



## AN ABSTRACT OF THE THESIS OF

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With the continual growth of scientific knowledge and ever-increasing arguments for science as the end-all “objective” system of knowledge, a severe criticism and analysis of science and its history is direly needed. Within this paper, I use the work of Max Horkheimer, the Frankfurt School, Martin Buber, and others to explore the limitations of science, its inability to solve ethical problems, and its instrumental nature. I argue that science not only fails to provide a solid foundation of ethics due to its instrumental nature, but risks highly destructive outcomes if applied as such due to its reductionist approach. Tracing the history of science from the beginnings of Modernity, combined with the Eurocentric worldviews and philosophies that shaped its creation, I argue that the concept of the objective scientist is ultimately false due to societal and personal biases, and that claims to objectivity risk portraying the subjective as objective truth. Finally, I address the reductionist and alienating nature of Western science and provide an alternative model of science that both places humanity within the context of nature and acknowledges the fallibility of science.

Key Words: Max Horkheimer, Frankfurt School, Martin Buber, I-It, instrumental rationality, scientific criticism, objectivity, subjectivity, Eurocentricism, race, racism, craniometry, nature, Enlightenment, Modernity, Descartes, Mind-Body Dualism

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The Parochialism of Instrumental Science

by

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## The Parochialism of Instrumental Science

### Prolegema

#### “God is Dead”

God is dead. God remains dead. And we have killed him. Yet his shadow still looms. How shall we comfort ourselves, the murderers of all murderers? What was holiest and mightiest of all that the world has yet owned has bled to death under our knives: who will wipe this blood off us? What water is there for us to clean ourselves? What festivals of atonement, what sacred games shall we have to invent? Is not the greatness of this deed too great for us? Must we ourselves not become gods simply to appear worthy of it?

To readers versed in Nietzsche's writings, the above quotation is recognizable as his take on the shift from pre-Enlightenment thinking to Enlightenment paradigms of rationality and objectivism. Originally published in 1882 in *Die fröhliche Wissenschaft*, the sentiment expressed is neither foreign nor dissimilar to modern sentiments towards science in both the public realm and within scientific communities, albeit replete with Nietzsche's customary dramatics. To put the crux of this sentiment in plain terms, the statement that “God is dead” is metaphorical in that methods of abstract reasoning, objectivity, and rationalism supplanted epistemology founded in spiritual and religious understandings of the world.



From an historical perspective, this shift is best understood as a transition from the medieval world into the age of Modernity. Beyond the shift from theistic foundations of knowing, the concept of modernity also encompasses the positivist belief that the acceptance of rationality and objectivity as foundations in both philosophy and science would eventually lead to new horizons of human well-being and flourishing. As Stephen Toulmin noted, “when they [writers of the mid-20th-century] proclaimed 'the end of ideology', they show a belief that, in the last 300 years, modern philosophy and science had succeeded (in John Locke's famous phrase) in 'clearing away the underbrush that stands in the way of knowledge'” (Toulmin 3).

To the contemporary reader, this positivist perspective is certainly alive and well in the current proclamations from the pattering pundits of positivism, as a common edict is that with the further dissolving of ideology and faith, intellectualism and science will be capable of paving the way to a new, bright future.

However, while it may be true that science and its attempts at objectivity have provided humanity with many benefits, does this positivist claim hold true? Will the dissolution of ideologies and the embracing of “science” truly lead to a superior society? A brief foray into the immediate history of science reveals that its objective methods have done nothing to restrain the more devious applications it has enabled, ranging from the holocaust to the use of atomic weaponry on Hiroshima and Nagasaki. If anything, it seems that science offers no influence over whether it is used for destructive or constructive purposes, other than offering a technological imperative, of what can be done, will be done.

To counter this, the positivist might claim that destructive uses of science are mere

perversions of science's true intent, and that we must hold confidence in the ability of scientists to improve the state of humanity. However, it seems doubtful that the technique of science could truly be “the automatic champion of progress,” as it has historically proven to predominantly act an extension of the society it is employed within, much akin to religion's use for ideology (Horkheimer 59). Even further, given that science itself is a means-oriented methodology for understanding and interpreting the world, how can it function to guarantee a canon of positive ethics?

