TOWARDS A SOCIOLOGY OF CURIOSITY

Theoretical and Empirical Consideration of the Epistemic Drive Notion

by

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ABSTRACT

Curiosity has long been a taken for granted concept in the popular imagination and a marginalized topic in academic discourse, especially in the field of sociology. However, studies in history and philosophy bring key reasons for developing an explicitly sociological treatment of the concept. This thesis provides an argument for the social production of curiosity. On the strength of its motivating characteristic, the essay reformulates curiosity as an epistemic drive in society which organizes the social production of knowledge under given socio-historical and local-cultural circumstances. In the first part of the thesis, historical, philosophical, and sociological literature is reviewed to address common preconceptions of curiosity and give a context for the argument. Then a theoretical apparatus is developed considering the emergence, development, and impact of epistemic drives which serves as a foundation for a new perspective on what motivates the social production of knowledge. The second part of the thesis focuses on the empirical applicability of the epistemic drive notion of curiosity. As a case study, the problem of economic incentives in scientific research is considered. After presenting data on global climate change investments and U.S. federal research funding, the proposition is formed that economic incentives put research projects with short-term profitability at a significant advantage in acquiring funding compared to projects with little to none immediate economic return. A tendency which systematically mobilizes production-oriented epistemic drives and immobilizes risk-oriented ones. The idea of pure curiosity driven research is addressed by reporting on a recent science-industry conference at an Austrian basic research institution. It is concluded that even basic research is influenced by economic incentives that produce production-oriented epistemic drives. Through theoretical and empirical developments, the thesis suggests the usefulness of the epistemic drive notion in understanding the motivation and organization of knowledge production in society.

Key Words

Curiosity, epistemic drive, scientific research, knowledge production, sociology of knowledge

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For Baba Vili

INTRODUCTION

When we hear the word ‘curiosity’ most of us associate a mental picture with it. Maybe it is a picture of a young child discovering the world, or a nosy neighbor peeking over the fence, perhaps an enthusiastic scientist staring into her telescope directed at the evening sky. What is common to all these pictures is the description of an action. Curiosity moves the child to touch the flame and it is curiosity what keeps awake the astronomer in the dead of night. Then we associate curiosity with a strong urge to know something, often despite the fact if that knowledge is good or bad for us. After all, curiosity killed the cat and it was also curiosity which caused the fall of Adam and Eve. Regardless of being good or bad, we also like to imagine curiosity happening to a person. More precisely, we imagine it happening inside a person. It is in the nature of the child to explore the environment, it is the habit of the neighbor to be snooping around, and it is the spirit of the scientist which makes her appreciate the constellation of celestial bodies. These are all ideas we attach to the word ‘curiosity’ without paying much attention. In general, curiosity is a taken for granted expression which is often used as a blanket term. As common sense as these ideas on curiosity are, their origin is deeply rooted in history where the notion took many different shapes and forms.

From the ancient philosophers up to the modern scientists the concept has transformed its meaning. For the most part however, curiosity was something shunned as it was identified with prying into matters which one had no business with. It was this negative attitude which has characterized the perception of curiosity in Christian Europe until the birth of scientific thinking has molded it into something desirable and necessary for reaching a greater understanding of the external world. Nonetheless, mixed ideas remain around curiosity. In the academic world curiosity has preoccupied philosophers who were contemplating the nature of human beings and the knowledge they possess. Although the topic only recently became popular in contemporary philosophy. Cognitive psychology is the other discipline which has treated curiosity extensively, particularly, as an emotion and a neurological phenomenon. Common to most approaches of studying curiosity has been a strong sense of individuality which was most interested in how curiosity occurs within the person. However, contrary to our deep-seated habit, what if we started thinking about curiosity not as something internal but something social?

This thesis pursues the idea that curiosity is primarily a social phenomenon. Due to the stringent individualism this idea strikes as unintuitive, however I propose that we have good reasons to think about curiosity as a sociological object. The main question I am going to address is what a sociology of curiosity would be about and how would it look like? Throughout, this essay, I provide an account of curiosity as the motivating and organizing force behind processes of knowledge production in society; meaning the systematic formation of interpretations arising from social conduct. Although sociologists have analyzed the circumstances and impact of knowledge production before, curiosity have not yet received a thoroughly sociological treatment. Through the course of this thesis, I establish curiosity as a distinctly sociological object by reformulating it as an *epistemic drive*. I argue that curiosity is an epistemic drive organizing knowledge production that emerges and develops under socio-historical and local-cultural conditions, and shapes the social, natural environment. Furthermore, with the epistemic drive approach, I wish to provide a model of curiosity which can be extended to social groups and institutions. Thus, instead of being solely a personal experience, curiosities live a vigorous social

life in the form of epistemic drives as they arrange and establish knowledge-projects in the social world.

To accomplish this, I develop the argument in two major parts. In the first part, I consider the theoretical possibility of a sociological concept of curiosity, while in the second part, I attempt to show its practical utility. Part I begins laying the theoretical grounding by addressing three major preconceptions of curiosity held in the popular imagination while also giving historical, philosophical, and sociological context for the discussion. The 'History of Curiosity' addresses the *normativity* of curiosity by showing how the concept was used with either deeply negative or positive connotations throughout different stages in history. The section on the 'Philosophy of Curiosity' dispels the preconception of *uniformity* with the help of contemporary philosophical literature which provides a detailed taxonomy of the different kinds of curiosities. The last preconception of *individuality* is addressed by reviewing how the sociology of knowledge opened up knowledge production as a fundamentally social phenomenon, although it did not address curiosity directly. Having done the groundwork, I attempt to fill this gap in the section of 'The Epistemic Drive Notion' which describes curiosity as an epistemic drive organizing the social production of knowledge as determined by historical and cultural conditions. I break up the description of the idea into the stages of emergence, development, and impact. Each of these segments elaborate on different angles of epistemic drives by describing them as social objects.

In Part II, I am focusing on showing that the epistemic drive notion of curiosity is a useful tool to interpret sociological problems. For this reason, I present the issue of the effect of economic incentives on scientific research. The essence of the problem is that scientific projects promising more immediate economic benefit receive substantially more funding than those with less or no short-term profitability. To trace the problem, I use the categories of 'production research' and 'risk research;' the former aiming to improve economic production while the latter aims to provide risk assessment and harm prevention from technological interventions. With these categories in mind, I present details on global investments addressing climate change, as well as statistics on the U.S. federal funding of research and development. These records demonstrate that there is a reluctance to invest in projects of risk research, a pattern which is alarming considering the progressing climate crisis. In light of their effect, I propose that economic incentives rather produce epistemic drives manifesting in production research than risk research. Additionally, I describe and contrast the epistemic drive motivating production and risk research to show in greater detail how curiosity for productive ends gains its prevalence in the current economic incentive structure. The last section of the thesis deals with the idea of a purely curiosity driven research, or basic research, which is theoretically free of external interest. By presenting a first-hand field report on a science-industry conference at a basic research institution, I indicate that even curiosity driven research manifests in epistemic drives with a production orientation. I conclude, that economic incentives – through the dependence of scientific research on financial sponsorship – produce production-oriented epistemic drives which motivate and organize mainstream scientific practice; a tendency which systematically immobilizes the realization of risk curious research projects, therefore leaving both decision makers and the public with a restricted understanding of the risks that technologies pose to nature and society.

Overall, I make a case for the social production of curiosity to deepen our understanding on what motivates and organizes knowledge production in society. While I tried to make my argument as comprehensive as possible, it is far from being a complete interpretation. I merely prepared the groundwork and outlined how a sociological interpretation of curiosity would look

like, and also provided an empirical case to test my ideas. Naturally, there will be some unanswered questions which could not fit this work. I will indicate these directions for future elaboration. If my account is convincing that it is *possible* and *worth* thinking about curiosity as a sociological object, I consider my attempt successful. With that, let us begin the journey towards the sociology of curiosity.

PART I – TOWARDS A SOCIOLOGY OF CURIOSITY

History of Curiosity

The first preconception we must address is the *normativity* of curiosity which assumes that curiosity is either a good or bad notion. Since the word 'curiosity' has so many different implied meanings, depending on who uses it and in what context, I see it fit to provide a short history of curiosity. Following the work of historian Philip Ball, the history of curiosity reveals a diverse past. Ball argues that curiosity has never meant just a single thing, but the meaning the word took mirrored the historical times in which it stood (2014). In general, we can distinguish two radically opposite interpretations of curiosity. The first one is negative which sees curiosity as a vice, the second is a positive one which sees curiosity as a virtue. Besides being interesting historical trivia, charting these connotations of curiosity throughout history can prevent us from accidentally slipping into one or the other inherited interpretations. This is especially important because the strong normative meanings may involuntarily sneak in the form of preconceptions in our discussion and neither of these views suffice for non-normative sociological interpretation. Therefore, to start a tabula rasa of curiosity we should start at the beginning.

