. Counterfactual accounts, given this, suffer with several problems like preemption, redundancy, backtracking counterfactuals, simultaneity and trumping. However, the counterfactual approach has certain virtues that have been exploited by later theories of causation. Paul claims on these virtues:

A general theoretical motivation for a reductive analysis of causation is that such an analysis would be deeply related to many other central philosophical topics, and would serve as a tool for philosophers, scientists, and others to use. (Paul, 2009, p.166)

Halpern and Pearl (2005), in continuity with the probabilistic and counterfactual approaches, formulate a definition of causality in relation to the language of structural equations. This causal modeling approach sets new methods to grasp causal relationships and new answers to its inner problems.
Here we give a definition of actual causality cast in the language of structural equations. The basic idea is to extend the notion of counterfactual dependency to allow contingent dependency. In other words, while effects may not always counterfactually depend on their causes in the actual situation, they do depend on them under certain contingencies. (Halpern and Pearl, 2005, p.844)

This definition allows solving, for instance, problems as preemption and redundancy. The truth of the causal claims is relative to a certain model, and the model is relative to a certain context or background. They claim that in that sense:

It is possible to construct two closely related structural models such that C causes E in one and C does not cause E in the other. Among other things; the modeler must decide which variables (events) to reason about and which to leave in the background (…) models of the world is a better representation of those aspects of the world that one wishes to capture and reason about. (Halpern and Pearl, 2005, p.845)

A set of random variables and functions build an equation that represents several mechanisms that modeled the way in that the variables influence others or cause others. Variables behave in this way:

In practice, it seems useful to split the random variables into two sets, the exogenous variables, whose values are determined by factors outside the model, and the endogenous variables, whose values are ultimately determined by the exogenous variables. It is these endogenous variables whose values are described by the structural equations. (Halpern and Pearl, 2005, p.847).

The system of equations requires random variables that support the direct and deterministic relationships of the model to shore up the adequacy of the variables influence the model. This
makes it possible to avoid problems of preemption, simultaneity, and redundancy. However, the proposal suffers certain weaknesses.

It may seem strange that we are trying to understand causality using causal models, which clearly already encode causal relationships. Our aim is not to reduce causation to non-causal concepts but to interpret questions about causes of specific events in fully specified scenarios in terms of generic causal knowledge such as what we obtain from the equations of physics. The causal models encode background knowledge about the tendency of certain event types to cause other event types. (Halpern and Pearl, 2005, p.849)

The proposal, beyond the warning of the authors, falls into a certain circularity, as Cartwright declares in (1979) because the variables that they set as background, are not understood as causes themselves; in the end, exogenous variables seem to determine the whole mechanism of causality. Halpern and Pearl's theory seems to be an interventionist account on causality, in a certain sense, a means-end reading of causation. Exogenous variables are fixed as the obtaining circumstances of the particular causal process modeled.

Spohn’s workable alternative (2006), which is our main task, seeks to solve all these problems thanks to the benefits of ranking theory and its account of induction and dynamics of belief. In the same path of counterfactual, probability and causal modeling proposals, Spohn starts his theory perhaps at the beginning of the problem, that is to say, Hume’s definition:

The paper builds on the basically Humean idea that A is a cause of B iff A and B both occur, A precedes B, and A raises the metaphysical or epistemic status of B given the obtaining circumstances. (Spohn, 2006, p.93)

The improvement of this basic idea, which Spohn makes clear in (2012) is due to the relationship established between inductive inference, to which the second chapter of this work
was devoted, and the causal inference. The first step to establish this relationship is then to fix the conceptual framework of his theory of causation. First of all, Spohn framework deals with particular causation. General causal processes are a later business to deal with. Spohn’s account as we saw in § 2.3 uses the language of variables, not events. Variables are specific objects at a certain time and with certain properties. To be the case for these properties of the variable is the realization of such variable. Hence, all these small worlds in § 2.3 are in one dimension ontological states of affairs and in other dimension epistemic propositions (Spohn, 2006, p.96). It is important to say that this set of variables is finite. Besides this, Spohn assumes determinate temporal relations with respect to causal processes:

For instance, a specific game of chess certainly is a causal process, and the natural variables to consider are all the possible moves of the game. The exact points of time at which the move occur may be taken to be irrelevant; what matters is only the temporal order of the moves. (Spohn, 2012, p.342).

Therefore, Spohn represents the temporal relations as follows: “I will usually write \( X<Y \) and \( X\leq Y \) in order to express that \( X \) precedes or is realized before (or at the same time as) \( Y \)” (Spohn, 2012, p.341). It entails a discrete temporal order for this model of causation. \( X\)-propositions or atomic propositions represent the variables and are the relata of causal relations. Causal relations are relations between atomic facts. With respect to temporal relations, \( A \) can be a cause of \( B \) only if \( A \) is not later than \( B \). Spohn’s proposal is thus grounded in the asymmetry of temporal precedence:

General relativity theory has inspired fantasies about backwards causation, and so do certain obscure quantum effects. All this is far beyond my ken. Let me simply state that none of the subsequent theorizing would work without this assumption. (Spohn, 2012, p.351)
At this point, he returns to his earlier definition in (2006); given this framework and the advances of ranking theory he defines causation as:

A is a cause of B iff A and B obtain, A precedes B, and A is a reason for B given the obtaining circumstances. (Spohn, 2012, p.354)

This is an epistemic reading based on the conception of reasons as the relation between ranking functions. Spohn claims then: “Thus like Hume, I take causation to be an idea of reflexion; I am bound to claim that causation is in the eye of the beholder” (Spohn, 2012, p.340). Causality is a sort of epistemic relation. It is based not in physical probabilities or mechanisms but in doxastic agent’s reasons. Therefore, causes are conditional reasons (See: § 3.2). In that sense, as ranking theory distinguishes kinds of reasons, hence we obtain kinds of causes:

Therefore, we will be able to equally naturally distinguish supererogatory, sufficient, necessary, and insufficient causes. Necessary and sufficient causes are the focus of the traditional accounts. (Spohn, 2012, p.354)

Obtaining circumstances following Spohn are defined as all the other causes of B that are not caused by A. This definition falls, apparently, in the circularity objection of Cartwright (1979). Spohn answers with this proposal:

However, the circularity dissolves, if only A’s being a direct cause of B is considered. In this case there are no intermediate causes, i.e. no causes of B caused by A; the relevant circumstances may hence include all other causes of B. (Spohn, 2006, p.104)

For instance, a causal chain A→B→C given the negative ranking \( k(A) = k(\neg A) = 0 \) shows that A screens off B from C.
And with respect to a conjunctive fork $A \rightarrow B$ and $A \rightarrow C$ something similar happens.

All this because the ranks count the violations of causal relations and therefore more violations lead to more disbelieve (Spohn, 2006, p.106). Hence, the epistemic direct causation account seems to solve circularity problems. In this sense, Spohn (2012) improvement gave us a powerful tool to clarify and interpret causation with respect to ranking functions:

“The following paradigmatic ranking tables in terms of two sided ranking function $\tau$ derived from the basic negative ranking function $\xi$ are instructive:

(a) joint necessary and sufficient causes

$$
\begin{array}{c|cc}
\tau(C | .) & B & -B \\
A & 1 & -1 \\
\neg A & -1 & -1 \\
\end{array}
$$

(b) joint sufficient, but not necessary causes

$$
\begin{array}{c|cc}
\tau(C | .) & B & -B \\
A & 1 & 0 \\
\neg A & 0 & -1 \\
\end{array}
$$

c) redundant causes” (Spohn, 2012, p.364).
The tables a) and b) are in a certain sense common in theories of causation, but table c) is a novelty to solve several inherited problems of the predecessor theories. The first one is *overdetermination*. In this case, two or more independent causal processes produce the effect.

| τ(C | .) | B | ¬B |
|------|---|----|
| A    | 2 | 1  |
| ¬A   | 1 | -1 |

“This kind of causes is related to the notion of supererogatory reasons. “For instance, to avoid the notorious cruel firing squad, the prince sings a love song (A) and accompanies it by playing the mandolin (B) in order to wake up the beloved princes (C)” (Spohn, 2012, p.365). Ranking theory explains it better than fine graining events, structural contingencies and regularity proposals.

The second case is the classic problem since Lewis (1973) of preemption by cutting. As table (c) represents better “The classic example introduced by Hart, (Honoré,1959, p.219) is the story of the desert traveler, which starts with the first assassin pouring poison into the traveler’s water keg, continues with the second assassin drilling a hole in the keg, and sadly ends with the traveler’s death in the desert” (Spohn, 2012, p.365). Counterfactual approaches are very worried about potential preemption, and backwards causation. However, ranking theory approach deals with these problems easily. In this sense, preemption by trumping is represented with this table:
The classic example with respect to this causal problem is the following as described by Lewis (2000, p.81):

The Sergeant and the Major are shouting orders at the soldiers. The soldiers know that in the case of conflict, they must obey the superior officer. But as it happens, there is no conflict. Sergeant and Mayor simultaneously shout Advance!; the soldiers hear them both; the soldiers advance. Their advancing is redundantly caused: If the Sergeant had shouted Advance! And the Mayor had been silent, or if the Mayor had shouted Advance! And the Sergeant had been silent; the soldiers would still have advanced. But the redundancy is asymmetrical: Since the soldiers obey the superior officer, they advance because the Mayor orders them to, not because the Sergeant does.

The Mayor preempts the Sergeant in causing them to advance. The Mayor trumps the Sergeant.

According to the table representation, we do not need to appeal to fine grainning causal chains or specified models for each asymmetrical case but just to appeal to reasons. Sergeant’s shout is a necessary and sufficient cause and Mayor’s shouting is a supererogatory cause. Spohn’s causation theory is thus a good modeling tool for several theoretical and practical purposes. In this sense, he claims that:

These examples aptly show how, already in the case of direct causation, the ranking-theoretic account provides us with greater expressive means than all rivals. These means allow us to take our intuitions at face value without further ado. Of course, the modeling of examples is hardly ever unique; as Halpern, Pearl (2005a) emphasize again and again, there often are several
plausible alternatives, and several manners of causal talk are thus representable. Still, I submit that ranking theory enriches our modeling options in plausible and unprecedented ways. (Spohn, 2012, p.369)

Now, given all this, how is possible to extend this local direct causation model to a general causation account?

I do not speak about repetitions generalizations, or causal laws, though I do suggest that this is a simple step, once we have successfully dealt with the single case. Or to be explicit: If $\xi$ describes the causal relations in the given single case, then the law $\lambda_\xi$ is the causal law that generalizes to all like cases. Of course, causal laws may only be ceteris paribus laws. We may embed all of our considerations about the single case into a background of normal conditions. The corresponding generalization will then produce only a ceteris paribus causal law. (Spohn, 2012, p.357)

The law $\lambda_\xi$ is then, as explained in the previous section, a ceteris paribus law. In Spohn (2006, p.115) he claims that $\lambda$ is the conjunction of all causal conditionals with respect to $\xi$. This leads to a normal conditions proposition or ceteris paribus clause with respect to a certain frame or causal like set. A causal law is a kind of subjective law, a mind-relative notion of causation.

The last problem that Spohn’s causation theory faces is relative to the costs of a subjective or epistemic perspective of causation. This is the problem of objectification. Spohn (2012, Ch15) claims that we can choose between three different paths. The first is just to ignore the issue and use the tools of the theory in a means–end perspective. Following a second perspective, one may be ecumenical and say that the theory can have several interpretations. Finally, the last way is to get involved in the problem of a mind independent notion of causation principally with respect to
the ontological commitments of the natural sciences. Spohn follows the last path and starts a projectivist approach.