It is these questions that serve as the foundational impetus for this thesis. The positivist faith in science as redemptive and the adoption of this particular scientific worldview into all aspects of life, imaged as a panacea, is altogether too hopeful. Even more axiomatically, the project of Enlightenment rationalism and the doing away of supposed ideologies possesses a far more ominous corollary, for lurking in the heart of this rationality is an entirely means-oriented and ultimately destructive paradigm – a paradigm which leads to authority claimed on the basis of illusory objectivity. This form of rationality, defined as instrumental rationality by Horkheimer and the Frankfurt school of thought, reduces all things to mere objects to be used by those who wield it. As I synthesize within this work, modern science is a direct application of instrumental rationality, as it converts all things into means to be used towards a specific ends by the society that uses it. As a result of this, the positivist argument is revealed to be extremely fallacious, as a technique for acquiring and applying means cannot successfully direct the ethics and morality of society. Even more dangerously, I conclude, any attempts to do so are gross misapplications of science that risks extremely destructive ends – for both humanity and nature as a whole.

## Chapter Summaries

In the first chapter, I describe the problem of instrumental rationality using the work of Max Horkheimer and Theodore Adolfo, with reference to Martin Buber's concept of the I-It relationship. This section serves to describe the concept of instrumental science as the same means-oriented system of instrumental rationality, and to also reveal its failures to transcend being limited to a societal tool.

The second chapter presents the beginnings of instrumental rationality within the context of Modernity and the Enlightenment, outlining the construction of the Cartesian mechanistic worldview and the separation of the mind from the body. This alienation, as the chapter reveals, was a necessary step in the creation of instrumental science in the first place. This serves to provide a historical understanding of instrumental science and the context that birthed it.

In the third chapter, I delve into two critical problems of instrumental science. The first of these, as briefly noted in the second chapter, is of how it has – and still does – enabled subjectivity to appear as objectivity. This is revealed through the historical application of science towards the justification of racism using the work of Stephen Gould and Patricia Fara.

The final chapter offers the concepts of instrumental science presented in the preceding chapters from a holistic perspective, focusing on the inherent problem of domination within instrumentality before providing a direction toward which science could be taken. Finally, I address the limitations of this body of work and where it could be taken in academia further.



## Chapter I – Instrumental Rationality

### Overview

The foundation of this thesis lies upon what modern rationality is and if it, whilst enabling progress, may also possess a more troubling and destructive side. This chapter serves to outline the form of reason and rationality held within modern Western society. This discussion begins with Horkheimer's concepts of pre-Enlightenment objective reason and Enlightenment-era subjective reason. Following this, I use Martin Buber's concept of the *I-It* relationship as a method for understanding the nature of subjective reason before analyzing how it led to the “despiritualization” of the universe itself. I then tie this back into the context of modern science and how it uses the means-oriented subjective reason to exact the wants of the society it is employed within. The objective of this chapter is to frame instrumental science as a distinct application of Horkheimer's concept of instrumental rationality.

### The Problem

The problem of the Enlightenment paradigm of instrumental rationality is twofold. First, and more superficially, instrumental rationality allowed and allows for the substitution of biased and subjective knowledge under the guise of objective knowledge. This process is a matter of procedure and appearance, as a subjectively influenced study – along with its conclusions – can be portrayed and presented in an objective manner, thereby giving the appearance of objectivity whilst retaining its subjectivity. Historically,

this has been a problem in the case of phrenology and other ultimately racist scientific studies that attempted to create an objective study to fulfill the pre-existing notions held by Eurocentric societies. While it may be true that such instances deviate from objectivity and as such, do not maintain the scientific method, the crucial problem is that such claims are often not fully fact-checked due to the presuppositions held by the society at that given time. In this way, it becomes easy for flawed knowledge to become accepted by the whole due to its adherence to the status quo. This problem can be condensed to an authority of subjectivity via apparent objectivity.