In 350 B.C., Aristotle famously wrote "All men by nature desire to know" (1984). At least ever since the Greek philosopher, the origin, nature, and qualities of curiosity has occupied a principal position in the minds of thinkers such as Plutarch, Aquinas and Saint Augustine. Later on, the idea of curiosity has been cemented in the modern scientific imagination as the mysterious origin of knowledge. It is a puzzling sensation hard to explain even for Albert Einstein who wrote, "Curiosity has its own reason for existence. One cannot help but be in awe when he contemplates the mysteries of eternity, of life, of the marvelous structure of reality" (Miller 1955). Curiosity is generally conceptualized as a desire for experience, knowledge or understanding. Nonetheless, in the popular view, it is a kind of sensation – sometimes likened to hunger – which *naturally* emerges within humans and it is only possible to extinguish through an inquiry of some sort. Inquiry, of course, results in acquiring knowledge; a process assumed to be so central to humans as a species that it is even reflected in the Latin designation *homo sapiens* or wise man. The centrality of curiosity in distinguishing humans as species was also briefly noticed by Thomas Hobbes, "Desire, to know why, and how, CURIOSITY; such as is in no living creature but Man; so that Man is distinguished, not only by his Reason; but also by this singular Passion from other Animals; … [curiosity] which is a Lust of the mind, that by a perseverance of delight in the continuall and indefatigable generation of Knowledge, exceedeth the short vehemence of and carnall Pleasure" ([1651]1985).

If the capability to create knowledge is what makes us human, then curiosity – this carnal desire to know – must be a characteristic equally central to our identity. However, this perspective of curiosity is quite recent considering the records of history. In fact, for the greater part of recorded history, at least until the 17th century, curiosity was not a trait held in high regard (Daston and Park 1998). Often *curiositas* (from the Latin *cura* to care) was understood as something close to prying into matters one had no business with. Contrary what his oft-cited quote suggests, Aristotle thought that curiosity (*periergia*) has a negligible role to play in philosophy, as he understood it as an erratic nosiness, rather, he thought it was the sense of wonder (*thauma*) which inspired one to seek knowledge consistently. The influential Christian philosopher, Saint Augustine saw curiosity as a

"malady" (*morbo*) which drove the folly off the path of faith and into the ungodly matters of magical arts (Saint Augustine [ca. 400]1982:55). This allure of heresy remained largely popular until the Renaissance when an unprecedented interest started to build up around the idea of curiosity. Historian Neil Kenny by surveying academic publication patterns in 16th century Europe, identified a sudden increase after the 1650s after which curiosity has remained a common topic of dissertations on the European continent (2004). The medieval academic world dominated by the scholasticism of Christianized Aristotelian deductive logic, started to be challenged by a new, primarily non-academic perspective which appreciated the minute details of the natural world through observation and later experiments. Curiosity started to change its meaning from nosiness into things which God did not want people to see, into an anticipation of understanding the work of God in its vast physical totality. As the 18th century philosopher Robert Boyle said, "'whatever God himself has been pleased to think worthy of his making, its fellow-creature man should not think unworthy of his knowing" (1772:13).

Discovering the wonders and workings of the natural world brought practical benefits, as well as occasions of entertainment. The rulers of the 17th century kept natural philosophers, sages, and courtiers to provide ideas for military advantage, but also to show spectacles in the form of machines, beasts and other peculiar findings what Ball calls the "theater of curiosity" (2014:49). The word 'curious' came to mean not just a state of being, but it also designated objects which were worthy of attention, careful examination, and even collection. Renaissance princes collected the most diverse and fascinating objects from nature in a *Wunderkammer* with the primary intention to impress their guests. These cabinets of curiosities were the predecessors of today's museums. The wealthy gentlemen of Britain started not just collecting the natural objects, but they began to systematically categorize them to display their learnedness to their contemporaries. Soon these privileged social circles formed the Royal Society of London under the aegis of Francis Bacon's utopian vision of *The New Atlantis* (1624) which championed an enlightened society of peace, prosperity, and faith brought by knowledge of nature. Curiosity was sidelined in the Baconian ethos of science which strived for the systemic observation and analysis of natural occurrences (natural histories) to deduce fixed laws revealing the underlying mechanisms of the world. Bacon's science was a cold "knowledge machine" devoid of the unique sense of wonder, only interested in the methodical interpretation of the physical world into one final synthesis (Ball 2014:103).

Today curiosity keeps playing an important role in scientific inquiry which has most importantly brought technological advancement on an unprecedented scale. This immediate impact of technology on our life makes curiosity the lifeblood of the concept of 'progress;' an idea of the indefinite betterment of the human condition. This idea resonates in the words of Robert Aymer, the past director general of the European center for particle physics in Geneva, when he said, "The Large Hadron Collider is a discovery machine. Its research program has the potential to change our view of the universe profoundly, continuing a tradition of human curiosity that's as old as mankind itself" (Collins 2008). Philip Ball takes this decidedly recent narrative of curiosity – 'the motor of uninterrupted progress' – as one interpretation among many throughout the course of time. Instead Ball appeals for a perspective of curiosity as a notion with different "meanings and values attached" according to a "particular and contingent history" (2014:398).

Curiosity came to embody very different interpretations throughout history which served different purposes; may that be inciting greater faith in God or technological progress. Although I detach value terms in the sociological analysis, they play an important role in showing how

different historical circumstances give rise to different normative understandings of the same phenomenon, or at least, what seems to be the same. What connects these historical accounts is the fact that they all regard curiosity as one thing.

Philosophy of Curiosity

The second preconception we must address is the *uniformity* of curiosity. After disarming the normative preconceptions, the next issue at hand is showing how curiosity can have radically different forms and often when we use the notion, we are implying a specific type of it. Here we must turn to philosophy to appreciate the analytical dissection of the many diverse types of curiosities and see what is common to them all. The first thing which surprises anyone interested in the present philosophy of curiosity is its relative novelty. As the previous section outlined there were many philosophers who used some idea of curiosity to a lesser or greater extent, however the first thoroughly analytical treatment of the topic was completed by Ilhan Inan in his *The Philosophy of Curiosity* (2012). This lack of theoretical literature is mentioned by several scholars in the field and it created an opportunity for original contributions. Therefore, much of the literature introduced here is following this rediscovery of curiosity in philosophy. Among the fruits of the new philosophical investigations is the importance of the motivating characteristic of curiosity and its many diverse manifestations.

There are several definitions to curiosity with notable differences between them, however curiosity is traditionally understood as "the desire for knowledge or understanding" (Miščević 2018). Generally, the nature of curiosity as a desire has been supported by most thinkers and also cognitive psychologists. The sensuous nature of curiosity has deep roots in the history of philosophy which the brief historical survey showed. More interesting are the recent psychological explorations of curiosity conceptualizing it as an emotion (Silvia 2006). Emotions, as the name suggests, are drives which make an individual inclined towards an action. This becomes the heart of the matter, as curiosity is the spring of motivation for epistemic action. According to Miščević, curiosity not only manifests the desire for knowledge, but it also drives the organization of *all* other cognitive faculties to reach a truth. He calls this the motivating virtue account of curiosity (2018). The motivating aspect will be central in our sociological account because it indicates that curiosity is a location of agency and change.

We can consider another important and debated aspect of curiosity, namely its truth-oriented teleology. The discipline of epistemology is concerned with how we can arrive at a legitimately true proposition; a statement which is either true of false. However, Inan notes, that epistemology had little interest in curiosity so far (2018:28). What is more, Inan's main contribution to this discussion has been the argument that acquiring propositional knowledge (i.e. something is true or false) does not necessarily satisfy someone's curiosity, therefore seeking truth – in the strict epistemological sense – cannot be the sole purpose of curiosity (2018:18). He argues that curiosity can be concerned with objects as well which is a much broader category. Being 'objectually curious' is having the ability "to recognize the object of inquiry when one runs into it" (Inan 2012:32). He brings the example, "If Holmes is curious about who the murderer is in a certain homicide case, there need not be any suspects for him to even formulate and entertain a hypothesis in the form of a proposition, and if not, then there will simply be no proposition about the murderer Holmes wishes to know whether it is true or false" (2018:17). Simply put,

propositional curiosity: Did Mr. Jones commit the murder? While, objectual curiosity: Who committed the murder? Inan's argument highlights that often we do not know exactly what we are curious about, we only have a general idea of where to start looking to satisfy our curiosity. This distinction is important because it shows that one must have some kind of prior knowledge to formulate a curiosity. Inan illustrates this with Meno's paradox which states that the initial point of inquiry cannot be complete ignorance. This theme will become important in identifying the already existing knowledge structures which influence the emergence of curiosity.