To be explicit, an objective (possible) law is true or false generalization backed up by an objectifiable persistent ranking function, and an objective causal pattern (or law, if generalized) is a true or false pattern of succession backed up by a ranking function that is objectifiable w.r.t. its (subjective) causal relations. Or as I titled my (1993a): causal laws are objectifications of inductive schemes. (Spohn, 2012, p.469)

At this point is important to claim that for the purposes of this work perhaps we don’t have certain costs to pay. This, just because, the ontological commitments with respect to social reality as we set in § I.2 are purely mind-relative. Social reality is a product of -at least at this moment- human minds and therefore is epistemic and mind-relative. This model of causation then is workable for our purposes and, just for the moment, to take the first or the second path is quite enough.
4 Two Lectures on Epistemic Normativity

4.1 Introduction

This chapter is devoted to the epistemic normativity entailments of ranking theory. The epistemic normativity is structured, in Spohn’s account, by the formal rules of doxastic rationality. In this sense, the laws of belief become the rock-bottom and structure of the rationality. The role of inferences, as developed in the previous sections, is not the whole story:

Our scheme of inferences is not merely a big switching yard in which we can move to and fro and up and down. Somehow, our inferences must start somewhere in order to arrive somewhere; somehow we form unconditional beliefs in the end; having only conditional beliefs would be useless. (Spohn, 2012, p.472)

Therefore, Spohn treats two main topics with respect to a well accurate grounding for an epistemological normativity frame with respect to our inference switching yard: perception and a priori belief states. Off course, the link and goal related to these two aspects is the achievement of knowledge, that is to say, at least, true belief. In that sense, the achievement of true belief in a normativity perspective is then addressed to the conception of a justified belief. Hence, the first problem to deal with is the concept of justification; this task will reveal the origins of justified belief and the right path to a normative picture of knowledge.
In the other hand, the epistemological normative frame is completed by the a priori structures of our cognitive system. A priori structures are another type of epistemic justification and normativity that seems to be independent of experience. Spohn’s dynamic apriority bets for a flexible conception of apriority that could match with different doxastic states of the mind. Apriority is a dynamic notion related to our conceptual development and to the structure of rationality itself. Truth-conduciveness of reasons is then the key to achieve an apriority normativity given a coherentist background with respect to the notion of truth.

### 4.2 Justification and Perception

The traditional starting point to study justification is the so called *Agrippan trilemma* (Klein, 2008). The initiator of the trilemma is the necessity to provide reasons or warrants to belief. A belief is justified if has reasons supporting it. The problem raises because those grounds need to be justified either, and if not, they cannot confer justification. Given this, here there are the horns of the trilemma down the spotlight of the ranking theory:

Having to give reasons for the reasons already specified we are caught in an infinite regress that we can never exhaust and that never produces any grounds for us to eventually stand on. Can it be escaped? Yes, we might try the second horn and stop the regress at some basic grounds that, exceptionally, are not in need of justification. Some disrespectfully call this dogmatism. The more familiar and positive label is foundationalism. In any case, the task is then to more specifically characterize those alleged basic grounds and to clear up the mystery of how they can be exempt from justificatory demands. If one despairs of resolving this mystery, one might finally reach for the third horn and accept that in the process of specifying reasons one must sometimes (always?) return to reasons already adduced at some earlier stage. This might be denounced as a
justificatory circularity, or one, can acknowledge it as the basic logic of coherentism. (Spohn, 2012, p.474-475)

Hence, given the trilemma hypothesis, Spohn starts to think about the nature of justification through the proposal of ranking theory and the mechanism of relations of reasons. He places his proposal in the space of the main conceptions on the possible relation of reasons as follows. The first conception is the positive relevance conception. Spohn endorses this perspective in his work as § 3.2 shows. The second is the deductive (demonstrative) conception. The entailment of reasons is the mechanism of this dominant conception. The deductive approach is a good tool for kinds of strong reasons, however, it is insufficient to explain non monotonic reasons as presented above in § 3.2. The third conception may be called computational. Reasons are reasons with respect to a certain set of inference rules. The most important thing to this conception is to state the rules that govern inferences. This perspective is not just related to deductive models; there are several non-monotonic computational models of inference. Finally, it is the causal conception of reasons. A belief is a reason for another if it is a cause. The big problem with this last conception is that belief is dispositional and, in that sense, it is hard to say that one belief causes another. That is why, first of all, we have to deal with normative aspects and then try to grasp the relation of causality and this doxastic states.

As expected, Spohn chose the first one as the more convenient and the core of his proposal. The task to achieve good reasons required criteria to satisfy standards of rationality, and in his view, the positive relevance conception of ranking theory is a good place to find it out. Ranking theory can help us to move from the concept of being a reason for the concept of being justified. Let’s see how the mechanism works. As we saw in § 2.5, ranking theory laws assign degrees of (dis)belief to certain set of propositions given the degrees of (dis) belief of another set of
propositions. This leads to the coherence between degrees and then to justification. Spohn says on it: “Justification explained: Degrees of justification or justifiedness are degrees of (justified, rational) belief and hence positive ranks” (Spohn, 2012, p.481). This is the first step, that is, to say what we mean with justification. The second stage is to find out what makes beliefs justified and whether internal or external this justification is the case.

According to a mainstream called evidentialism what justifies belief is evidence. If you possess evidence for believe \( A \), then you are justified to believe \( A \). “In this view, evidence consist of perceptual, introspective, memorial, and intuitional experiences, and to possess evidence is to have an experience of that kind” (Steup, 2018, p2.2). That kind of experiences represents \( A \) as a true belief. However, reliabilists claim that this is not enough. Certainly, the evidence is important, but experiences are justified just if and only if they result from a reliable cognitive process with respect to perception, memory and so on.

The other dimension of the justification is related to the context of justification, or the internal vs external debate. First of all, we have to deal with the internalism account. To the internalism approach, the factors of justification are mental states, and there are accessible through reflection. In the other hand, externalism claims that something external to the mind, certain external conditions, turns belief into knowledge and justifies belief. Spohn argues about this debate in a moderate way:

So, my overall impression is that the confusing manifold of positions in the theory of knowledge essentially results from partial (attempted) externalizations and objectifications of the various aspects of the internalistic picture that I have out lined and that I take to be basic. (Spohn, 2012, p.486)
Spohn claims that the debate is a sort of misunderstanding of the consistency and behavior of the sources of knowledge justification. Hence, the problem goes now to the first source of justification: perception. Spohn explains his argument as follows:

The answer appears obvious: somehow, it comes from perception. All mental activity depends on perceptions; without perceptions we could not acquire any concepts whatsoever; perceptions are the elixir of our minds. This is not quite the right sort of dependence, though. Sure, we could not even acquire a priori beliefs without perceptions, since even a priori beliefs presuppose concepts, and concept acquisition rests on perception; however, the justification of a priori beliefs, if there is any, does not depend on perceptions or perceptual evidence. Still, all our a posteriori beliefs are justificatory dependent in this way, and we need to more specifically describe this dependence. So our task, finally, is to understand the role of perception in belief formation. (Spohn, 2012, p.486-487)

For justified beliefs that lead to knowledge, we need sources with a good degree of reliability. Perhaps emotions or biased prejudices are not the best candidates. But perception qualifies very well. Besides this, perception is a good pivot to evidentialism and reliabilist accounts, and by the way, to externalism and internalism debate. In that sense, Spohn chooses perception as the starting point to set reading on how the dynamics of belief is driven.

Fact perception is the idiom relevant to us; if I perceive that A, it is analytically implied that A is actually the case that I believe that A. Indeed, fact perception is the paradigm insofar knowledge is at least justified true belief, that A is the case and I justifiably believe that A. This is what everybody using our terms must say. (Spohn, 2012, p.487)

The structure of perception is traditionally defined as the causal theory of perception. We can define it in this way:
If a perceives that A, then the fact A is a cause of a’s believing A.

This leads to the thesis that perception entails true belief. The causal theory of perception is thus essentially a strong paradigm of knowledge useful for Spohn’s agenda. However, as we saw in §3.4 direct causation is frame-relative. In that sense, perception is relative to the conceptual frame imputed to the doxastic subject and the causal relations as we saw in § are essentially relative to the doxastic possibilities of the certain doxastic subject. In the other hand, for instance, an object is red if and only if it looks red to those who look at it. This leads to the sum of reliable conditions as bright daylight, normal observers and so on. So, we can say that an object is red if and only if looks red, when looked at under normal conditions. After assert that premises Spohn reasoning in the next way:

Given that an object is looked at, the proposition that it looks red is a defeasible a priori reason for the proposition that it is red and vice versa (…) however, we need to be more explicit about the subjects and the times involved and thus we arrive at what I call The Schein-Sein Principle (defeasible version): Given that the person a attends at t to some external situation, \( \Phi_a(t)(A) \) is, for the person b, a defeasible a priori reason for A, and vice versa. The Schein-Sein Principle (unrevisable version): Given that a attends at t to some external situation under normal conditions, \( \Phi_a(t)(A) \) is, for b, an unrevisably a priori reason for A, and vice versa. (Spohn, 2012, p.495)

The principle says, first of all, that we initially trust the senses of others and the assertions that things looked to them in a certain way that can lead us to believe that these things actually were in that way. *Ceteris paribus*, my doxastic conditions are not different from the situation of others and then the resemblance is evident. Even counterfactually, things supposed to appear (and being) to me and the others in the same way given this normative structure. Spohn claims that
my beliefs about this kind of causal perception experiences, or $\Phi_{t, \text{now}}(A)$, are then first-order beliefs. *A posteriori* are the grounds of the initial doxastic states in each belief dynamics. Acquire such belief is thus at that initial doxastic state maximally certain. This argument leads directly to the *Schein-Sein –Belief –Principle*:

The Schein-Sein –Belief-Principle: Let $B_{a, t}(A)$ be the proposition that $a$ believes at $t$ that $A$, and let $A$ be a proposition such that $\Phi_{a, t}(A)$ is well-defined. Moreover, assume the non-reflexive case in which either $b \neq a$ or the reason relations are considered at a time $t' \neq t$. Then, given that $a$ attends at $t$ to some external situation, each of the four propositions $A$, $\Phi_{a, t}(A)$, $B_{a, t}(\Phi_{a, t}(A))$, and $B_{a, t}(A)$ is a defeasible a priori reason for $b$ for each other of the four propositions. (Spohn, 2012, p.506)

This principle presupposed that normal conditions are the same to different doxastic subjects $a$ and $b$. In that sense, normal conditions entail rationality and that each doxastic subject master the concepts that set the propositions appropriately. Off course this is just a defeasible a priori principle, however useful to reach ulterior firm rock-bottom.

One important dimension of this principle is the possibility to establish a strong relation between consciousness and knowledge. The *Schein-Sein –Belief-Principle* driven, as we said upon, the initial doxastic state as maximally certain. If $\Phi_{a, t}(A)$ is well-defined and given to me, then I have it, or $B_{a, t}(A)$. Therefore, I know I have it and if it is not given to me I know I do not have it. Spohn explains it with a nice example:

The usual paradigm is pain: if I am in pain, I feel—that is, I am aware of my pain; if I feel no pain, I have no pain, however painful my bodily condition may be. Conversely, if I feel pain, I have pain, however phantom-like or inexplicable it maybe. This relation is so close that it seems odd
(or even ungrammatical, as Wittgenstein (1953 §246) suggested) to say: “I know I am in pain”.

(Spohn, 2012, p.509).