The second problem, and far more subtle, is simply that instrumental rationality has led to a reductionist method of thinking that seeks to condense all of existence to a series of utilitarian relations to be manipulated by the society that wields it. While this aspect of instrumental rationality may not seem immediately clear, it is a necessary product of the attempt to categorize and compare objects towards a particular ends. This mode of thinking is what has led towards particularly exploitative practices in relation to the natural world, especially when combined with the mechanistic worldview. As expressed by Carolyn Merchant in regards to this combination, “because nature was now viewed as a system of dead, inert particles moved by external rather than inherent forces, the mechanical framework itself could legitimate the manipulation of nature” (Merchant 47).

More importantly, however, these aspects of instrumental rationality have carried over into the common practices of life, due to apparent success of such reasoning within the realm of science. However, this carry-over is an entirely dangerous progression, as the direction of instrumental rationality, at least as effected by science, has no say over

ethical matters. Rather, it boils down relations to ones of mere ends and use. The implications for society from this are entirely negative, as the adoption of an ends-oriented rationality, when combined with a belief in science as being the only adequate fount of knowledge, can only result in the adoption of oppressive and ultimately totalitarian systems.

As it stands, this does not nullify the knowledge derived from the adoption of the scientific method, and the attempts to hold to objectivity, but rather it is intended to reveal the unrealistic and problematic aspect of believing in this rationality as being an entirely trustworthy source of knowledge.

In conclusion, the Enlightenment worldview, which holds to the paradigms of instrumental rationality, while having allowed for the positive progression of human endeavor, has also created a worldview which can be entirely destructive to both human life and nature as a whole. It is with this realization in mind that we can now analyze and synthesize the concept of Instrumental Rationality as presented by Max Horkheimer and Theodore Adorno.

### **What Is Reason?**

Given that the foundation of scientific knowledge rests upon the notion of rationality or reason, it would do well to establish what exactly “reason” and rationality may mean. Within Horkheimer's book, *Eclipse of Reason*, and his shared work with Adorno, *Dialectic of Enlightenment*, the concept of instrumental rationality is presented as being an aberration of true rationality. In the first chapter of *Eclipse of Reason*, the discussion of instrumental rationality begins with Horkheimer's exposé on how the

commoner defines reason: “When pressed for an answer, the average man will say that reasonable things are things that are obviously useful, and that every reasonable man is supposed to be able to decide what is useful to him” (Horkheimer 3). From this, post-Enlightenment reason can be understood as a method concerned with the application of logic and rationality towards a want or need of the user. This form of reason, titled as subjective reason, is “essentially concerned with means and ends” and places “little importance to the question whether the purposes as such are reasonable” (3).

It is clear, then, that this subjective reason is concerned only with fulfilling a need or want of its user, and not concerned with any objective property of truth. To put this more clearly, Horkheimer provisions reason into two distinct categories: objective reason and subjective reason. In the case of subjective reason, “when [it] is used to connate a thing or an idea rather than an act, it refers exclusively to the relation of such an object or concept to a purpose, not to the object or concept itself . . . it means that *the thing or the idea is good for something else* [emphasis added]” (6). Contrary to this, the now-defunct objective reason placed reason as a “force not only in the individual mind but also in the objective world – in relations among human beings and between social classes, in social institutions, and in nature and its manifestations” (4). Rather than hold its primary concern about whether or not some means are reasonable towards some wanted end, objective reason held that what was rational was something that adhered to an objective system. This perception, although certainly home to a degree of subjective reason, “aimed at evolving a comprehensive system, or hierarchy, of all beings, including man and his aims . . . [and] the degree of reasonableness of a man's life could be determined according to its harmony with this totality” (4). In this way, reason was not a subjective matter that



only concerned one's wants in a bubble from the rest of reality, but rather one which sought to place the human mind and the endeavors of humanity within a larger, holistic scheme.

The largest difference, then, was that objective reason's "emphasis was on the ends rather than on means" and that it "did not focus on the co-ordination of behavior and aim, but on concepts – however mythological they sound to us today – on the idea of the greatest good, on the problem of human destiny, and on the way of realization of ultimate goals" (5). Or, put more succinctly, the deviation of subjective from objective reason is the move from reason as being "a principle inherent in reality" to one which "is a subjective faculty of the mind" (5).