Beyond the propositional-objectual contrast of curiosity there are other relevant distinctions which sets different types of curiosities apart. These differences address the preconception of uniformity and reveal the many shapes curiosity can take. In this we can rely of Miščević's account of an initial taxonomy distinguishing curiosities along four main properties: 1) Target, 2) Quality, 3) Value Status, and 4) Bearer (forthcoming). Miščević notes that this is a taxonomy under construction, therefore I will only present the most important aspects of curiosity pertaining to our topic. With that said, the 1) Target of curiosity is concerned with the object of interest or the objective the inquiry wishes to achieve. First of all, the target can have extrinsic (applicability) or intrinsic (pure theory) *goals* or a mix of the two. The *scope* of the investigation can be depth (intensity) or width (range) oriented depending on the aim. Finally, Miščević distinguishes between the *linkage* of curiosity meaning whether it is connected (systematic inquiry), perhaps part of a research program, or disconnected (individual occurrence). Then, we may describe the 2) Quality of curiosity which concerns the style, strength, and time variables. The *style* of the curiosity can variate between pessimistic and optimistic ends. Miščević uses the contrast between falsificationism and verificationism in the philosophy of science as an example. He notes that radical optimism can lead to forms of dogmatism, while radical pessimism can lead to excessive skepticism but, of course, most curiosities are located somewhere between the two (Miščević 2018:47). Furthermore, the *strength* of curiosity might be described from mild to intense, and the *time* of curiosity can range from short to long term. The 3) Value Status of curiosity, Miščević points out, considers the *moral* dimensions as far as its target and quality is concerned. For example, Nazi prison experiments have bad status while Jonas Salk's polio vaccine experiments have a good status. Additionally, we can also distinguish the *importance* of the target of curiosity; for example, making a polio vaccine or developing a new flavor for a candy bar. Unfortunately, Miščević does not address how the determination of the value status of a curiosity is contingent on the shared value system of social groups and the difficulty of completely evaluating something as good or bad. The last key attribute is the 4) Bearer of curiosity. It designates the characteristics of the entity who possesses the curiosity. In *general* terms Miščević divides this into individual and social aspects. Furthermore, considering the *social* organization of curiosity one may speak of institutionalized or non-institutionalized curiosities. This is of remarkable importance to the sociological approach, but Miščević offers little direction at this point. Although he realizes the categorical difference an institutional curiosity can make, he does not engage in a deep discussion due to his focus on the individual varieties of curiosity. Therefore, among other things, the task ahead is to give an outline of the social and institutional aspect of curiosity.

TARGET	Goal	Extrinsic/Intrinsic
	Scope	Depth/Width
	Linkage	Disconnected/Connected
QUALITY	Style	Pessimistic/Optimistic
	Strength	Mild/Intense
	Time	Short Term/Long Term
VALUE STATUS	Moral Status	Bad/Good
	Importance	Low/High
BEARER	General	Individual/Social
	Social	Non-Institutional/Institutional

Figure 1.

In general, I find the taxonomic distinctions of curiosity very useful as they help to distinguish between different *kinds* of curiosity and help us avoid the preconception of uniformity which results using the concept as a blanket term. Furthermore, the idea of curiosity as a motivation is vital, since it is only through this aspect can we see the notion as a force which induces change in the social world. This change not only occurs in the social organization of knowledge production, but the consequences of the produced knowledge are equally transformative as they justify social action. This is the reason why I take the motivating characteristic as the foundation of the sociology of curiosity. However, the general short coming of the philosophy of curiosity, at least from a sociological aspect, is the constant treatment of the idea from an individualistic point of view that does not try to explain social or institutional cases. This orientation of individualism has been criticized by philosophers such as Miranda Fricker who lamented the "lack of any theoretical framework" to discuss the "ethical and political aspects of our epistemic conduct" (2007:2).

Curiosity and the Sociology of Knowledge

I consider *individuality* as the last preconception of curiosity that we must shed before formulating a sociological account. Individuality has not only dominated philosophical and psychological analysis, but it also connotes a naturality with curiosity which assumes that curiosity is a biological phenomenon. Sociology is set against these individualist traditions of thinking. Since curiosity motivates knowledge production, the first place where one may look for help is in the sociology of knowledge. The sociological understanding of knowledge poses that ideas develop in relation to social groups and institutions; that epistemic processes and perceptions are determined by socio-cultural factors (e.g. class, race, gender, socio-economic status, nationality, age etc.); and it investigates the degrees, patterns, and manners of social group influence (McCarthy 2007). The central thesis of the sociology of knowledge – the causal relationship of social structure and knowledge – cancels the individualist approach by definition. While the sociology of knowledge establishes knowledge as a socially dependent object, it does carry a mixed legacy with it.

Having its first breakthrough in the 1930s, the Hungarian sociologist, Karl Mannheim developed a *Wissensoziologie* to provide an explanation for the differing truth claims of the competing ideologies of Fascism, Communism, Traditionalism, and Liberalism ([1929] 1936). While Mannheim's theoretical abilities were widely regarded, his social theory focusing on ideology was criticized for its lack of empirical use. The second large wave of sociology of knowledge came in the 1960s during the ideologically turbulent Cold War. Peter Berger and Thomas Luckmann pursued a phenomenological approach to the sociology of knowledge in *The Social Construction of Reality* (1966). Although Berger and Luckmann had an original approach and their work became a classic at the time, the buzz around the sociology of knowledge cooled off. Peter Hamilton, who formulated a short history and criticism of the topic, emphasized the lack of empirical applicability as the key component of the apparent letdown of the sociology of knowledge (1974). I do not share the extent of Hamilton's view because these theoretical formulations did provide a better perception and vocabulary to describe the broader issue at hand, although this did not include the idea of curiosity *per se*.

Arguably, a more fruitful attempt of studying the social aspects of knowledge production came from the sociology of scientific knowledge which started in the 1970s by a group of academics at the University of Edinburgh. This interdisciplinary Science Studies Unit inaugurated the 'strong programme' which adhered to the maxim that no piece of scientific knowledge becomes accepted simply because it is true. Rather scientific knowledge is contingent on socio-historical context, dependent on the negotiation processes of the local context, and it demands constant work to keep knowledge legitimized (Daston 2009:804). This path of inquiry has led to the interdisciplinary field of Science and Technology Studies (STS) analyzing the social structures and institutions behind scientific knowledge production. More importantly, contrary to the earlier theoretically oriented pioneers of sociology of knowledge, STS is focusing on the local as described by the empirical. Through its collection of case studies, STS wishes to bring transparency to the scientific process. The historian of science Lorainne Daston says, "Science was shot through with social interests and political struggles; it was the job of science studies to lay them bare" (2009:806).

Interestingly, the topic of curiosity is absent from science studies literature as well. Even the flagship journal of STS, the *Social Studies of Science*, has not published any articles on curiosity yet. Although, I do not believe this absence mirrors the discipline's awareness of the issue. Any investigation of society which seeks to answer questions relating to how a piece of knowledge came to be must have if not an explicit concept, but an underlying assumption about curiosity. Some research projects in STS deal with the issue of how research topics are selected in science. The pharmaceutical industry has been one of the most prominent examples where several scholars pointed out how research is excessively motivated by market interests which leads to issues such as the under research of tropical diseases or the potential bias of industry-sponsored clinical trials (Dumit 2012, Reiss and Kitcher 2009).

More importantly, alongside the empirical science studies popular in Anglo-Saxon academia, the theory of the sociology of knowledge gained large contributions by the German sociologist Nico Stehr. The foundation of Stehr's sociology was laid in *Knowledge Societies* (1994) which proposed that the existing and transforming knowledge practices provide the backbone of modern society. Placing the notion of knowledge in the center, Stehr analyzed the role of knowledge in different areas from science, politics to economics. What was common to all his investigations is Stehr's understanding of knowledge as "a capacity to act," something which

puts things in motion. He emphasized, knowledge was not simply a "model of reality" but a "model *for* reality" which allows certain social groups to influence and shape the world through the means of knowledge "work" (Adolf and Stehr 2017). In Stehr's sociology the concept of knowledge is not just factual information but a socially produced object encapsulating the possibility of social action. Agency, therefore, is deeply intertwined with how knowledge is produced, disseminated, accessed, and applied. The importance of action is not new, it was also emphasized by Emile Durkheim who wrote, "At the origin of the process of knowledge, the idea to be checked is the idea of something to be done" ([1955] 1983:48). We can notice how this definition of knowledge as *action* intersects with the definition of curiosity as *motivation*. Both trace the common line of placing agency in the center of epistemic actions. But Stehr's sociological theory focuses on knowledge as a social product and does not accentuate the preceding phases. However, *curiosity* precedes *knowledge*, in the same way, *motivation* precedes *action*, therefore the question of how the motivation for acquiring knowledge comes to be is one waiting to be answered.