This ungrammatical hinge or is the starting point of a strong epistemic normativity. Spohn develops it thanks to the *Conscious Essence Principle*:

The Conscious Essence Principle: C is a (possible) content of consciousness of subject a at time t if and only if, necessarily, C iff B_{a,t}(C) (that is, a believes C at t). (Spohn, 2012, p.509)

Belief is, in this case, knowledge. However, contents of consciousness are relative to subjects and times. That is why this hinge is defeasible a priori and frame relative. One important entailment of this argument is the possibility to extend the *Conscious Essence Principle* to the sets of wider doxastic subjects; perhaps this is the core of this work as we will see in the ulterior chapter. Spohn claims on this as an introductory hypothesis:

I will speak only of contents of consciousness of persons like us. An interesting side issue is whether the subject a may be a group or some other social entity. Colloquially, we speak of something like collective consciousness. Often this may mean no more than common knowledge. Perhaps, though the Conscious Essence Principle fits even then. (Spohn, 2012, p.509)

Let’s keep it in mind and follow in the development of our normativity grounds.

Therefore, following the previous argument, hinge contents of consciousness are ineffable in a phenomenal level. Nevertheless, contents of consciousness, as hinges, appear to me as sets of possibilities even if I cannot understand it as a part of a grammar or given certain language. In the proposition that something appears to me as A, the appearances depend on concepts assessed thorough a linguistic community or grammar. In that sense, intentional consciousness is not just
sensations and feelings. Certain mental activities are not felt in a certain way. For example, the
task to finish the present dissertation. I am not always aware or thinking about (almost) finishes it. However, that is a continuous concern and doxastic task. Now, Spohn thinks that we can establish the difference between phenomenal and intentional consciousness thanks to the

*Conscious Essence Principle:*

If A is an actual content of consciousness for me, I believe A, and I also believe that I believe A, etc. Thus, intentional consciousness agrees with what has been called “higher-order though consciousness”. (Spohn, 2012, p.515)

Because as we saw in § 2.3, doxastically, A belief is a centered possible world conforms to all the set of beliefs of a subject. Therefore, believe, believe that A and the content of “I believe that I believe that A” are different manifestations of the same proposition. In this point Spohn explains the resemble of his theory with the tradition of Kant’s thought:

I cannot forbear the remark that this principle closely resembles the original synthetic unity of pure apperception that Kant (1781/87, B 136.) declares to be the supreme principle of understanding. It says that the “I think” must be able to accompany all my representations, intuitions as well as judgments. Intuitions are part of phenomenal consciousness; judgment are part of intentional consciousness. (Spohn, 2012, p.515)

The *Conscious Essence Principle* claims that the essence of the contents of consciousness is that they are *ipso facto* believed. And in that way *ipso facto* known. It entails that beliefs in contents of consciousness are true and then perfectly warranted or justified. Contents of consciousness are reliable guarantees of justified beliefs. That identity leads to understand it as knowledge. In that sense, we can measure that propositions with ranking theory as follows:
If $\tau_{at}$ is the two-sided ranking function of $a$ at $t$ then for any possible content $C$ of consciousness of $a$ at $t$ $\tau_{at}(C) = \pm \infty$ (Spohn, 2012, p.517)

Hence, the rank is maximal and can be understand as a hinge or rock-bottom of our epistemic normativity. This leads to the next argument on justified belief and the nature of warrants. Why I believe $A$ is a request for reasons or warrants for $A$. However, I cannot give reasons for the fact that I believe $A$, as the previous argument claims. In that sense:

I certainly can do so regarding the beliefs of others, or regarding my own past beliefs, and I can reason about my likely future beliefs. My own present beliefs, however, are a peculiar blind spot for my in this respect. (Spohn, 2012, p.518)

This blind spot is the same with respect to possible actions. Reasoning on possible actions or evaluate it does not need an explanatory epistemic attitude. This is the fuse of the freedom of the will. Then, we can affirm that there is an ineffable basis of our belief formation and that is why contents of consciousness in the level of phenomena are related ontologically with the external world and make a link with the realm of my beliefs. However, in the other hand, $\Phi_{a, t} (A)$ is related to certain frames. It is different when the proposition is addressed to the phenomenological now or to the past or to the future. $\Phi_{a, \text{past}} (A)$ is an object of reasoning and of course, it starts the dynamics of belief pictured in the previous chapters.

This is the normative proposal on the first kind of inputs of the cognitive system, that is to say, perception founded inputs. This account combines several elements of foundationalism, coherentism, internalism and externalism in a very interesting, novel and idiosyncratically way. So, in the next section, we will explore the normativity of the second kind of input or the so called the problem of the apriority.
4.3 A priori structures

The last reading is all about another kind of input of our cognitive system. This section will deal with the a priori structures of our cognitive system. In that sense, a priori structures are another type of epistemic justification and normativity that seems to be independent of experience. A priori structures, for the tradition, rest on certain kind of propositions that obeys the principle that not experience, but its form and innate cognition faculties, determine their propositional content. For instance, Kant’s pioneer famous definition claims that: “(a priori knowledge) is knowledge that is absolutely independent of all experience” (Kant, 1787, B2-3). Contingent facts or objects do not determine the content of this kind of knowledge source. A judgment is a priori if and only if it is necessarily true (Kant, 1787, B3-4). For Kant’s account a priori is thus linked with conceptions as that always contingency is a modality related with facts, and, in the other hand, that necessity is equivalent with universality (Hanna, 2017, 2.2.1).

Kant is either the founder of the distinction between analytic and synthetic judgments and the relation with apriority. Analyticity is truth by virtue just of conceptual or linguistic meaning sources and syntheticity is truth given empirical sources. The first is then necessary judgments and the second contingent. As we will see later, these are the two main sources of apriority and the first is perhaps the most explored. In that sense, sometimes, analyticity and apriority are commensurable for certain philosophical accounts (Hanna, 2017, 2.2.1).

This classic reading founded in Kant’s approach leads to conceptions such as innate ideas, idealism and several approaches claiming that empirical evidence cannot never override this sort
of knowledge. Similarly, Putnam (1983) claims that a priori knowledge is not defeasible at all; in his view, we have certain rational propositions a priori grounded that we believe; there are rational propositions that \textit{must} be justified a priori.

In the foregoing, I use the idea of an absolutely “unrevisable” truth as an idealization. Of course, I agree with Quine that this is an unattainable “limit”. Any statement can be “revised”. But what is often overlooked, although Quine stress it again and again, is that the revisability of the laws of Euclid’s geometry, or the laws of classical logic, does not make then more “empirical” statements. (Putnam, 1983, p.496)

A priori is thus not defeasible at all. Necessary truths are just analytical propositions. The breaking point is that there are certain necessary truths that just can be justified as knowledge through empirical sources. This is evident, for instance, in the arguments of Stegmuller (1952) and Kripke:

Of course, it is only a contingent truth (not true in every other possible world) that the star seen over there in the evening is the star seen over there in the morning, because there are possible worlds in which Phosphorus was not visible in the morning. But what contingent truth shouldn’t be identified with the statement that Hesperus is Phosphorus. It could only be so identified if you thought that it was a necessary truth that Hesperus is visible over there in the evening or that Phosphorus is visible over there in the morning. But neither of those are necessary truths even if that’s the way we pick out the planet. These are the contingent marks by which we identify a certain planet and give it a name. (Kripke, 1972, p.274),
Following Kripke, there are several contingent truths justified a priori, as the proposition “the standard meter stick in Paris is a meter long”. These kind of tautological contingent propositions are a strong challenge to the classical approach.

Nevertheless, the great challenge is the possibility that certain evidence can override several a priori propositions, first a priori justified, like the a priori justified belief of Kant herself, that geometry is a priori based (Kant, 1787). Several counterexamples can illustrate that a priori justification cannot be absolutely independent of experience (Russell, 2017, §.2). For instance, propositions such as “All dolphins are mammals” and “All penguins are birds” are analytical and a priori, but we achieve this knowledge given a certain relevant set of experiences (in time) and then, seem to be defeasible in certain sense. Evidence, driving epistemic change, and conceptual achievement are strong challenges to the traditional account.

On this wise, there is a debate of a strong conception of a priori justification and a kind of defeasible version of the a priori justification. The key to solve this debate perhaps lays on what Russell (2017, §.4) sharply points out: “A more plausible requirement is that a priori knowledge and justification be independent of all experience beyond what is needed to grasp the relevant concepts involved in the relevant proposition”. That is, to be a priori justified, is to be justified enabling experiences.

Spohn’s position with respect to this debate is founded in ranking theory and tries to establish a novelty epistemic normativity solution on a priori justification. Spohn’s reading is twofold; there are unrevisable and defeasible apriority. Here it is the definition given:
A doxastic state is unrevisibly a priori iff all possible rational doxastic states have it, and defeasible a priori iff all possible initial doxastic states have it; derivatively, then, these two notions could be carried over to propositions (or judgments or sentences). (Spohn, 2012, p.522)

We can call this approach *dynamic apriority*. Spohn bets for a flexible conception of apriority that could match with different doxastic states of the mind. Apriority is a dynamic notion related to our conceptual development. The task given such definition is to establish how this doxastic states or beliefs are structured conceptually in a certain way. The example of the bachelor explains it perspicuously:

It seems obvious that, typically, belief contents are conceptually structured in some way. That all bachelors are unmarried should turn out to be unrevisably a priori, indeed analytic, but it cannot be believed by someone who has not acquired the concept of bachelor and does not know what a bachelor is. This, it seems, refutes our original explication: that all bachelors are unmarried is not believed in all possible doxastic states; at best it is believed in all possible doxastic states mastering the concept of a bachelor. What can and cannot be believed in a given doxastic state is relative to the conceptual means acquired by or in this state. (Spohn, 2012, p.523)

A unrevisably a priori state, as the bachelor one, requires to have beliefs involving the concept “bachelor” if and only if this concept is mastered by the doxastic subject. As in the previous section, this kind of normativity is frame relative. Just in that sense, the proposition is unrevisibly a priori. Only the concept acquired *ceteris paribus* allows us to establish the unrevisable a priori feature. This is a good explanation on this topic:

We may indeed say that Euclidean geometry was unrevisably a priori in the sense explained here, as long as this geometry was the only conceptualization of space at our disposal. Kant was right; no experience whatsoever could disprove Euclidean geometry. This changed with the extended
conceptual means provided by the invention of non-Euclidean geometries; only then could we even begin to ask whether experience conforms to this or that geometry. In this way, even the unrevisable a priori may be subject to change. (Spohn, 2012, p.526)

In the other hand, and following the frame relative normativity proposal, a doxastic state is defeasible a priori just if and only if: “each possible initial doxastic state capable of having this feature has it- where a doxastic state is initial with respect to this capacity iff the state has (acquired) the capacity, but not further exercised or applied it” (Spohn, 2012, p.524). Or, in other words, noticing not normal conditions leads to a defeasible state of the priority given to the first doxastic state. As presented in the previous section, Ceteris paribus, my doxastic conditions are not different from the situation of others. In that sense, Schein-Sein Principle claims that my initial beliefs or \( \Phi_I \), now \( (A) \), are then first-order beliefs. So, they are the grounds of the initial doxastic states in each belief dynamics and, therefore, maximally certain. As we say upon, normal conditions entails rationality and that each doxastic subject masters the concepts that set the propositions appropriately. This is the sense of this kind of defeasible apriority because learning and belief dynamics can change this first hinge as we saw in §2.5.

At this time the distinctions on a strong or defeasible apriority are relative just to one source of the apriority: the conceptual apriority relation. As the classical traditions present, there are several forms of the relation between concepts and the apriority structure. Summing up, the first form is analytic truths or a priori necessary truths. In the second place, as we saw, there are a priori contingent truths, as the meter stick in Paris, or Sir Edmund Hillary in the Everest for the very first time (“the first to climb Mt. Everest climbed Mt.Everest”). Spohn asserts that there is another kind of defeasible relation between the concepts and the a priori. There are defeasible a priori propositions given conceptual grounds. This is explicit in ostensibly learned concepts as
“dog” and “witch”. “There are dogs” is defeasible a priori, because it is true, but it may change to be false. In the case of the concept “witch” is easier to grasp the difference. Spohn exemplifies it as follows:

Take e.g., the ostensively learned term “witch”. Of course, one can ostensively acquire that term only by also coming to believe that there are witches. Later on one learns that witches are essentially possessed by the devil, and since there is no devil, as we know today, there cannot be witches. (Spohn, 2012, p.526)

This ostensively learned concepts need a more vivid development, perhaps in other work, given our present goals, because these analytic propositions are almost the first source of conceptual acquisition (Watkins, 1957).