This switch from the objective to the subjective did allow for the dissolution of superstition, as it enabled the "denouncing [of] mythology as false objectivity, i.e. as a creation of the subject . . ." (7). However, Horkheimer posits that, at least initially, other forms of objectivity were put in the place of the mythology they supplanted, such as the Pythagorean theory of numbers, wherein it "was transformed into the theory of ideas that attempts to define the supreme content of thinking as an absolute objectivity ultimately beyond . . . the faculty of thinking" (7). The real problem of the modern subjective reason, as Horkheimer claims, is that "at a certain point thinking either became incapable of conceiving of such objectivity at all or began to negate it as a delusion" (7). Horkheimer then claims that this negating of objectivity as delusion – or, more clearly, the embracing of absolute subjectivity and rejection of objectivity inherent to the world – has led to the formalization of reason, as expounded on in the following section.

## I-It Relationship

One way the shift to formalized reason can be understood is through Martin Buber's concepts of human relation. Buber presents the idea of the *I* as being the distinction of the self from that which is not self, in either the form of the *I-Thou* or the *I-It* (Buber 3-4). The *I-Thou* relation is that of the relation of the self to the entirety of other selves – or, more broadly, other entities in general. Within the *Thou* relation, there is no conception of the other thing as being a tool which can be used by the *I*, but rather only the universal collection of that which makes up the other thing. It is a relation of non-objectification and respect.

In comparison to the *I-Thou* relation, when the *I-It* relation begins, the *I* separates itself from “the human body, as the bearer of its perceptions, from the world round about it” (22-23). Following this, “when the *I* of the relation has stepped forth and taken on separate existence, it also moves, strangely tenuous and reduced to merely functional activity, into the natural, actual event of the separation of the body from the world round about it, and awakens there the state in which *I* is properly active” (23). The separation of the human self from the world around it – the establishment of the subject-object relation – is the beginning of formalized reason, as the human self understands all through a relation of means. In the *I-It* relation, “the primary connexion of man with the world . . . is comprised in *experiencing*, which continually reconstitutes the world, and *using*, which leads the world to its manifold aim, the sustaining, relieving, and equipping of human life” (38).

The correlation of the *I-It* relation to subjective or formalized reason is clear, as the individual, “now with the magnifying glass of peering observation . . . bends over

particulars and objectifies them, or with the fieldglass of remote inspection . . . objectifies them and arranges them as scenery, . . . [isolating] them in observation without any feeling of their exclusiveness, or . . . knits them into a scheme of observation without any feeling of universality” (29-30). As a result of the objectification of those things which are not perceived as the self, they can now be used by the self towards particular means – or, in other words, things are able to be understood and used towards subjective reason.

Just as Horkheimer and Adorno found the modern world to have shifted towards formalized reason and instrumental rationality, so did Buber. As is also inherent within Horkheimer and Adorno's work, Buber believed that the modern individual was suffering under the reduction of the self and other selves to constant relationships of *I-It*. The self – and other selves – are constantly seen as *Its*, objects to be used towards a particular purpose (68). This ultimately leads to a devaluing and dehumanization of life, as Buber claimed that only “through the *Thou* [that] a man becomes *I*” (28).

It is with the correlation of subjective reason with the concept of the *I-It* relationship that we can return to the concept of reason and how its modern formation is that of mere instrumentality.

### **The “*lumen naturale*” Extinguished**

To emphasize the stark contrast of old reason with new reason, philosophers of objective reason believed in the notion of “*lumen naturale*,” or the “natural insight” of reason as something which would be recognizable through the act of reasoning itself (Horkheimer 15). In this way, all individuals “endowed with intelligence” would be capable of using reason, which would inevitably lead to particular reasonable outcomes

for that individual. As Horkheimer expressed, “under the philosophy of reason, insight into the plight of an enslaved people, for instance, might induce a young man to fight for its liberation, but would allow his father to stay at home and till the land” (15). Whilst consequences may be different between people, there still existed the *lumen naturale* which would push the oppressed towards liberation.