The Epistemic Drive Notion

Throughout discussions on historical, philosophical, and sociological literature we have finally arrived at the point to formulate a proposition of the sociology of curiosity. So far, I argued that the preconceptions of normativity, uniformity, and individuality of curiosity must be addressed to clear the ground for this attempt. The work we have done to eliminate these preconceptions can also give us guidance in the future elaborations of the notion. Therefore, the sociological idea of curiosity which is proposed here should be neutral in its terms, diverse in its manifestations, and above all, it should be rooted in social causes. Furthermore, I take the view of curiosity as a *motivation* as the starting point of my account. For that reason, I propose the sociological understanding of curiosity as a motivation organizing the processes of knowledge production. To indicate this explicitly social aspect of curiosity, I will refer to it as an *epistemic drive*. Contrary to previous ideas of curiosity, an epistemic drive is not merely individual and emotional, but social and structural. By taking this into account we can see how the motivation to create epistemic products is emerging under the pressure of specific historical and cultural conditions. Then any epistemic drive – or curiosity – is the end result of historically and culturally specific social influences. We can then reframe the social organization of knowledge production with curiosity at the center, identified as an epistemic drive propelling the creation of knowledge products. Using this understanding of curiosity, we can conceptualize not only individuals as being curious but also more abstract social entities, such as communities, organizations, and institutions. In light of this, I offer the sociological definition of curiosity:

An epistemic drive organizing knowledge production that emerges and develops under socio-historical and local-cultural conditions, and shapes the social, natural environment.

The outline of the sociology of curiosity presented here will contain three parts: emergence, development, and impact. These three units represent different angles on curiosity, and they bring different questions to the analysis. The part on emergence investigates the social origins of curiosity in individuals or institutions. The question at the center of this stage is understanding why do individuals or institutions become interested in those *exact* things in that *exact* way they

become interested about? Why do individuals or institutions want to answer question X and not question Y, and how did they come to formulate their question? In other words, where does their curiosity come from? Ultimately, questions of emergence are about identifying certain social triggers or influences of curiosity. The part on development concerns the progressive interaction between curiosity and the social environment. Curiosities, as epistemic drives, have trajectories. They are rarely static entities, instead they change or experience a variation in their target, quality, value status, or bearer over time. What we are interested is what is the role of socio-historical, local-cultural factors in this variation. What are the epistemic drives which get to be realized and end up creating knowledge products? Why did those epistemic drives succeed while others faded or died out? The last part concerning the impact of curiosity deals with the relationship of epistemic drive, knowledge product, and the impact of knowledge on the social, natural environment. This segment brings out the political dimensions of curiosity by asking about the consequences of large-scale knowledge producing practices. Given the real-world consequences of these epistemic practices, who are the winners and who are the losers of dominant curiosities? This provokes the idea if not all curiosities can be equally realized should we change that? If we do, then are we limiting the freedom of science? Since epistemic motivations are extending through historical time and social space the stages of emergence, development, and impact cannot be fully dissected. They may occur and interact at the same time however, we will discuss them separately for greater clarity.

Emergence

All epistemic drives must come into existence at a point in time. The sociological proposition here is that the social environment in which the individual or institution exists has a significant effect on the emergence of the epistemic drive. What kind of elements do we mean under the term social environment? The social environment signifies the collective of sociological characteristics an individual or institutions occupies or possesses, as well as the network of relationships they exist in. I use the term socio-historical to refer broadly to social, political, economic, and environmental conditions at a given historical time, and local-cultural to refer to the network of agents at social locality, the cultural norms which describe their relations, and the resources they have at their disposal (e.g. time, financial capital, technical apparatus etc.). This list of social conditions is not exhaustive however, they signify key categories of analysis. The socio-historical and local-cultural conditions then influence the different attributes of epistemic drives, as in their target, quality, value status, and bearer. For example, a social movement can intensify interest towards racial inequities, or the lack of resources may restrict the epistemic drive only to a short term. In addition, depending on the case, there are different *triggers* of curiosity without which the motivation to conduct an inquiry would have never emerged. Although, triggers can only work alongside *background structures* which are relatively static. For example, the existing bodies of knowledge serve as such a background structure that limit the possibility of questions to ask. Then a trigger of curiosity would be a more immediate environmental stimulus, such as the need to generate shareholder value. As mentioned before, pharmaceutical companies tend to ignore researching tropical diseases because they lack financial incentive. When pharmaceutical companies decide to dedicate resources to developing a drug, they conduct market research to make sure that they make the best use of their investment. In this case market interests and the financial resources of a company both play an important part for a very specific curiosity to emerge. The general proposition suggested here assumes that a similar set of social structures and

conditions will yield similar epistemic drives, perhaps, not to a fully deterministic extent, but at least to a fairly parallel one. This also implicates that there can be a limit to what an individual or an institution can be curious about. If epistemic drives are determined by social structures, then the epistemic drives which are not necessitated by our social environment cannot emerge. Therefore, the lack of pharmaceutical interest in tropical diseases. Additionally, there might be a limit to what one can be curious about at a given historical time in a specific social location, a limit beyond which lies the unthinkable; an area which cannot be targeted as an interest due to the limits of what is reachable epistemically.[1] On the whole, the emergence of epistemic drives are tied to the existing socio-historical and local-cultural conditions; this is what I call the *social production* of epistemic drives (Figure 2).

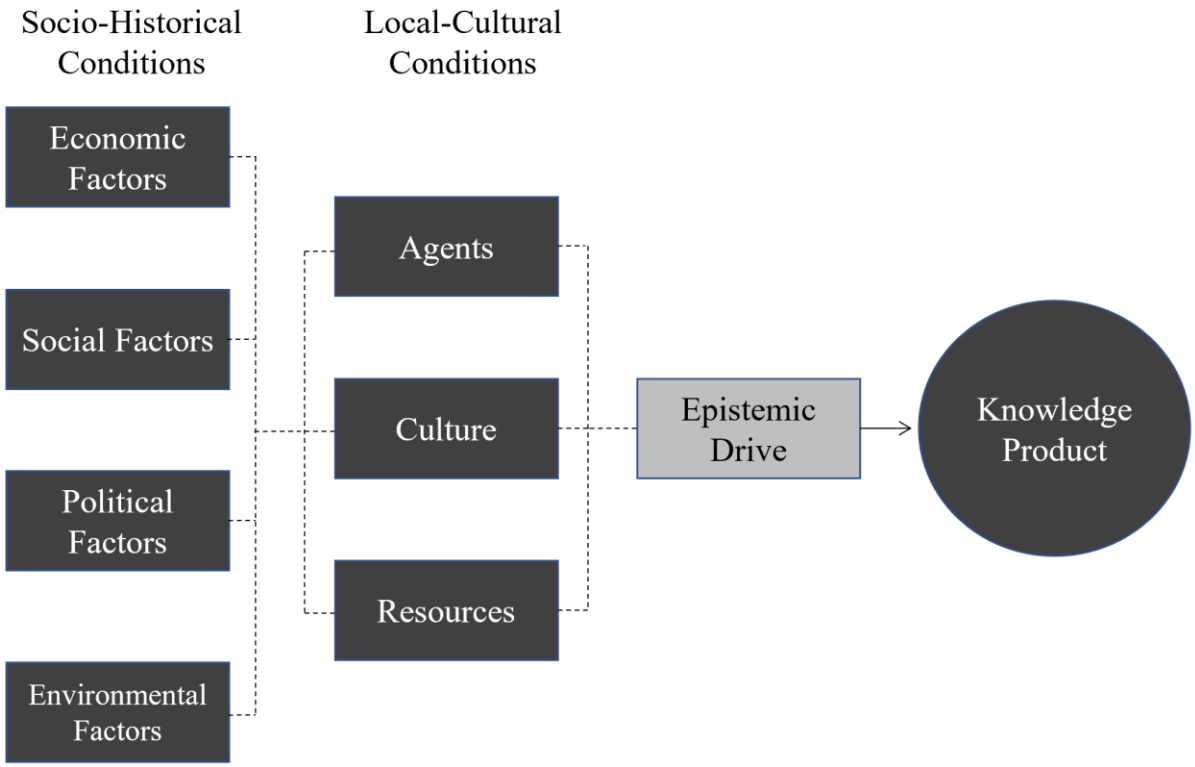

Figure 2.