Consequently, these are the conceptual origins of the a priori. However, Spohn claims that there is another origin of the a priori structures. Following Kant (1787), and his synthetic principles a priori project, Spohn wants to construct another kind of source of the a priori outside just the conceptual relation. Kant’s project was very difficult to achieve because several inner unintelligible features and ontological commitments (Stegmuller, 1952). The reaction of logical empiricist made clear the business (Carnap, 1934); there are just empirical truth and conventional truth. For Carnap analyticity is relative to particular grammars and languages (Carnap, 1942, p.247). Hence, we cannot go further and just think in the first source, that is, conceptual relation. Therefore, synthetic a priori is almost senseless. Ulterior, Quine (1951), criticizes the notion of analyticity because of the inner circularity of the definition and the lack of empirical criteria. His new perspective about an epistemology without the notion of analyticity is now still in certain sense in the way to be fulfilled (Creath, 2017, §4.3).
This account was dominant until Kripke’s reflections. Following Kripke, there is a gap between metaphysical and epistemological modalities as we saw (Kripke, 1972). Apriority and necessity then are driven by different kinds of modalities. Is then frame relative to the different model of modality given. Nevertheless, for Spohn, Kripke’s claims are still in the field of conceptual a priori relation:

As I just tried to indicate Kripke’s apriority still was of an exclusively conceptual origin, whereas Kant’s notorious necessary conditions of the possibility of experience intended to more generally refer to the constitution of our mind, our intuition and our understanding, and not merely to what comes along with the concepts we happen to acquire. (Spohn, 2012, p.527)

So, to keep going, Spohn traces a path analogous to that of Kant. Similarly to Kant, Spohn focuses the inquiry in the doxastic subject. The logic-syntactic structure of a judgment expressed by a proposition is not enough. The doxastic subject projects herself cognitively into the world given certain epistemic frame. Hanna expresses it precisely when he refers to Kant’s judgment theory:

The judger cognitively orients herself in the world by projecting the object under specific points of view (Gesichpunkte) or modes of presentation that would also be typically cognitively associated with the constituent concepts of the judgment by any other rational human animal in that context. (Hanna, 2017, 1.3)

The new path to find another source of apriority is then the rationality itself. First of all, as Kant did, Spohn claims that “all principles of theoretical rationality are unrevisably a priori” (Spohn, 2012, p.527). For instance, consistency and deductive closure are unrevisably a priori notions. In that sense, for example, all the basic axioms of probability are then part of the form
of our though. But, where are that axioms and boundaries of our though? As Frege, (1956, p.289-311) Spohn answers that this is a logical inquiry guided and aimed by the word true. The idiosyncratically way to do this special task is therefore to “discern the laws of truth” (Frege, 1956, p.259). The first step to achieve that goal, the normativity of certain unrevisable a priori axioms, is in Spohn’s perspective, to look the connections between reasons and truth.

The first dimension to set that relation is the first person’s perspective. As we saw in §3 the first guarantee for truth are our basic beliefs. Contents of consciousness are the kind of guarantee for truth and reasons relation:

From the first- person perspective the answer seems obvious: Reasons induce belief; and to believe something is to believe it to be true – so much is tautological. Therefore, reasons bring me closer to the truth; this is what I have to think and say (…). Apparently, the force of the question only appears in the third-person perspective. You, or God, or the scientist, may respond to me: “Sure, this is what you have to say; you always believe that you believe the truth. However, we would like to question whether this is really so, whether, and to what extent, your impressive rational powers dispose you to dispose you to find out about the actual truth”. (Spohn, 2012, p.537)

The guarantee of the first-person perspective is given by identity because actual contents of consciousness are identical with respect to their beliefs. Our basic beliefs are thus justified a priori. However, as Spohn quoted, we are forced to walk into the second dimension or, in other words, into the third-person perspective. The point is that in this perspective I cannot make a strong commitment with normativity, because normativity is in fact an internal discourse. To ask an external source of normativity with respect to epistemic issues is a sort of senseless
heteronomy. Neither God, nor scientist or teachers can answer this kind of affairs. The first-person perspective is the frame of the normativity. Spohn asserts in that sense that:

However, the first-person perspective is not my private one, it is that humanity, not only of actual humanity, but the entirety of potential participants in normative discourse. And that entirety cannot ask someone on the outside. Surely we can try to figure out in that discourse what the external scientist, or God, would say. However, this would just be another move within the internal normative discourse. (Spohn, 2012, p.538)

Therefore, we need to set a truth notion that fits with this internal normativity discourse. As we saw in §4.2 wittgensteinian correspondence truth theories are related to the third-person perspective; this approach is related to a cognitive relation with the external world. So, this approach is not enough for our purposes. But the account of two-dimensional truth of Spohn (2008) is perfect for this task. To justify our epistemological mechanism we can appeal to a coherent and pragmatic sense of truth.

Coherence theories state that the truth of a proposition is the coherence of such proposition with respect to a given specifically set of propositions (Young, 2018, §.1). In both cases, truth bearers and truth makers are propositions. The set given is then a sort of power set of the possible propositions believed or taken to be true. In the case of Spohn’s account, we can talk of a so called beliefs in use, because beliefs are dispositions that fall in a huge counterfactual exercise of exclusion of possible worlds as we studied in §.2.3. This super set then is just a structure or general unsaturated truth possibilities. Philosophers like Putnam (1981) claims that this superset is the limit of inquiry or the set of beliefs of an omniscient being. However, that is not a real problem for Spohn’s belief theory.
In fact, ranking theory is in this sense a coherence theory of truth. Ranking theory shows that a system of beliefs is coherent with respect to a centered doxastic subject. And of course, the inductive normativity explicit in the dynamics of belief, reasons, and causality, is the epistemic justification of the truth conduciveness. Ranking theory axioms construct this kind of a priori unrevisable structure of reasons. Truth-conduciveness of reasons is then the key to set an appropriate truth notion. I think I receive direct beliefs and thus I have to believe it. To have them is to take it to be truth. However, they might turn to be false; to be real truth they have to resist further stages of learning. Truth is thus a dynamic achievement. For each truth, there is a truth reason. And laws of belief, the set of ranking theory axioms, lead me to the internal task to achieve the truth and coherence of the system. Spohn synthesizes this saying:

The slogan “truth must be believable” suggests, rather that the totality of true reasons in favor of some true atomic proposition A outweighs the totality of true reasons against A. Otherwise, one could not ultimately believe A. (Spohn, 2012, p.546)

And here emerges the correspondence theory of truth in his bidimensional account. Because, as we saw in the previous section, perception guarantees the justification of an external input, and in that sense, the starter of this dynamic task of finding the coherence of truth reasons and the stability of our belief system. Empirical propositions have to be learnable and drive the change of our degrees of belief in a strong sense and indicate the right way to find truth.

Therefore, this internal account of truth conduciveness is based in an ideal theory of rationality that is unrevisably a priori, that is to say, is truth in every possible doxastic state. And, as we said previously, this internal deliberation, in the first-person perspective, is a deliberation
not inner to only one subject, but to the entire epistemic first-person community. In normal conditions, truth is detectable given truth reasons and then believable.

Ranking theory is then able to set a collective structure of the rationality and a ground or a rock bottom to a possible collective consciousness.
5 Making Ranking Theory Useful for the Social World

5.1 Introduction

The philosophy of the social sciences is responsible for dealing with the traditional problems of philosophy and its link with the empirical study of human society. In general, the nature of the social sciences is conceived as follows:

Social science will be understood broadly as including all systematic empirical research into the activities of human beings, with a special interest in those things we do together, as part of larger social groups. It explicitly includes methods like interviews and participant observation. And unless otherwise specified "theory" is not restricted to talk about causes and laws. Theory includes all the ways that social scientists formulate and express their results. (Risjord, 2014, p.6)

The general problems of philosophy that engage with such investigations of collective human action can be divided into matters relating to the theory of value, including ethics and aesthetics, epistemology, and metaphysics. The philosophy of the social sciences fits and is relevant in all these philosophical subfields. Therefore, the distinctive or essential feature of this discipline is determined by the tasks it deals with, in relation to such diverse philosophical realms.

The realm of epistemology deals with the topic of collective human action, and the task of establishing the possibility to share and build the same epistemic goals, norms and methods. Mainstream epistemology traditionally searches for knowledge and its nature in the isolated individual. However, it is important to remark the difference of knowledge in the background of social interaction and shared epistemic goals. From this, we can talk of a new branch in the
philosophical study of social science called social epistemology. Douven and Schupbach explain the difference as follows:

In groundbreaking work, Goldman (1999) showed that an exclusive focus on the isolated epistemic agent was deeply mistaken. There are important aspects of our epistemic lives that can only be understood by considering our interactions with fellow epistemic agents and by studying whole collectives of agents pursuing truth in a concerted effort. (Douven and Schupbach, 2017, p.16)

The central point is that what we believe or know is, in a huge sense, derivate from our interaction with others. In that sense, we can ascribe belief or knowledge to different social groups. Thus, the key debate is how we can develop or construct epistemic group attitudes as a sort of aggregation or derived attitudes from individual epistemic attitudes (Douven and Schupbach, 2017, p.17). From this analysis, we can set property methods and protocols to achieve the social sciences epistemic goals.

The proposal is then, as preluded in previous chapters, to set a formal epistemological account or ideal model of the epistemic normativity that ground the possibility of set epistemic group attitudes such as beliefs, knowledge and rationality and, in the same way, methods to the scientific study of such collective epistemic attitudes. We can frame these claims in the recently and pioneer subfield of the social epistemology called formal social epistemology and a novel theory in this promising realm: the ranking theory approach as a tool to face this social epistemology challenges.

The final chapter is thus devoted to developing a novel account that wants to achieve the goal to make ranking theory useful for the social world. This development wants to throw light to
certain foundational and methodology aspects of social science and would to be capable to be useful for philosophers and empirical social scientists. The idealized model of rationality developed by ranking theory is then applied to some important aspects of the social world as a novel research and methodology tool-box for social sciences. This is the first approach of an extended research project; the present chapter is then the riverbed for an ulterior research project of interdisciplinary applications as a way to test the epistemic conditions model here developed.

Social entities and social action required normative epistemic conditions for the doxastic states of agents and social agents in order to set the ulterior doxastic states of other agents and groups of doxastic agents (Chant and Ernst, 2008, p.549). To achieve the goal to create social entities and perform collective action, social world requires that a social agent and its members satisfy a given model of epistemic conditions. Social epistemic challenges of the form: “I believe that you believe” (Tuomela, 2002, p.28) require high order beliefs as necessary conditions for this task. Such normativity is thus a sort of ideal or formal theory of the possibility to establish criteria for interactive knowledge in the sense of the pioneer work of Goldman (1999). Truth and information seeking is then essentially social:

People have interest, both intrinsic and extrinsic in acquiring knowledge (true belief) and avoiding error. It therefore makes sense to have a discipline that evaluates intellectual practices by their causal contributions to knowledge or error. This is how I conceive of epistemology: as a discipline that evaluates practices along truth linked dimensions. Social epistemology evaluates specifically social practices along these dimensions. (Goldman, 1999, p.69)

This theoretical model of epistemic conditions or normativity for the interactive or collective knowledge allows us to enable or disable collective formation of entities and prevent or suggest
collective action. Collective knowledge requires to evaluate our beliefs and reasoning as justified or unjustified, and in doing so, we are doing normative judgments about them. As epistemology is a normative discipline, the relation between norms, rationality, and reasons is ineluctable.