Development

After emergence we can talk about the development of epistemic drives. We may start out from the assertion that epistemic drives are developing in a relation to the surrounding social environment. I propose understanding epistemic drives in society with trajectories extending and developing through social space and historical time through which their attributes can modify. That is after a specific epistemic drive emerged it has a continuous interaction with its immediate social context. According to this milieu the attributes of the epistemic drive may alter in different directions. In other words, we can say that no epistemic drive in society can occur in isolation from

[1] The similar notion of *episteme* is developed by Michel Foucault in *The Archeology of Knowledge* (1969)

the social environment. The sociological question is then to explore the circumstances of specific cases of epistemic drives and uncover their trajectories of their development with explanations for changes. The assumption of such an analysis is that these trajectories rarely develop in a linear fashion without changing some element of their attributes. Instead of the pure rational model of knowledge production, as described by epistemology, the sociological investigation of epistemic drives is looking for points of friction, obstruction, or discontinuity as markers of relevant social influence.

Given the proposition of nonlinear development, what kind of changes can we distinguish when examining the trajectories of epistemic drives? The main categories of trajectory development are *mobilization* and *immobilization*. If we accept that epistemic drives are an effort to form projects with the aim of knowledge creation, then we may say mobilization moves epistemic drives towards the *realization* into knowledge form. On the other hand, immobilization is a development towards the *termination* of the epistemic drive (Figure 3). The reason why it is worth thinking in these terms is because there are indications that some curiosities are preferred over others, meaning that not all epistemic drives can get realized with an equal chance. The specific context of social structures and the power relations running through them enable some type of epistemic drives while disabling others. These relatively consistent patterns of epistemic drive mobilization and immobilization can be envisaged with the analogy of cultivating a garden. Immobilization occurs to those epistemic drives which do not fit some condition of their social environment; these end up being ignored, neglected or even weeded out, depending on the manner of immobilization. In general, these epistemic drives do not have the chance to flourish into knowledge form. A direct and intensive immobilization, or *suppression*, of epistemic drives can be found in politics when a government forbids researching certain topics. This induces a chilling effect resulting in the retrenchment of academic interest in the matter. Alternatively, the direct and intensive mobilization of an epistemic drive, or *stimulation*, occurs when an excessive amount of resources are made available for researching a given matter. Therefore, the social environment can influence the rate at which epistemic drives get realized and create knowledge products. However, this is not necessarily the end of the social life of a curiosity. When an epistemic drive achieves realization, it can either cease or trigger and transform into a new epistemic drive. For instance, both the stimulation and suppression of epistemic drives can lead to the *multiplication* of them. A stimulation multiplies epistemic drives due to the availability of resources, while suppression can multiply curiosities as a reactionary act. However, stimulation results in a greater quantity of epistemic drives, suppression can alter trajectories towards more intensive curiosities as reaction to the hostility of the environment. Together mobilization and immobilization illustrate how epistemic drives develop trajectories in an interaction with the socio-historical and local-cultural social environment.

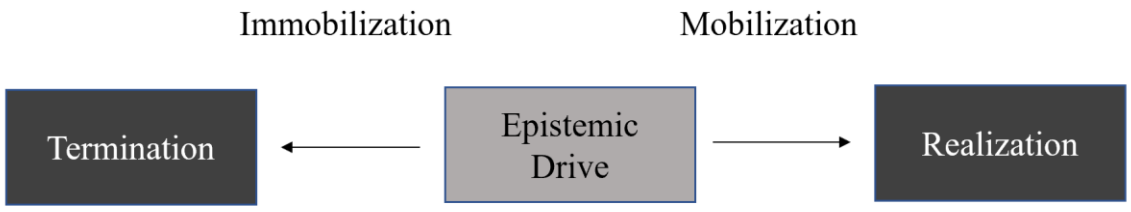

Figure 3.

Impact

We have outlined so far how epistemic drives emerge and how they develop in an interaction with their social environment. The last perspective of curiosity in need of analysis is its eventual impact on the social world. As we have assumed in the beginning of this discourse curiosity is a drive which motivates knowledge production. What we have to consider is what are the consequences that the produced knowledge creates in the environment in which it is applied? Specifically, how can we describe the relationship between the epistemic drive and social impact of knowledge? This question is important because knowledge has a highly valuable status in modern societies. The different processes of knowledge production and dissemination are often described as knowledge economies where knowledge becomes a commodity (Sismondo 2018, Adolf and Stehr 2017). Of course, knowledge as such is intangible, however the value inherent in epistemic products is their interpretive ability which provides a model to the world around us. Those who possess knowledge have the ability to make decisions with a greater degree of certainty and predictability. In short, knowledge allows agents to organize their actions in a meaningful way which serves their interest. Among other things this is why a definition of knowledge is 'the capacity to act' (Stehr 1994). Furthermore, knowledge production allows agents to diminish or raise the importance of existing concepts, make connections between them, and even create new meanings. The production and rearrangement of bodies of knowledge becomes a tool which can pick at and shape understanding and perception. Through these processes dominant interpretations of the world emerge which become paradigms; a generally accepted frame of reference. In some ways this happens at the expense of other possible interpretations of the world which would produce different social actions depending on their content. In this light, the impact of epistemic drives becomes quite relevant. Curiosity demarcates the target of interpretation, it serves as a locus of agency by organizing epistemic projects, it creates knowledge products and, ultimately, social action is taken based on this knowledge which benefits some and disadvantages others. We can chart a cycle of how epistemic drives emerge from their social environment and by motivating knowledge production they also end up shaping it (Figure 4).

The issue is that there are epistemic drives which attain greater mobilization through existing structural conditions in society, such as the circumstances of given political and economic systems. These epistemic drives are not just directly stimulated but they are generally valued higher by the norms of a society. Given that epistemic drives produce knowledge products, the most knowledge and understanding produced will be through the prevalent epistemic drives. Those epistemic drives which are deemed less important cannot have access to adequate resources for realization and cannot have an influence on the prevailing understanding of a subject matter. Consequently, these unpopular epistemic drives also have less sway in determining the direction of social action. Asking who are the winners and losers of prevalent epistemic drives is crucial because the entrenched patterns of mobilization and immobilization of epistemic drives play a role in reproducing social inequalities. To recite a previous example, those who suffer from tropical diseases are disadvantaged by the prevalent curiosity in researching diseases common in Europe and North America. This demonstrates that the emergence and development of epistemic drives have real-world consequences which are not isolated from the existing relations of power. If knowledge is power, then the drive to produce knowledge is the source of power. Coming full circle, the impact of epistemic drives shapes the very conditions of the social environment from which it emerged in the first hand. With that I provided an initial outline for understanding what

epistemic drives are, and how they operate in society. So far, we have only theoretically reflected on the epistemic drive notion and have not put these ideas to test with an empirical problem. I already hinted at how economic and market interests effect epistemic drives. Therefore, in the second part of the thesis, I will describe the problem of the influence of economic incentives on scientific research to test the epistemic drive notion.

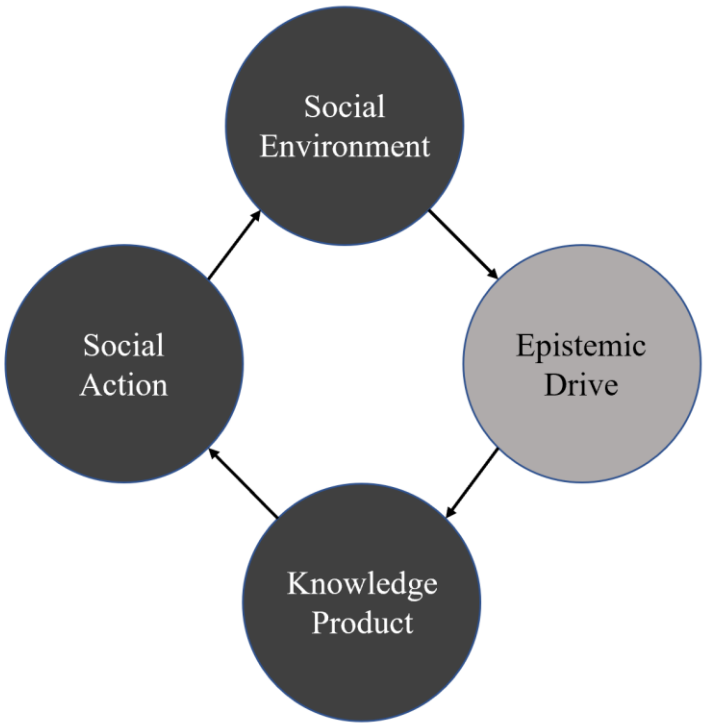

Figure 4.