The notion of norm is commonly associated with the notion of rationality, both because norms concern what one ideally ought to do or think, and because rationality seems to be normative in the sense that it prescribes a certain kind of conduct. (Engel 2011, p.47)

Thus, there is a sort of twofold normative regulation. In one hand we have the relative regulation with respect to a certain goal (instrumental) and, in the other hand, a regardless prescribing perspective with respect to any goal. Engel argues in this sense that, “One can understand these (epistemic norms) as general requirements of rationality following from the very nature of belief and of the mental” (Engel, 2011, p.49). Therefore, the principles of logic, or those of probability, and raking theory are the most general norms for belief. No one can be said to belief without these norms. The task is then how to guide, regulate, and implement them as part of our epistemic practices. This argument drives to the following definition:

**Definition 5.1:** Epistemic norms are necessary and sufficient conditions with respect to an epistemic state if and only if are warranted by a perceptual or a priori justified reason.

Ranking Theory expresses these two general views on normativity and is the rationality model or riverbed here used to achieve the complex means-end to obtain knowledge in the social world.

The first step is to develop this novel epistemic normativity riverbed is to show the link between ranking theory and the so called building blocks of the social reality. In the second section, we shall see the many tools derived from ranking theory applied to the social world.
First of all, the tool of the dynamic of reasons and its entailments, that is to say, the ceteris paribus account to social sciences and a methodology model grounded in causality. Following we shall see the normative entailments to the internal normativity of the social sciences and the paradigm of the internal deliberation for the social sciences. Finally, we will argue in favor of a further research horizon with respect to the present proposal and Artificial Intelligence.

5.2 The Building Blocks

The foundational Building Blocks of the social reality are propositions. The present approach is near to the pioneer John Searle’s account of *The Construction of Social Reality* (1995), and the Spohn’s reading of society in (2011). Social facts, in this sense, depends on the human mind and therefore, are a human creation. Searle pioneer account affirms:

> How can there be an objective world of money, property, marriage, governments, elections, football games, cocktail parties and law courts in a world that consists entirely of physical particles in fields of force, and in which some of these particles are organized into system that are conscious biological beast, such as ourselves?. (Searle, 1995, p.xi-xii)

This invisible ontology requires a special kind of entities. Such entities are thus mind dependent, but, at the same time, needs to be *objective*. Only this objective character guarantees the possibility of establish knowledge and science in this ontological realm. Therefore, social facts have to be *independent of particular states of mind*, in the sense of particular representations. In this way, candidates to fulfill this ontological commitment are propositions. Social facts are then social propositions.
Propositions, given the ranking theoretical approach, are sets of possibilities in a given space of possibilities. The following definition makes clear the force of this assertion.

**Definition 5.2:** *A is a social proposition iff \( S \) is the power set of social possibilities and propositions \((A, B, \ldots)\) are subsets of \( S \).*

Social propositions are then counterfactuals; such propositions are believed if, first of all, in a sort of epistemic move, we exclude the complement of the set of a given proposition as taken such complement as not believed. That is to say in other terms:

**Definition 5.3:** *A is a social proposition believed by a subject \( s \) in a certain time \( t \), \( B_{st}(A) \), iff all possibilities in \( \neg A \) are excluded by the subject \( s \) at certain time \( t \).*

A social proposition is a centered possible world, or counterfactual, standard represented as: \( SP = B_{st}(A) \).

Social propositions are thus an exercise of counterfactual reasoning, that is to say, the epistemic move previously described. In that sense, the objects of social belief are not necessarily a concrete world of facts but rather a set of intensional counterfactual referents.

Social propositions (SP) are epistemic dispositions and their content are beliefs. In that sense, social propositions became in social knowledge just if:

**Definition 5.4:** *\( SP (B_{st}(A)) \) is social knowledge iff \( SP (B_{st}(A)) \) is true.*

Therefore, social propositions are the counterfactual exercise to assent to a truth function. Here it is important to say that, as dispositions, social beliefs and social propositions are epistemic states not necessarily taken as truth beliefs. A centered doxastic subject at certain time could has false beliefs and reasoning with it. Social world is then an epistemic dimension; a set
of epistemic possibilities or noumenal worlds with the capacity to represent a complete manifold of experience even far away from our actual world. Social reality or social world is not a necessary world; it always could be different.

The epistemic task to belief in social propositions requires a counterfactual test or epistemic reasoning process of exclusion of possibilities. Therefore, it is an inference process guided by certain epistemic normativity. To belief a social proposition is to be leading by a means-end intention of taken such propositions to be truth. But taken it to be truth is relate to a coherentist sense of the word truth. Coherence theories affirm that the truth is the coherence of a proposition with respect to a given and specifically set of propositions.

But the pursuit for truth is not easy. Subjects practice very often the counterfactual test of beliefs. In fact, it is hard to establish certainty on many subjects because the big sets of social beliefs comes in degrees of certainty. To avoid this difficulty, Ranking theory provides a formal mechanism to measure degrees of certainty to social sciences propositions. The mechanism of measuring is twofold in the following sense. There are two kind of social propositions and two kinds of social belief inferential normativity. First of all, we have static a priori beliefs and in the other hand, inferential or dynamic beliefs supported in perception and evidence. Following the standards of probability theory, ranking theory dynamics of belief can be understood in terms of conditionalization.

**Definition 5.5:** The probability \( P(A) \) is a condition to the subsequent probability \( P’(A) \), given certain evidence \( E \) and \( P(E)>0 \), iff \( P’(A) = P(A/E) \).

This substantial idea, taken borrowed from Bayes theorem, leads to the ranking theory idea of the law of simple conditionalization. The evidence reduces the space of possibilities of the power
set $S$ for the purposes of our business. The counterfactual test required is fulfilled thanks to this epistemic normative device or epistemic mechanism.

However, the probabilistic perspective is in certain sense insufficient as pointed out in § 1.4. Ranking Theory is a strong tool to measure degrees of belief and the dynamics of social beliefs and propositions as evident in the next definition:

\textit{Definition 5.6:} SP $((B_{st} (A))$ is a social static belief iff SP $((B_{st} (A))$ is consistent and has deductive closure.

Propositions of social belief sets are believed to be consistent and closed under logical consequence mechanism. These first ground belief laws make possible a strong commitment to truth and scientific knowledge. To maintain true sets of beliefs is an important epistemic agenda leading by the commitment of getting to the truth and avoiding an error.

Given this fundamental first order laws of belief, we can start the task of measure degrees of belief. The first case of normativity, given such important laws, is the case of belief conditionalization. A belief dynamics ruled by consistency and deductive closure lead us to the notion of ranking function. Ranking functions measure the reliability or degree of in certain social proposition. We can measure and test the strength of social building blocks of the social reality, given this formal mechanism as we shall see in the next section.

If an agent wants to achieve the goals of getting to the truth and avoiding error, with respect to social propositions, she should obey the norms of ranking theory as an epistemic model of reasoning. That does not mean that obey implies telling her what belief content she must to
belief. These norms just establish objective criteria to obtain this means end agenda, that is to say, social scientific knowledge.

As evident in the second and third chapter of the present dissertation, ranking theory measure mechanism and laws of belief account entail a set of epistemic conditions and normativity evident in the employment of different philosophical applications. For our task, these building blocks can be set as a sort of methodology tool-box for the realm of social science and the achievement of social knowledge. In the next section, we shall explore certain models of applications as a methodology epistemic criteria for the social world.

5.3 A Methodology Tool-Box

5.3.1 Reasons and Society.

Ranking Theory applications could behave as a methodology tool-box for the social sciences. On the ground that social propositions are the building blocks of social reality, such blocks require a good epistemic justification as warrants of the whole structure. A justified building block is what ranking theory calls a reason; social world is built thanks to reasons.

A reason is a sort of mechanism of confirmation of a hypothesis given certain evidence. The confirmation of a given hypothesis is connected with the concept of epistemic relevance as remarked in § 3.2. The support of evidence drives the change in the degree of firmness or credibility on certain social proposition; that is what relevance indeed means.
Ordinary language statements like A confirms B, A supports B and A is a reason for B, portraits the concept of relevance. Ranking theory formal definitions allows setting a model of reasons such as follows:

i. A is positively relevant to C iff \( \tau(C|A) > \tau(C|\neg A) \)

ii. A is irrelevant to C iff \( \tau(C|A) = \tau(C|\neg A) \)

iii. A is negatively relevant to C iff \( \tau(C|A) < \tau(C|\neg A) \) (Skovgaard-Olsen, 2015, p.76).

This model of relevance is a non-monotonic model of reasoning, a model of transmission of epistemic justification. The special value of this model is evident in everyday life events of the social world. Epistemic transmission of justification and inferential reasoning are a strong tool for modeling prediction of events and to ground and reinforce already justified beliefs or revise and change others. Ranking Theory is a means to measure the force and strength of such reasons or justified beliefs in the realm of social sciences.

One important feature of reasons, already explained in § 3.2., is that reasons are relative to doxastic subjects and, again, is important to highlight that is not necessary that different doxastic subjects always agree on their reasons. Here arises an important claim of the proposal: in the realm of social world doxastic subjects are not just individuals but collective doxastic subjects.

This novel notion needs to be more detailed settled and explained. The key question is: how to expand this individual epistemic notion to a group of epistemic subjects? In this sense, how to share reasons? And, how are we expected to infer and transfer justification as social epistemic agents? The following definitions clarify formally this though issue.
Definition 5.7: A is a collective doxastic reason iff such a reason is the arithmetic mean or average of
the two sided valued ranking functions measures of belief firmness and relevance of each member of the
collectivity, formally:

\[ \mu(A) = \frac{1}{n} \sum_{i=1}^{n} \tau_i \]

Given \( \{ \tau_1, \tau_2, \ldots, \tau_n \} \)

and the result is then a Supererogatory, Sufficient, Necessary or Insufficient reason with respect to
such warrant or social proposition.

Definition 5.7 leads to the notion of social epistemic agent. A social epistemic agent is an
intensional concept defined as the result of the previous equation in a given certain time. The set
of social beliefs as the result of this process constitutes a social epistemic agent as the set of
collective doxastic reasons for a group of individuals at a certain time.

In this sense, we can establish a dynamics of belief in the same way of individuals and expand
the mechanism to collective doxastic reasons and to social epistemic agents in a given time.
Doxastic collective reasons are therefore the social propositions that we are trying to achieve.
Language is the representation but just a contingent feature that makes patent the assent to a
given social proposition, and, given the epistemic normativity of ranking theory. This model is
thus fruitful if and only if each subject obeys such epistemic normativity model.

Given this model and the ranking theory normativity, the dynamics of social beliefs or the
weight of reasons for social epistemic agents are driven by conditional inference guided by
evidence. The wide and extended recognition of evidence leads to a revision or change of the set of social beliefs.

Here it is a paradigmatic example. The failure of Ptolemy’s geocentric model of the universe, based on Aristotle’s requirements for the uniform circular motion of celestial bodies, leads Copernicus to a heliocentric model (Copernicus, 1992). The model has a direct relationship between the distance of the planets and the size of the orbits as the principal warrant. This is the theory starter of a big social process so called the scientific revolution (Rabin, 2015). Copernicus hypothesis starts the counterfactual test and the measuring and reliability of several social beliefs, beginning with individuals and certain influencer persons such as Luter, Tycho Brahe, Clement VII among others. Here starts the revision process of beliefs given evidence; this is a progressive path. The new evidence compiled, for instance by Brahe, Kepler and Cassini, drives the change in certain fundamental social beliefs with respect to the so called weltanschauung of a given social set in time. This process is asymmetrical, and that is why a lot of communities, at the same time, still strongly believed in the Ptolemy model as a strong hinge. Evidence drives the change, but it is quite different the belief change of the isolated individual and the social one. Even well, the belief change is different given the scale of members of a determinate community among others.