PART II – ECONOMIC INCENTIVES AND SCIENTIFIC RESEARCH

Funding Science

We have a theoretical outline of curiosity as a sociological object but how can these ideas be applied in actual academic practice? After having established the theoretical possibility of a sociology of curiosity, we should consider if such a framework is meaningful enough for interpreting empirical cases. Therefore, I attempt to show how the sociology of curiosity can be a useful tool for approaching knowledge production in society. To do this, I bring the empirical problem of the role of economic incentives in scientific research.

The problem is the following: It is acknowledged that scientific research is a capital-intensive process which demands sponsorship but not all projects receive funding equally. Some research projects receive more funding than others which creates a hierarchy. Towards the top of this hierarchy are scientific projects which yield more immediate economic return. These are usually concerned with discovering or bettering processes of production by technological implementations; I call this production research. On the opposite, projects with less immediate or fewer economic returns are mitigated, even if they have valuable humanitarian or intellectual contribution. Among these are research projects assessing the risks of technological interventions and their social-environmental impact (e.g. unintended consequences), some examples are environmental science, technology assessment or conservation biology; I call them collectively projects of risk research. While I understand that many research projects show both or more characteristics, this generalization is utilized to illustrate how social conditions – in this case economic ones – produce a specific type of epistemic drive.

Since they have different aims, production and risk research have significant differences in the way they conduct science. Production research is pragmatic and optimistic, while risk research is speculative and pessimistic. Both inquiries are operating on scientific grounds given the knowledge and apparatus they employ, yet they are curious about different things; production or prevention respectively. Hence, according to Miščević's taxonomy, production and risk research constitute different *kinds* of epistemic drives. Since economic incentives play a crucial role in determining which projects are funded, we can infer that economic incentives also determine what institutions get curious about. Therefore, economic incentives stimulate a specific kind of curiosity. How can we show this? The assessment of research funding is an exceptional tool in gaining an understanding of what kinds of scientific projects are enjoying greater access to resources. This analysis works with the assumption that the distribution of research funding – the ratio of allocated resources – is reflecting the importance of epistemic drives for the funding institutions. Here we see that production research prevails in the spending charts however, this has significant negative consequences.

The neglect of risk research along with the advancement of production research creates an environment where risk discovery and assessment are valued and pursued less. But ignoring the existence of accumulating and interacting risk factors leads to technology induced harms, sometimes drastic and irreversible (e.g. climate change). To reduce these harms, risk research must

receive more funding, yet immediate economic returns are deemed more important. Ultimately, I propose that the economic incentives behind funding science largely determine the emerging epistemic drives in actual scientific practice.

In the first section, we will look at how climate change expenditures are generally more inclined to flow into production efforts than preventative ones. A pattern which is also reflected in the federal research funding charts of the U.S. government. The need for immediate economic return diffuses into these spending habits that leaves risk research relatively neglected. This pattern also indicates the greater mobilization of production-oriented epistemic drives and the immobilization of risk-oriented ones. Using the notion of epistemic drives, I will address the different attributes of curiosities motivating production and risk research and stress that economic incentives rather support the former. This provokes the question if we can eliminate economic interests in research altogether to solve the issue?

In the second section, I treat the popular notion of pure curiosity driven research, allegedly free from the influence of economic incentives. I point out how the problem of economic incentives on research is widely conceptualized by scientists as the dominance of *applied* research over curiosity driven *basic* research. They lament how political and market interest dictate applied research and appeal that pure curiosity research is the key for large technological and societal change. I suggest that the idea of pure curiosity is misleading. I will present a report on a science-industry conference at a leading basic research institution which indicates that production research still enjoys predominance even in the isolated, purely curiosity driven scientific environment. Basic research claims to be pure but it is still cultivating a specific, production-oriented epistemic drive. The reasons for this, I argue, are rooted in the structural dependence of scientific research on financial sponsorship, and the general demand for knowledge to directly serve economic production. In the end, I conclude that economic incentives largely shape the emerging epistemic drives in scientific practice, therefore they are an important influence in the social production of curiosity.

Reluctance to Invest in Risk

Previously, I assumed the existence of a hierarchy of research funding where the values of production and immediate economic return are higher than prevention and long-term investments. This is not surprising since the flow of financial capital towards short-term return investments has been one the major trends of the increasing financialization of the global economy. Nonetheless, this phenomenon has been also observed in the flow of global investments to address climate change. According to environmental journalist Sophie Yeo, “climate cash” is disproportionately flowing into projects concerned with energy production – such as solar power plants and hydro power stations – that are inadequate to limit temperature rise (2019). Yeo notes how these enterprises are often related to private investors in wealthier countries which drains the cross-border flow of funds. At the same time, the Intergovernmental Panel on Climate Change cautions that “spending on adaptation efforts is particularly low” (Yeo 2019). Generally, plans which would limit the impact of climate change receive some twenty times less funding. Yeo indicates how these projects prioritize adaption effort such as building coastal defense systems, reforestation, and cutting carbon emissions which are not attractive investments for the private sector. Furthermore,

Yeo states, U.S. fossil-fuel ventures received around $400 billion in subsidies in 2018, more than double what renewable resources got. Seeing these global investment trends, we might expect a similar pattern in funding scientific research.

Taking a look at the distribution of the U.S. federal funds for research and development (R&D) confirms expectations (NSF 2018). Consulting the official 2018 surveys, we can notice that the field of Engineering received almost three times as much funding for research than the field of Environmental Sciences. The difference is staggering between the National Aeronautics and Space Administration (NASA) that received around $2 billion for R&D, and the Environmental Protection Agency (EPA) which only received $700 thousand. Yet, these numbers are overshadowed by the Department of Defense which received an incredible $53 billion for research in 2018 making it the most funded agency. Other risk-oriented U.S. agencies are also underfunded compared to the overall resources their department got. For example, the nuclear waste cleaning Environmental Management received $38 million in the Department of Energy (received total $13 billion), and the Agency for Toxic Substances and Disease Registry received $2.8 million in the Department of Health and Human Services (total $40 billion). The most funded risk-oriented agency was the U.S. Geological Service ($593 million) which spends more than 60% of its budget on issues like "adaptation, resource allocation, and planning to address drought, flooding, wildfires and related risks affiliated with change in land use" (USGS 2019). Although around $84.1 million of its budget is still dedicated for "research and assessments on the occurrence, quality, supply, and use of national and global mineral and energy resources" (USGS 2019). Clearly, investing in risk is not too attractive. This is underlined by epidemiologist Dennis Carroll whose research institution investigating zoonotic disease threats got completely defunded by the U.S. government in 2019, just before the COVID-19 outbreak. Carroll said, "It's not just the U.S. government but governments at large and the private sector—we don't invest in risk […] So part of the challenge is getting lawmakers and investors to invest in risk" (Berger 2020). The reluctance to invest in risk justifies the existence of a hierarchy of research funding reflecting the vigorous influence of economic interest in research.

One might say that even though production research is more attractive for investment, this is not a problem, since it was through pioneering new technologies that the benefits of modern life came into existence. While this is true for the well-off segments of the world, we know that along with new technologies new problems arise which impact the least well-off the most. Then a society which devalues investing in risks is a society partly blind to the threats they pose and to those who suffer the consequences. We need look no further than current assessments of the climate crisis. More than two centuries after the First Industrial Revolution the world is facing the damages done by the increase in the global mean temperature and the problem only seem to worsen. Scorching heat waves torment dense urban populations and raze rural crops, rising sea levels displace communities along sea sides forcing them into migration, and ever harsher storms devastate vulnerable infrastructures of settlements leaving many dead behind. These are only the consequences of climate change that we can understand at the moment. According to a new estimate if the global mean temperature increases by 3 Celsius degrees approximately 7 billion will be at risk of heatwaves, near 4 billion at risk of water stress, near 1 billion experience power reduction, 2 billion suffer crop yield change, and over 1 billion must bear their habitat degrade (Beyers et al. 2018). The risks of climate change are incomprehensibly large and there is an overwhelming scientific consensus that it is the result of human technological intervention. Although risk research became more institutionalized over the last thirty years by NGOs, policy

makers, and social movements, it is still largely overlooked by industrial interests (Dunlap and Catton 1994, McCright and Dunlap 2010). Nevertheless, by marginalizing risk research the structure of industrial society is endangering the very environment it depends on.

Social scientists anticipated that the symptoms of self-destruction will bring growing awareness to the sources of risks. The German sociologist Ulrich Beck developed a critique of technology-oriented science in *Risk Society* (1992) where he argues for the increasing presence and awareness of technology induced risk in modern societies. According to Beck, Western societies are going through a process of "reflexive modernization," an increased understanding of the quality and extent of the risks technologies produce (1992:155). As an example, Beck cites the environmental movement which since then has only grew larger with recently Greta Thunberg rallying people in 150 countries through her *Fridays for Freedom* protests. One of the key problems with emerging risks, states Beck, is that they remain largely invisible and their exposure depends on scientific investigation; they "require the 'sensory organs' of science – theories, experiments, measuring instruments – in order to become visible or interpretable hazards at all" (1992:27). Even in the face of increasing risks techno-scientific rationality keeps getting most resources but there is no effective answer from it. Beck sees this as a problem "systematically grounded in the institutional and methodological approach of the sciences to risk" (1992:59). While Beck points out the key issue, the source of the problem is not only the sciences approach to risk but the socio-economic structures which incentivize and fund research to make science available in the first place.

Since scientific research is a capital-intensive enterprise, it depends on sponsors for the provision of adequate resources. In general sponsors come from the public or private sector, however regardless of social positioning funding research is usually seen as an investment with an expected return. The dependence of scientific research on sponsorship and the economic benefits sponsors demand have been criticized as narrowing down the creativity of research and limiting the freedom of science. In the public sector this issue has been tied to grants culture where proposed projects must conform to a certain area and style of research dictated by the government. Notably, U.S. President Dwight D. Eisenhower lamented how government grants become "virtually a substitute for intellectual curiosity" (1961). On the other hand, private sector funding poses the threat that the curiosity of research projects is increasingly tied to interests dictated by the market. In the financialized global economy both government grants and market interest are increasingly moved by short-term economic incentives and they serve as stimulants for a specific kind of epistemic drive, the one which manifests in production research. To gain a better understanding of the issue, let us apply our theoretical framework and describe the epistemic drives behind production and risk research.

The epistemic drive motivating production research largely corresponds with what Ulrich Beck calls "techno-scientific curiosity," an inquisitiveness in the "utility for production" (1992:60). Working from the taxonomy we can describe the *target* of techno-scientific curiosity (or production-oriented epistemic drive) as extrinsic applicability, especially in discovering more efficient technological solutions for production processes. This pragmatism of techno-scientific curiosity manifests in finding out *how to make something work*. Noting the *quality*, the style of this kind of epistemic drive is primarily optimistic which resonates with the relentless hopefulness of 'don't take no for an answer' philosophy of modern capitalism. The strength and timeframe largely depend on specific cases, however institutions are often the *bearers* of this kind of epistemic drive, especially in places where research is directly supporting the production chain. In

contrast with production research we should also chart the epistemic drive motivating risk research to appreciate their differences. Risk research demands a different style of scientific practice than its productive counterpart. What we may call risk curiosity (or risk-oriented epistemic drive) is an epistemic drive which has rather an intrinsic, theoretical value as it aims to uncover an interconnected network of risk factors and their threats to the social and natural environment. Instead of immediate application, this epistemic drive is rather skeptical by asking *what can go wrong* and *what are the consequences*? In its *quality*, risk curiosity manifests a pessimistic style as it needs to assume the worst cases which can develop from technological threats. Regarding strength and time frame, it is also case dependent, ideally the stronger and longer the better. The *bearers* of this epistemic drives are also institutions, but instead of private industrial entities they tend to be public civil organizations.

We can notice the key differences between the two orientations of these epistemic drives. Given the influence of economic incentives it is logical why techno-scientific curiosity enjoys predominance. Since production research and risk research has qualitatively different aims, they demand different styles of investigation which are made possible by different kinds of curiosities. By looking at the funding patterns we can see that production research is more abundant in resources than investigations of risks. In turn, this disproportionate spending habit also affects curiosities as it leaves little resources for the realization of risk curious projects. Above all, it is not just projects that are left underfunded but entire styles of thinking, unique ways of organizing research, and original perceptions the world are sidelined. Risk oriented epistemic drives are routinely immobilized by the norms of the existing funding patterns largely defined by economic incentives. The lack of opportunity to realize risk curiosity results in decreased emergence and the general impotence of these epistemic drives which if well-supported could lead to novel, complex knowledge products on understanding the threats of technological practices both on communities and the natural world. This is not to say that there is no active risk research going on, only it is significantly fewer and smaller than those for improving production. However, the stimulation of techno-scientific curiosity is also counter-productive as it increasingly becomes restricted and compartmentalized for achieving narrow, practical purposes. Hence the negative impact of an intensively mobilized production-oriented epistemic drive is the lack of detailed understanding of how technological interventions generate new threats to society. In overall, we are able to trace how the need for short-term economic return is mobilizing production-oriented epistemic drives while immobilizing risk-oriented ones. Since understanding the world demands a heterogenous pool of knowledge, a collection of different styles of maps, we are at loss of those kinds of epistemic drives which do not get the chance to realize.

Pure Curiosity Driven Research

Seeing how deeply economic incentives determine epistemic drives, we might wonder if we could eliminate economic incentives from funding science altogether. Then curiosities would have a more equal chance to flourish. This is the hope what the purely curiosity driven basic research promises. Natural scientists demanded space for more basic research as they noticed the encroachment of immediate political and economic incentives on their practice which was evident from the increasing focus on applied research. Chemistry Nobel Laureate Ahmed Zewail was concerned about this issue when he warned, “The curiosity-driven approach seems increasingly

old-fashioned and underappreciated in our modern age of science […] Some believe that more can be achieved through tightly managed research – as if we can predict the future. I believe this is an unfortunate misconception that affects and infects research funding" (Ball 2014:405). The cure for restoring the liberty of scientific investigation seems to be in the unbound possibilities of pure curiosity driven basic research. The idea is if only the conditions of pure curiosity in research can be guaranteed by expelling political and market interests then scientific research would become more fruitful. Perhaps basic research being untainted from politics and the market holds the key towards an unbiased direction in epistemic output? Can basic research truly represent a neutral curiosity, free of external interests? The following first-hand field report at a basic research institution suggests otherwise. By reporting on the contents of a science-industry talk, I proceed to show that even basic research ends up manifesting a quite homogenous pattern of epistemic drives largely determined by economic incentives. It might be curiosity driven but it is the same *kind* of curiosity which drives it.

The Case of IST Austria

On the 19th of November 2019 the Institute of Science and Technology (IST) in Austria organized a science-industry talk titled *Capturing Serendipity*. IST Austria's flush Raiffeisen Lecture Hall hosted the event from 6 to 9 pm. The elegantly arranged occasion was aiming to bring together leading scientists and entrepreneurs under one roof to discuss best practices in seizing technological innovation for commercial purposes. Researchers, entrepreneurs, inventors and investors presented themselves in sophisticated outfits as they busily chatted away at the reception sipping wine and enjoying a three-course dinner. The entire occasion was designed to network and to make business. I was mesmerized by the elite atmosphere of the venue, as well as the selection of desserts; nonetheless, what I heard at the main event raised questions in me whether basic research is as free as it claims to be.

The main event presented a panel of influential industrialists and showcased the institute's leading research projects. In light of this fact, I should not be surprised that there was not a case of risk research among the presentations. Regardless of being a science-industry talk, I find it unsettling that no projects even mentioned the climate crisis because even a pessimist could have expected some projects in the spirit of environmental modernization (i.e. solving the climate crisis with new technology), but almost none of the presenters found this aspect important. Instead these scientists presented their projects appealing to productive prospects, valiantly projecting their voice to the furthest corners of the room – some more successfully than others – trying to impress the honorable audience. This confidence permeated all the voices of the conference, creating a cacophony of optimism. In order to get a sense of IST Austria's scope of research, I will summarize the projects of the panelists' who presented.

The first researcher to present was Georgios Katsaros (1), a physicist working on quantum computer technology with his team. In his presentation he emphasized the paradigm shifting possibilities in quantum computing as it allows to do calculations which standard computers cannot handle. The second in line was physicist, Maria Ibáñez (2) who is working on creating metamaterials by using nanocrystals as artificial atoms. She stressed that nanocrystals can give greater control over physical matter which in turn leads to countless commercial applicabilities. One of them is a fabric which generates electricity through the heat of the body. The third presenter was Krzysztof Pietrzak (3), a computer scientist occupied with improving cryptographic

technology. One of his main projects is creating a sustainable cryptographic system for Bitcoin, because the secure operation of the digital currency uses up more electricity than some countries do. The fourth presenter was computer scientists, Bernd Bickel (4) who is improving methods of digital fabrication by creating algorithms which can model and simulate material designs. He presented the success of his recent project (funded by the European Research Council) which was a software generating mold designs based on the digital simulation of a product. This allows businesses to efficiently produce products by plastic molding. The fifth researcher to present was neurobiologist, Gaia Novarino (5) whose team investigates the genetic basis and neurological functioning of conditions such as epilepsy and autism. She was very optimistic about creating pharmacological treatments to these predispositions, although there is a growing movement against medicalizing aneurotypically functioning people. The last presenter was Harold Vladar (6) the CEO of Ribbon Biolabs, a company selling synthetic DNA and located at the newly built corporate office park on the IST Austria campus. True to a good business pitch, Vladar exhibited his company's competence in supplying synthetic DNA for future clients.