The model of definition 5.7 expresses the whole thing. Epistemic changes of the belief in a social background are asymmetrical with respect to individuals. An important entailment of this claim is that epistemic dynamic with respect to social groups is slower than the dynamics applied to individuals. And in this sense, are slower in direct relationship with respect to the number of
members of the social groups. Nevertheless, the force and commitment is stronger as a social belief, in larger groups, than in small ones.

In this sense, social epistemic agents like democracies, assemblies, families, and tribes and so on, can have individual subjects with good epistemic normativity skills and obey evidence, but do not champion their claims because of the consequences of definition 5.7, with respect to a certain social proposition. This happens because beliefs are dispositions. Just the pretention to get into the truth and avoiding error, given certain normativity, guarantees social epistemic agents in the pursuit of knowledge. We cannot change the sets of beliefs in social world, and in that sense social world itself, without this dynamic of reasons. However, as we shall see later, freedom is a sort of epistemic fuse for individuals with respect to the realm of the individual herself and with respect to social groups. *Individuals do not need to engage always in social behavior and, of course, in social epistemic states.*

### 5.3.2 Normal Conditions in Social Sciences.

Ceteris Paribus clauses or normal conditions clauses, given ranking theory normativity, is a central topic for social sciences methodology. This model of defeasible reasoning leads to an important application. Ceteris Paribus laws are the case given normal conditions in the certain ontological realm. We obtain high probable conditions in a certain counterfactual or possible world.

Spohn’s Ceteris Paribus account is a normal conditions interpretation in a ranking theoretic epistemic approach, as explained in §3.3. At this point, it is good to return to this point to achieve our purpose. We can define *normal* as the not unexpected. Ceteris Paribus Laws have the goal to
establish criteria to make claims that can be true or false; confirmed or disconfirmed. All these arises because scientists and philosophers of science have several difficulties to achieve certainty about such claims. Ceteris Paribus clauses are then a sort of ideal epistemic conditions.

Hooke’s law, for instance, allows us to know about good manufactured springs. Here, ceteris paribus means not exposed to too large forces, temperature or other exceptional conditions (Spohn, 2014, p.386). Interpretations of ideal conditions of the speed of light in the absence of resistance is a useful model, nevertheless, always introduce further problems on the commitment with the truth or confirmation of such hypotheses.

The question is then: how to ground truth conditions?; how to set an appropriate epistemic space of conditions? Spohn claims that Ceteris Paribus laws are epistemic normativity criteria or a kind of default rules beyond the problem of truth conditions (Spohn, 2014, p.391). Spohn affirms on this topic: First, within the epistemic interpretation the meaning of an utterance is not a truth condition, but the mental state expressed by that utterance (Spohn, 2014, p.392).

Epistemic states express beliefs and sets of beliefs. And in this sense, an epistemic account is not related to truth conditions, but with belief expectations. Belief formation is a task related to the belief on our possible beliefs, that is, our conditions to make inductive reasoning. Therefore, the ranking theory approach to Ceteris Paribus laws is grounded in the mechanism of conditional belief; the relevance approach of reasons as explored in §3.3.

As agents and scientists we continuously have beliefs, expectations, conjectures and we do so unconditionally as well as conditionally, and we may or may not believe on expect the conditions to obtain in turn. (Spohn, 2014, p.393)
In this sense, the expectations account as a root of normal conditions clauses need a belief theory and an inductive logic model. Ranking theory fulfill these requirements as hitherto argued.

Initial rank $\tau$ can be interpreted as an initial belief credit, or in ranking theory code, a defeasible a priori hypothesis, on conceptual grounds, and given the mastering of such concepts. This initial rank allows to learn with inductive logic, starting in the dynamics of such initial credit.

The dynamic of belief is here changed to a learning process from this initial credit. Thus, how do we learn from the initial rank $\tau$ credit? Here it is the laconic answer: “Conditionalizing on the data observed” (Spohn, 2014, p.402). Applying ranking conditionalization we can figure out the behavior of our expectations.

The means-end is thus to maintain a reliable hypothesis with less violations of the expectations as possible. Thus, normality is meaningful in a certain environment or background.

For the realm of the social world, normal conditions are epistemic conditions in the following sense: social epistemic agent’s belief in certain a priori defeasible relations of phenomena given certain fixed background or a power set of social propositions.

Ceteris Paribus clauses are necessary and sufficient reasons that work as reasoning conditions or hypothesis conditions to reasoning. We belief defeasible a priori the hypothesis or ceteris paribus law if we belief that:

\[ \text{Definition 5.8: } H = S \rightarrow (D \leftrightarrow R) \text{ is defeasible a priori given } S, \text{ and } D \text{ is a necessary and sufficient reason for } R. \]
For instance ceteris paribus clause of demand: The scarcer the supply, the highest the prices, formally: \( CP \text{ if } x \text{ is } y \rightarrow x \). Supply curves relate price and quantity, under the assumption that the other factors do not change. The expectation is that the relevant economic factors do not change, but only the price of the product. If the expectations are not fulfilled, the ceteris paribus law of demand does not hold.

Several factors can affect the clause with respect to the production of products. For instance, in a Factory of cars, the increase in steel prices could affect the curve of production and thus the price of each car. The factories will obtain less profits and therefore, they will do not manufacture the same quantity of cars. Among other exceptional conditions we can posit natural or weather conditions; certain unexpected policies and the rush of certain technology advancements. All these disturbing factors set and start the revision of beliefs and the dynamics of inductive reasoning.

Ceteris Paribus laws are, therefore, the defeasible or a default clause obtained after such process of revision. In this sense, Ceteris Paribus laws given ranking theory normativity can be modeled with the model of relevance and dynamics of reasons as hitherto argued in the previous section. A sort of linear process of relevance revision can obtain the normal conditions clause, given certain fixed background (Spohn, 2014). This is, at the same time, one of the basic ideas of the causal account with respect to social sciences that we shall see in the next section. Therefore, recalling the theory exposed in § 3.3, the final power tool of ranking theory to social sciences is the model of causation.
5.3.3 Causation in Social Sciences.

The association between different kind of events and the *expectation* of one following another is the intuitive core idea of causation. The prone to form such a habit is inherent to the dynamic of human beliefs. In this sense, ranking theory approach to causation is guided by the idea of the raising of the probability of an event given another. This is, in the same way, the core idea for a proposal of a causation account as the ground of certain methodologies applied to social sciences.

This starting point for ranking theory is well explained by Cartwright (1979) as we saw in 3.4, and we can reformulate it to our present task as follows:

*Definition 5.8:* Given two social propositions $C$ and $E$, $C$ causes $E$ iff $P(E/C \cap B) > P(E/\neg C \cap B)$ for every background context $B$.

Such core idea is strongly related to the hypothesis of counterfactuals as the rock-bottom of social propositions. Counterfactuals are subjunctive conditionals of the form, if it were the case that $A$, then it would be the case that $B$. In short, something relevant drives an important difference (Halpern and Pearl, 2005, p.845). Causation in this perspective is relative to models, and such models relative to certain background; the modeler decides the set-up of the variables as the better representation of those aspects of social world that one wishes to reason about.

The useful ranking theory advantage, as an evolution of this counterfactual account of causation (Spohn, 2006 and 2012), is the following basic idea:

*Definition 5.9:* Given two social propositions $A$ and $B$, $A$ is a cause of $B$ iff $A$ and $B$ both occur, $A$ precedes $B$, and $A$ raises the epistemic status of $B$ given the obtaining circumstances.
In a strict ranking theory code we obtain:

Definition 5.10: Given two social propositions A and B, A is a cause of B iff A and B obtain, A precedes B, and A is a reason for B given the obtaining circumstances.

Obtaining circumstances are the set of the complement or the other causes of B that are not A. This is the counterfactual test before exposed in §2.2. In this sense, it is possible to say not given the obtaining causes but *ceteris paribus*.

The ranking theory approach of reasons applied to causation claims that causation is thus in the eye of the beholder; causation is based on the idea of epistemic reflection. Causes are conditional reasons in a defeasible reasoning model.

Causation remains at the hearth of social sciences as the *LSE Motto* affirms: *Rerum cognoscere causas*. The deeper sense of this lemma is grounded in that the fact to know the causes of things allows us to describe and understand the world, to construct a better social world, and to change our live conditions given our inductive inferences or possible world predictions. As Nancy Cartwright claims, social studies need to study causal relation for two important reasons:

Social science studies causal relations at two levels. The first is the singular: what are the causes and effects of specific single events? The second is the general: what kinds of features are generally connected as cause and effect? (Cartwright, 2014, p.310)

These levels of causation, as epistemic normativity, has the advantage to fit perfectly with the standard statistical methods used by social science to test relations of phenomena. All these observational studies or social experiments, which take data from populations in their natural
environment, can be interpreted clearer through the normative epistemic account on causation. For instance, the randomized controlled trials RTC evident in the following definition.

**Definition 5.11:** Let $K_i$ be where all causes of $E_t$ take $N$ some fixed value:

$$C_t \rightarrow E_t \text{ in } K_i \leftrightarrow P(E_t \mid C_t + K_i) > P(E_t \mid \neg C_t + K_i)$$

Treatment groups with $C_t$ and $\neg C_t$ for instance, in placebo trials are certain kinds of RTC. The typical problems of balance of $K$, that is to say, problems with the balance of populations, should be best solved with this causation approach given the benefits of ranking theory.

Another advantage is engaged with the possibility to model and manipulate phenomena with certain models of causation as Cartwright shows:

The manipulation view of causation revolves around the idea that causes give us effective strategies for producing effects we want, or preventing those we do not; by manipulating the cause we can manipulate the effect in a predictable way. (Cartwright, 2014, p.316)

The basic idea is that an intervention is a manipulation that is done in the right way to make the causal relation, or lack of it, apparent (Cartwright, 2014, p.316). For instance, inflation, when it occurs naturally, can in the short run cause reductions in unemployment. The formal structure of manipulation is thus the following.

The basic idea is that, supposing $C_t$ and $E_t$ are regularly associated in $S$, then $C_t$ causes $E_t$ in $S$ just in case the association between $C_t$ and $E_t$ is invariant under interventions in $C_t$ (Cartwright, 2014, p.320)
This is absolutely related with the previous ceteris paribus account. Causal claims in social sciences are meaningful give a ceteris paribus laws clause either related with a given model of causation. The advantages of the ranking theory account of causation are useful for the social world because the complexity of experimentation in the social sciences. The task is then running this causation model in specific problems of social world.

However, there is a strong aversion to the use of causal modelling in the practice of the social sciences as Kinkaid makes clear:

Widely used causal modelling techniques in the social sciences arguably make implicit assumptions about the nature of social causation that fit poorly with some or much social science research (Kinkaid, 2009, p.727).

The aversion argument can be normalized as follows:

_Aversion Argument:_

1. Social entities are constructed aggregates
2. No constructed aggregate can be a real cause
3. Thus, social entities cannot stand in causal relations (Heldstrom and Swedberg, 1998, p.11).

Aggregates can be causes because, as hitherto argued, because social facts supervene on individual facts. Social causes are epistemic states and become real by the disposition to believe in social propositions. Kinkaid has a very similar approach on this affair:

When a particular corporation acts in a market, it has causal influence. The influence of that specific entity is realized by the actions of the individuals composing it just as the influence of
the baseball on the breaking window is realized by the sum of particles composing it (Kinkaid, 2009, p.731).

In summary, social propositions can be interpreted as causes given the ranking theory approach. But this is a horizon to achieve; to gain knowledge in social sciences is a very hard goal and causation model can have an important use and perhaps more fertile than in the natural sciences. The conclusion is then start to test these models in everyday social scientific practice.