This birds-eye-view of the showcase illustrates the scientific portfolio of IST Austria. Certainly, the institute is very innovative as all the described projects are pushing the limits of existing scientific knowledge and its technological capabilities. After acknowledging innovativeness, the fact confronts us that all of these scientific projects are being conducted in the name of production research, as they aspire to find new means of enhancing production and establishing greater control over the environment. Production orientedness is obvious in project 2 (meta-materials), 3 (digital finance), 4 (plastic item production), 5 (pharmaceuticals) and 6 (biotechnology), however project 1 (quantum computing) also entail production enhancement, albeit in more indirect terms. Furthermore, all six projects present new means of establishing greater control over the environment. The example of meta-materials is a very literal instance of this point. On the other hand, based on the presentations none of the undertakings evaluates the adverse effects of technological intervention, therefore they cannot be categorized as projects of risk research. Project 5 seems like an exception, because developing new drugs involves elaborate testing for side-effects. Nonetheless, it is still production research, since its goal is to establish control over the environment (i.e. neurological conditions) and its result will be used to produce more financial capital. Not to mention, none of the projects emphasized an environmental dimension. Based on these indications, it is reasonable to claim that IST Austria is largely focused on production research.

Why was there no presentation of risk research if basic research theoretically offers the ability for all type of scientific projects? Perhaps, only the commercially attractive projects were showcased? I hardly think so, browsing through IST Austria's website I found no reference to researching risk assessment or prevention. One cannot even claim that these are commercially unimportant because, for example, the anticipation and prevention of the effects of climate change can save billions of euros on damages. In view of this fact, it appears the reluctance to invest in risk runs deep. Even my brief assessment reveals that pure curiosity driven research at IST Austria means principally research with a production orientation. If we were to speak in terms of curiosity, then we may say that the epistemic drive cultivated at the institution correlates with techno-scientific curiosity. To reiterate, the *target* of techno-scientific curiosity is primarily to find more efficient means of production. That can mean several things from reducing the costs of production by, for example, a new molding technique, or it can mean inventing a new meta-material. Furthermore, the optimism of techno-scientific curiosity was audible in the presentations and it was also captured by the opening speech of Iris Rauskala, Federal Minister of Education, Science

and Research of Austria who stated that "exploitation is the institution's guiding principle." Therefore, we can see that there is a very specific *kind* of institutional epistemic drive which is prevalent at IST Austria. We should appreciate the fact that techno-scientific curiosity need not be the dominant type of epistemic drive at the institution. For instance, we can see how some research institutions gives space for risk curiosity. In theory scientific investigations can be motivated by different epistemic drives, yet those concerned with productive targets seem to prevail in practice; even at a research institution dedicated to purely, curiosity driven research.

To summarize, the second part of the thesis aimed to demonstrate the fundamental connection of economic incentives to the emergence and development of epistemic drives. By contrasting production research and risk research, I showed how short-term economic return allows the mobilization of production-oriented epistemic drives while it systematically immobilizes risk-oriented ones. In turn, the marginalization of risk curiosity creates and sustains ignorance about the threats technological interventions produce to societies and ecosystems. Reframing the issue using the epistemic drive notion has allowed us to pay attention to the social conditions which determine knowledge production from the outset. The notion especially highlights the paradigmatic entrenchment of large-scale knowledge production practices that, among other things, endanger underprivileged social groups and the natural environment.

CONCLUSION

Throughout this thesis I have attempted to give a distinctly sociological meaning to curiosity. A term which is often used in everyday life but rarely explicated on its meaning. We have seen that curiosity had a handful of different meanings throughout history and most of these meanings echoed a negative connotation. Curiosity, nosiness, and unruliness was treated as near synonyms. With the changing practices of an increasingly empirical science, curiosity began its apotheosis into a culturally positive concept however, analytically it continues to retain a marginal position up to this day. This neglect of curiosity began to be amended by a couple of philosophers who continue to expand on it within the analytic tradition. The result of this effort has been the description of curiosity in greater detail, specifying the many variable forms of its existence. The common line has been the understanding of curiosity as a desire for knowledge or understanding. The questions of how strong this desire is, how long does it last, what is the object of interest, and how important it is are all part of describing instances of curiosity. Among these considerations arose the question of who is bearing curiosity and institutions came to the forefront. Occupied with individualist aspects, philosophers have left the social characteristics of curiosity unexplained which became the central aim of this work.

I wondered if it is possible *and* meaningful to sociologically conceptualize curiosity. I dealt with theoretical possibility in the first part of the thesis where I addressed the common preconceptions of normativity, uniformity, and individuality of curiosity to prepare the ground for a non-normative, diverse, and above all, social interpretation. Fundamentally, I located the sociological core of curiosity in its motivating characteristics. Curiosity becomes social as it motivates agents to organize epistemic projects which inevitably occur in relation to a social world. However, I also proposed that we can trace the emergence and development of curiosity to specific social origins. From these reflections, I formulated curiosity as an epistemic drive which emerges in, develops with, and impacts the social environment under socio-historical and local-cultural conditions. I described how the social environment can mobilize or immobilize epistemic drives which has a significant impact on different segments of society and the environment.

In the second part, I attempted to show that the epistemic drive notion allows us to meaningfully reflect on certain sociological cases, such as the effect of economic incentives on scientific research. Appealing to divergent funding distributions, I established that scientific projects promising short-term economic return are preferred over scientific projects with long-term or lesser profitability, such as the study of the risks of technological interventions. Consequently, the reluctance to invest in risk implies the immobilization of risk-oriented epistemic drives, even in the face of the dangers of the climate crisis. In the final section of the thesis, I shared a report of a recent science-industry conference in Austria to argue that even what is supposed to be an environment for pure curiosity, in fact produces a series of investigations with the similar *kind* of epistemic drive motivating them. A curiosity which is primarily interested achieving some form of economic reproduction. Hence, even a supposedly sterile research environment cannot be free of external, social influences which shape its epistemic output. I concluded that economic incentives extensively influence the emergence and development of epistemic drives; in this case for the detriment of risk curiosity.

Without question, the epistemic drive notion needs further development and exploration. However, there are noteworthy possibilities and, as a direction for future research, I would like to

mark a few points that can be addressed. I have been arguing for the existence of a determinative relationship between social structures and epistemic drives, however the extent of this determination is still case dependent. Therefore, it would be interesting to see how epistemic drives operate in different professional fields where knowledge production plays an important role (e.g. politics, public policy, law, education, natural sciences, social sciences etc.). In these specific fields it would worth examining how much agents develop and adapt their curiosities to meet the standards of the prevalent, or popular curiosity. In other words, how are paradigmatic epistemic drives restricting the emergence, development, and impact of marginalized curiosities? For example, how is reflexivity or critical thinking limited in certain institutions with specific political or economic goals in mind, or otherwise how does an institution successfully encouraged and sustain a variety of epistemic drives? Also, what are the institutional limits of encouraging a diversity of epistemic drives, for instance organizations may demand to think outside of the box, but *when* is it too much outside of the box is sociologically telling and rarely explicated. Overall, theorizing the role institutional cultures on epistemic drives have notable potential for future development. What is certain is that analyses must be rooted in empirical cases to further expand on theoretical description.

Coming to the end of our journey, what can we take from this brief inquiry into the sociology of curiosity? Although much exploratory ground has been covered, I believe I managed to point out that curiosity, described as an epistemic drive, is at least a thought-provoking contribution for explaining the knowledge producing practices of society. In view of the complex arrangements of cognitive division of labor in modern societies, and the magnitude of influence these epistemic organizations have, it becomes necessary to ask *what* they are interested in, *why* are they interested in it, *how* did they come about being interest in that exact thing, and *who* benefits or suffers from that interest. Here, the sociological idea of curiosity can come as a useful tool as it allows us to conceptualize curiosity as an epistemic drive embodying diverse attributes which changes over the time under the influence of social and cultural conditions. In the final analysis, the epistemic drive notion always suggests that the direction of knowledge production is *not* a choice of 'pure curiosity,' but bound to specific social conditions. As said in the beginning, if I was able to convince that curiosity is a meaningful sociological object, I consider my attempt successful. Personally, we might want to revisit our approach to the idea of curiosity to revise its imminent possibilities and limitations by appreciating the many social ties enabling its birth and vibrant life, or at other times, its quiet demise.

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