5.4 An Epistemic Normativity Frame for the Social Sciences.

5.4.1 The Inductive Path.

Ranking Theory sets certain important normativity entailments. Formal rules evident in the argumentation of the laws of belief and the tool-box of applications constitute a riverbed for rationality. In this sense, such normativity entailments are useful for social sciences internal normativity as explained in §1.3.

The switching yard of rationality ruled by ranking theory models a twofold picture of knowledge justification: perception or inductive path and the apriority model. In this section, we will (shall) start with the normativity entailments on perception and induction.

As we saw in §3.4 positive relevance conception endorses the ranking theory account of a coherentism logic of justification of knowledge and in the same way social knowledge. Being a reason leads to the possibility of being justified. Degrees of justification are directly related to positive ranks or degrees of belief in the ranking theory key.
The root of this coherentist account of justification is perception. If doxastic subject a perceives that A at time t, then the fact A is the cause of a’s believe in the proposition A’. All this rests on the so called *Schein-Sein Principle* as introduced in § 4.2. Formally: $\Phi_{a, t}(A)$.

This means that we initially trust in our senses and the sensations and assertions of others. Thus, *ceteris paribus*, my doxastic conditions are not different from the situation of others and the reliability in my perceptions, beliefs and assertions with respect of the others are high and optimal. Even counterfactually things supposed to appear and being to me and the others in the same way and conditions given this normative modeled structure.

**Definition 5.12:** A is a first order belief given that $\Phi_{a, t}(A)$ iff $\Phi_{I, NOW}(A)$ and, *ceteris paribus*, if $\Phi_{I, NOW}(A)$ then $\Phi_{All other doxastic subjects, NOW}(A)$ as a first order belief.

Different doxastic subjects, *ceteris paribus*, master the same belief, and in that sense, the same first-order beliefs. This entails the epistemic foundation of share beliefs in the realm of social groups.

At the same time, these first-order beliefs are related to the capacity of each doxastic subject to master and form concepts and linguistic or language basic notions as terms and propositions. Language as a social phenomenon is grounded in this essential normativity claim. This shows either the shared formation of concepts of groups given certain shared background.

Here it is important to remark certain important aspects on the relation between consciousness and knowledge with respect to social groups. *Schein –Sein Principle* leads to the notion of *Self Consciousness*:
Definition 5.13: Subject I is self-conscious iff, if $\Phi_{I,\text{NOW}}(A)$ then $B_{I,\text{now}}(A)$. Therefore, I know that I have A as true belief or $K_{I,\text{now}}(A)$.

For example, let see this wittgensteinean classic topic. If I am in pain I feel it. So I believe it and therefore, I know that A. If I do not feel pain, then I don’t have it, and I know I do not have it. Borrowing the words of Wittgenstein this structure is an ungrammatical hinge of knowledge (Wittgenstein, 1951§.575).

$B_{I,\text{now}}(A)$ is immediately a truth and justified content of consciousness. Nevertheless, each hinge is in certain sense different, because time and conceptual frame of subject and subjects. In this sense, conscious hinges are defeasible a priori propositions born in perception.

In the other hand, this frame relative hinge can be shared as propositional content thanks to language. We can share the propositional content and thus the mastering of the concepts like pain for our example. Here the subject become in a social agent and we can talk of a sort of collective consciousness. This kind of common knowledge goes beyond the first-order beliefs, but, ceteris paribus, a set of doxastic subjects called social agent or social entity can know such hinges like pain, given such defeasible a priori structures. Formally:

Definition 5.14: If A is an actual content of consciousness of the form $\Phi_{I,\text{NOW}}(A)$ then $B_{I,\text{now}}(B(A))$ and $K_{I,\text{now}}(A)$, then, caeteris paribus, another subject O believe that A, and therefore, $\Phi_{O,\text{NOW}}(A)$ then $B_{O,\text{now}}(B(A))$ and $K_{O,\text{now}}(A)$.

Contents of consciousness are ipso facto believed and know and thus ipso facto believed for others subjects given the same background, linguistic competences and mastering the same concepts; all these conditions constitute the normal conditions clause.
Collective consciousness is derived from representations of particular perceptions of subjects and in this sense is a high-order form of thought. Collective consciousness supervenience particular epistemic states.

Given ranking theory measure system, the content of consciousness can be modeled and measured as: $\tau_{at}(C) = \pm\infty$. That is to say that such content of consciousness is a maximal measure and rock-bottom of certainty given this model of epistemic normativity. A request of justification or a request for warrants or reasons for $C$ are thus senseless; my own present beliefs are an epistemic blind spot for myself. The entailment of our hypothesis is then, that collective contents of consciousness are blind–spots either for a first-person point of view. Another entailment is that this blind-spot applies either for possible actions or counterfactuals.

This big problem of the model is countered through two fuses. The first one is free will. The second is the learning or override process of evidence based in first order beliefs given the defeasible a priori character of first-order beliefs. Many times counterintuitive experiences are deeper forms of perception. For example, as we saw, it seemed intuitive to think of a time when the earth was flat, a proposition that fits our model with maximum certainty for a first-order belief. But the dynamics of belief of the ranking theory can overrides, given new evidence, for instance, deeper forms of perception build thanks to new scaffold technologies and system of metrization that allows us to grasp a lot of phenomena out of our range of standard perception.

5.4.2 The Apriority Path.

Another topic useful for our purposes is the so called normative a priori account in a ranking theory key. The first notion useful for social world is the contingent truths argument. The famous
example is the proposition “The standard meter stick in Paris is a meter long”. Tautological contingent propositions are an epistemic hinge, and in this sense, kinds of contents of consciousness, that is to say, knowledge a priori given. These concepts are important for the social world as the essence of the imposition of functions to intensional entities.

Assignments of social functions depend most of the time on tautological contingent propositions believed maximally, but defeasible a priori. For example, $x$ stands for $y$ model of social propositions, and the case of money and other social functions. In the end, these are the constitutive rules of the structure of the social world.

Following the apriority path, a priori justified knowledge is to be justified enabling experiences. However, Ranking Theory account on apriority is a dynamic notion related to our conceptual development. For instance, the proposition “All bachelors are unmarried” is unrevisably a priori and analytic if and only if doxastic subject acquired and mastered the concept of bachelor. Euclidean geometry is another remarkable example. Euclidean geometry is a priori and analytic. However, Euclidean geometry changes epistemic with the conceptual means of the invention of non-Euclidean geometries in the XIX century (Lobachevski, 1829).

These remarks and examples make patent the form and structure of unrevisable a priori propositions and are useful for the following ranking theory commitment introduced in §4: All principles of theoretical rationality are unrevisable a priori. Doxastic subject projects herself cognitively into the world give certain theoretical a priori normativity frame.

Coherence theories affirm that the truth is the coherence of a proposition with respect to a given and specifically set of propositions. This entails the necessity of truth conduciveness of reasons; to be truth consist into resist further stages of learning and belief revision.
The law of belief, the set of ranking theory axioms and its entailments, lead to the internal or epistemic task to achieve the truth and coherence of such set of propositions. The ideal or means-end intention of this task is to achieve that the truth must be believable. Such process or task is a sort of internal deliberation, a continuous process of reflection and learning, and, in this case, an entire epistemic first-person community of reflection.

Collective consciousness depends on the continuous doxastic state of reflection; internal normativity ruled by epistemology models as ranking theory account is a necessary task for a set of good epistemic community deliberation.

5.4.3 Internal Normative Deliberation

Internal deliberation is a strong entailment of ranking theory normativity account. Spohn’s method of normative deliberation is a special methodology tool to study norms in a diachronic perspective appealing to use participant’s observation to study norms. Spohn distinguishes two perspectives on normativity as we argue in §4.

On the one hand, it is possible to consider from a third-person external perspective. Thus, approached, norms are the object of empirical investigation. On the other hand, norms may be viewed from a first-person internal perspective. Here, the norms are evaluated by asking whether they should be adopted and to answer this, question it is necessary to engage in normative deliberation. (Zahle, 2016, p.90)

The main argument is that social scientists have not only an external normative perspective, but also an internal one. This perspective rises when they take into account the norms and
normativity within the social groups and the change of such normativity over time. Zahle clarifies the Spohn claim as follows:

Spohn’s argument may be reconstructed as follows. When considering norms in a diachronic perspective, their development may sometimes be explained as due to changes in fashion or as a result of historical contingencies. In addition, the changes in norms overtime sometimes have to be seen as a result of individuals aiming to find out and do what is right. In the latter case, an idealized theory must be adopted to the effect that, as a result of their efforts, individuals get closer and closer to a certain ideal situation in which they have found out and are doing what is right. (Zahle, 2016, p.90)

Spohn makes it clear that the ideal is not reachable; it is a normative fiction. However, social science requires to engage their inquiry with the formulation of ideal theories on normativity. In this case, the present model, the first step is to formulate an ideal theory on rationality and knowledge on social world, to the ulterior goal of formulate it with respect to the manifestation in language and in actions. The procedure is then described perspicuously by Zahle:

In order to specify the ideal, the social scientist must engage in normative deliberation (…) When the social scientist has collected data about the past norms within a community, she may sometimes come to realize that the employment of an idealized theory is called for; she must represent the norms as changing, overtime, in the direction of an ideal state in which the right norms are implemented. In order to posit the right norms, the social scientist has to make use of the distinct method of normative deliberation. (Zahle, 2016, p.91)

As hitherto argued, deliberation is, therefore, epistemically related with the internal justification of our beliefs. Each doxastic subject must deliberate into the dynamics of her own beliefs given certain normative model, in this case, the ranking theory approach. In this sense,
inductively, social agents have the same duty; social agents must justify their own shared beliefs. And of course this justification is necessary even given the possibility of the suspension of judgment and freewill fuse. The freedom of subject is an internal deliberation weight of reasons process.

Thus, internal deliberation is the epistemic weight of reasons and the ranking of the reasons that are acceptable or achievable for an individual doxastic agent or a social one. At this moment is important to remark the similarities of the present proposal with the last claims on the theory of democracy. Tom Christiano describes the main normative notions of democracy as follows:

The basic principle seems to be the reasonableness according to which reasonable persons will only offers principles for the regulation of their society that other reasonable persons can reasonably accept. The notion of the reasonable is meant to be fairly weak on this account. One can reasonably reject a doctrine to the extent that it is incompatible with one’s own doctrine as long as one’s doctrine does not imply imposition on others and it is a doctrine that has survived sustained critical reflection. (Christiano, 2018, §2.2.2)

Nevertheless, we can say that this interpretation driven by the internal deliberation on the norms of rationality and reasonableness with respect to society is an instrumentalist account and devoted or committed with unanimous and full consensus. Self-governing and internal deliberation are related; freewill is then, again, the fuse of this epistemic account: In Christiano’s words:

The ideas is that the right of self-government gives one right, within limits, to do wrong. Just as an individual has a right to make some bad decisions for himself or herself, so a group of
individuals have a right to make bad or injust decisions for themselves regarding those activities they share. (Christiano, 2018, §2.2.1)

While decision making and action is not our present business, internal deliberation and epistemic normativity is a sort of condition of possibility of doing so. In the same spirit of Habermas proposal in (1984), if the social world wants to achieve the goal of a theory of society and a scientific approach to the social world, is necessary to establish a model or theory of rationality and in that sense such tasks involve normative content. Habermas claims with respect to such social theory:

If we assume that the human species maintains itself through the socially coordinated activities of its members and that this coordination is established through communication – and in certain spheres of life through communication aimed at reaching agreement- then the reproduction of the species also requires satisfying the conditions of a rationality inherent in communicative action . (Habermas, 1984, I. p.397).

Here arises another horizon to the application of the toolbox here presented. Given that arguments are the manifestation of the rational behavior in the sense of the reconstruction of propositions, reasons and pragmatic commitments, the present account is equally relevant to ground certain theory of argumentation in the same mood of a defeasible account of arguments patent in authors like Blair, Walton, Van Eemeren among others. This is a further challenge of great importance, but let me talk about a further research challenge that can subsume the others.
5.5 Further Applications: Social Artificial Intelligence

Artificial Intelligence (AI) can be defined synoptically as “the field devoted to building artificial animals (or at least artificial creatures that - in suitable contexts- appear to be animals) and for many, artificial persons (or at least artificial creatures that – in suitable context- appear to be persons)” (Bringsjord and Govindarajulu, 2018, §1). This mainstream definition started with the pioneer work of Alan Turing (1950) “Can a Machine Think?” and his challenge of the so-called Turing test (TT). Some scholars place the first milestone in Descartes test for artificial intelligence of Discourse (1637, p.116) and others in the famous 1956 Dorthmouth conference (Bringsjord and Govindarajulu, 2018, §2).

However, several diverge opinions, the TT is perhaps the best criterion and research horizon of this field (Oppy, and Dowe, 2016, §1). TT consists in a counterfactual, where there are a human being and a computer isolated and separated, and both are requested for a judge with several questions. Given the strength of the answers the judge sets a 50/50 possibility criterion of indiscernibility to declare which is a human or a machine. If the judge reaches this 50/50 standard the Touring test is passed. AI is for this mainstream the dream to pass TT. The last boundary is the possibility to answer arbitrary and random questions as the IBM Watsons jeopardy machine starts to do (Levesque, 2013).

The core of TT is the linguistic indistinguishability, but as we shall see, the present proposal want to go beyond this classic milestone. The following account, on a sort of weak artificial intelligence, wants to set the modeling of doxastic attitudes and doxastic reasoning as the core of the field. This account wants to achieve a constructive definition guided by formal tools from
philosophy such as first order logic, intensional logic, probability approaches and, as a novelty, a ranking theory approach.

In this account, AI is strongly related to reasoning and inference. In a constructive point of view is not just a question of a human based development, but an ideal rationality model; it is not just about to think like humans. The goal is, in a novel sense, think rationally and then, act rationally guided. By the way this is not a sort of imitation of human epistemic capacities, conversely, is an idiosyncratically form of rationally proper of these kinds of agents. Therefore, the ultimate goal is to model intelligent agents which think and act in accordance with certain models of reasoning. In this account intelligence and optimal rationality are symmetrical. An intelligent agent is thus guided by rationally normative models of reasoning that leads to possible machine learning process. Here appears the challenge of modeling deep belief network learning and inference.

Ranking theory and the present account of a tool-box of models to social agents can lead to the possibility of think in AI social agents in a formal, but not monotonic or logicist approach. The first step is then to model social rationality or epistemic conditions, and thus, start to model social action for AI agents.

This account is near to the multi agent system AI proposal (Ferber, 1999). AI main conditions are related in this reading to a constructive vision of AI. The conditions are the partial possibility of perceive the environment, the possibility of communicate and achieve goals in a background of multiagent relations between all the entities capable of fulfill such conditions and performing actions collectively. Multiagent systems want to achieve accurate problem solving skills, multiagent simulations for social science, construction of synthetic worlds and collective robots.
The horizon is to set epistemic conditions for artificial social agents and modelling actionable social knowledge.
6 Conclusion

Against the social juggernaut

This sort of Philosophical postscript is devoted to a metaphorical figure so called the juggernaut. This destructive and unstoppable chariot procession in honor of one of the names of Krishna, *jagannatha, the world lord*, and its overwhelming sacrifice entailments, is a great image to my concluding claims.

The out of control behavior of society and the assumption that we ought a blind devotion and a merciless sacrifice to it, is one of the most important premises of the metaphor. Society is not, nowadays, a means –end structure of normativity and institutional guidance to fruitful collective action and decision making, but colossal machinery of collective blind co-working being crushing destructive. The improvement of individuals and collectives is not an explicit goal of actual mainstream models of society.

Society behaves more like an overflowing river of decadent institutions and innocuous symbols. And perhaps the objective would not be to face it but rather to channel the river from the inside, modelling the riverbed making the bitter water a docile one.

The wittgensteinean simile of the riverbed has been therefore the guiding concept of the intentions of the present dissertation. And the countless nights of meditation in front of the Rhine River writing the chapters of the text given to this literary device an important family air to the deep meaning of the work. The key to finding *Das Rheingold* is thus grounded in the deep epistemic normativity of our rationality.
The central point is that what we believe or know is, in a huge sense, derivable from our interaction with others, and in this sense, we can ascribe belief or knowledge to different social groups. Thus, the key debate is how we can develop or construct epistemic group attitudes. As shown in the previous sections, from this analysis we can set property methods and protocols to achieve the social sciences epistemic goals.

This novel account has shown the relevance of ranking theory as a useful theory of rationality and make clear how it can be applied for the social world. The dissertation then throws light to certain foundational and methodology aspects of social science and the importance to philosophers and empirical social scientists. The idealized model of rationality developed by ranking theory is then applied to some important aspects of the social world as a tool-box for social sciences. The models and the methodological tool-box is a normative hypothetical imperative, a means-end theory to apply formal philosophical, specifically, a formal epistemic machinery to be applied to the social scientific realm.

This is, as the last chapter exposes, an extended research project; the present work is the riverbed for an ulterior research project of interdisciplinary applications as a way to test the epistemic conditions model here developed. This theoretical model of epistemic conditions or normativity for the interactive or collective knowledge allows us to enable or disable collective formation of entities and prevent or suggest collective action.

All these is possible given a special social ontology patent in the last chapter. Social facts are grounded in human minds and perhaps in other kind of epistemic doxastic subjects. This invisible ontology requires a special kind of entities. Such entities are thus mind dependent, but, at the same time, needs to be objective. Only this objective character guarantees the possibility of
establish knowledge and science in this ontological realm. Therefore, social facts have to be
independent of particular states of mind, in the sense of particular representations. In this way,
candidates to fulfill this ontological commitment are propositions. Social facts are then social
propositions. Social propositions are certain kind of counterfactual reasoning; are epistemic
dispositions and their content are beliefs; social propositions are knowledge if such
counterfactual assents to a truth function. Maintain true sets of beliefs is an important epistemic
agenda leading by the commitment of getting to the truth and avoiding an error. However, this
special truth functions reveals that the reliability of social propositions is, the most of the times,
graded.

Ranking functions measure the reliability or degree of belief in a certain social proposition.
We can measure and test the strength of social building blocks of the social reality given this
formal mechanism On the ground that social propositions are the building blocks of social
reality, such blocks require a good epistemic justification as warrants of the whole structure. A
justified building block is what ranking theory calls a reason; social world is built thanks to
reasons.

One important feature of reasons is that reasons are relative to doxastic subjects and, again, is
important to highlight that is not necessary that different doxastic subjects always agree on their
reasons. Here arises an important claim of the proposal: in the realm of social world doxastic
subjects are not just individuals but collective doxastic subjects.

Here arises perhaps the main achievement of the dissertation $A$ is a collective doxastic reason
iff such a reason is the arithmetic mean or average of the two sided valued ranking functions
measures of belief firmness and relevance of each member of the collectivity, formally:
Given \( \{ \tau_1, \tau_2, \ldots, \tau_n \} \)

\[
\mu(A) = \frac{1}{n} \sum_{i=1}^{n} \tau_i = \frac{\tau_1 + \tau_2 + \cdots + \tau_n}{n}
\]

The result is then a Supererogatory, Sufficient, Necessary or Insufficient reason with respect to such warrant or social proposition.

A social epistemic agent is an intensional concept defined as the result of the previous equation in a given certain time. The set of social beliefs as the result of this process constitutes a social epistemic agent as the set of collective doxastic reasons for a group of individuals at a certain time.

Given this model and the ranking theory normativity, the dynamics of social beliefs or the weight of reasons for social epistemic agents are driven by conditional inference guided by evidence. The wide and extended recognition of evidence leads to a revision or change of the set of social beliefs.

An important entailment of this claim is that epistemic dynamic with respect to social groups is slower than the dynamics applied to individuals. And in this sense, are slower in direct relationship with respect to the number of members of the social groups. Nevertheless, the force and commitment are stronger as a social belief, in larger groups, than in small ones.

We cannot change the sets of beliefs in social world, and in that sense social world itself, without this dynamic of reasons. However, freedom is a sort of epistemic fuse for individuals with respect to the realm of the individual herself and with respect to social groups. Individuals do not need to engage always in social behavior and, off course, in social epistemic states.
For the realm of the social world, normal conditions are epistemic conditions in the following sense: social epistemic agent’s belief in certain \textit{a priori} defeasible relations of phenomena given certain fixed background or a power set of social propositions. Ceteris Paribus clauses are necessary and sufficient reasons that work as reasoning conditions or hypothesis conditions to reasoning.

Causation, therefore, remains at the hearth of social sciences. Causes of things allows us to describe and understand the world, to construct a better social world, and to change our life conditions given our inductive inferences or possible world predictions.

In summary, social propositions can be interpreted as causes given the ranking theory approach. But this is a horizon to achieve; to gain knowledge in social sciences is a very hard goal and causation model can have an important use and perhaps more fertile than in the natural sciences. The conclusion is then start to test these models in everyday social scientific practice.

Thus, collective consciousness is derived from representations of particular perceptions of subjects and in this sense is a high-order form of thought. Collective consciousness supervenience particular epistemic states. Given ranking theory measure system, a content of consciousness can be modeled and measured as: $\tau_m(C) = \pm \infty$. That is to say that such content of consciousness is a maximal measure and rock-bottom of certainty given this model of epistemic normativity. A request of justification or a request for warrants or reasons for C are thus senseless; my own present beliefs are an epistemic blind spot for myself. The entailment of our hypothesis is then, that collective contents of consciousness are blind –spots either for a first-person point of view. Another entailment is that this blind-spot applies either for possible actions or counterfactuals.
Collective consciousness depends on the continuous doxastic state of reflection; internal normativity ruled by epistemology models as ranking theory account is a necessary task for a set of good epistemic community deliberation. Internal deliberation is a strong entailment of ranking theory normativity account. Spohn’s method of normative deliberation is a special methodology tool to study norms in a diachronic perspective appealing to use participant’s observation to study norms. In this case, the present model, the first step is to formulate an ideal theory on rationality and knowledge on social world, to the ulterior goal of formulate it with respect to the manifestation in language and in actions.

Finally, as a new research horizon, ranking theory and the present account of a tool-box of models to social agents can lead to the possibility of think in AI social agents in a formal, but not monotonic or logicist approach. The first step is then to model social rationality or epistemic conditions, and thus, start to model social action for AI agents. This account is near to the multiagent system AI proposal (Ferber, 1999). AI main conditions are related in this reading to a constructive vision of AI. The conditions are the partial possibility of perceive the environment, the possibility of communicate and achieve goals in a background of multiagent relations between all the entities capable of fulfill such conditions and performing actions collectively. Multiagent systems want to achieve accurate problem solving skills, multiagent simulations for social science, construction of synthetic worlds and collective robots. The challenge is then to set epistemic conditions for artificial social agents and modelling actionable social knowledge.

Retaking the literary language, the present work can be understood as an airbag against the social juggernaut. It suggests a new way of methodological research in the social sciences and a new way to understand the deep ontology of society and human relations. Nevertheless, it is in
spirit, an elucidatory work. Perhaps, it prevents us to understand what is the right time to do not suffer company at all.
References


Ferber, J. (1999), Multi-Agent System: An Introduction to Distributed Artificial Intelligence, Harlow: Addison Wesley Longman.