However, with subjective reason, there was no room for the *lumen naturale*, as it was supplanted with an entirely results-oriented form of reason. This death of objectivity is understood through subjective reason's destruction of the absoluteness of religion – an absoluteness which mirrored the *lumen naturale*. As Horkheimer expressed, “[religion's] neutralization paved the way for its elimination as the medium of spiritual objectivity and ultimately for the abolition of the concept of such an objectivity, itself patterned after the idea of the absoluteness of religious revelation” (17). With the objective spirit of reason removed, reason thus made it “an extremely practical social instrument,” in that there existed no particular objective aspects to reason, only its use towards a particular goal of the society (18-19).

Most destructive of all in the shift towards subjective reason was that of the formalized aspect of reason. As a result of formalization, “concepts have been reduced to summaries of the characteristics that several specimens have in common . . . concepts eliminate the bother of enumerating qualities and thus serve better to organize the material of knowledge” (21). In this way, concepts hold to the same notion of the *It* as proposed by Buber, in that things are reduced to their most apparent commonality and not understood in the holistic context of the thing itself. This enables knowledge to be swiftly acquired and action to be quickly done via that knowledge – reason's “operational value,

its role in the domination of men and nature, has been made the sole criterion” (21).

This adoption of subjective reason and the formalization of reason has led to a society wherein no idea or cause holds any particular objective truth to it, save for the raw facts or probabilities held within it. There is no room for objective systems of ethics within subjective reason, only the raw *I-It* relation of utility.

### **The Role of Science**

What does this concept of subjective reason hold for the modern glorification of science as the only root from which progress can grow? The answer is, quite simply, that the core of modern science holds to the same principles of subjective reason – that is to say, modern science is merely the “classification of facts and the calculation of probabilities,” and as such, cannot hold any say to the truth of one ideal over another (24). As a result of this, the progress of science can only be measured by the ideals as held by the society it is within. It only exists as a means to be used towards a priori ends. Indeed, as Larry Laudan wrote: “If you ask, 'Successful according to whom?' or 'Progressive according to what standards?' the answer, of course, is: successful by *our* lights; progressive according to *our* standards” (Laudan 138).

More dangerously, science cannot say whether or not democracy is truly better than a dictatorship, it can only provide the means to either end. As Horkheimer noted, “if a group of enlightened people were about to fight even the greatest evil imaginable, subjective reason would make it almost impossible to point simply to the nature of the evil and to the nature of humanity, which make the fight imperative” (32). There exists no guarantees for concepts such as “justice equality, happiness, [or] tolerance,” as their

validity could only be held if they were objective principles of reason. Whilst they may be “aims and ends” for a society, they possess “no rational agency authorized to appraise and link them to an objective reality” (23). As Horkheimer notes, this results in the absolute dissolution of any ideal as being “more closely related to truth than its opposite” (24). In the modern era, which has adopted subjective reason wholeheartedly, there is only the authority of science. As a result of this, the “statement that justice and freedom are better in themselves than injustice and oppression is scientifically unverifiable and useless” (24).

In this way, it is certainly a useful tool, but it only remains as that – it cannot be an ideal in and of itself, as it cannot prescribe any ideal as having any concept of truth. This instrumental nature of science, when combined with the belief that it is an ideal in and of itself, risks leading towards totalitarianism and oppression. The reason is simply that without any possibility of prescribing truth, in the objective sense, it can easily be used towards ideological manipulation. Subjective reason, which is at the heart of modern science, “conforms to anything” (25).

### **Conclusion**

In this chapter, a handful of crucial terms and concepts in understanding the role of reason and science have been provided. The first of these is the distinction between objective and subjective reason, with the former encapsulating the earlier notion of reason as being a property inherent to the world, and the latter being the modern notion of reason as a means-oriented process that is only used towards some subjective end. This distinction reveals the shift from a belief in objective truth to one of subjective needs –

the reduction of reason to that of a mere tool to be used towards a particular ends. It is this latter form of reason that is the heart of modern science, as science exists as a tool to be used by society towards a particular process. It explains no truth to any object or idea, and as such, concepts such as freedom or liberty can be no better or worse than slavery. This reveals the positivist claim of science as being redemptive to be entirely false.

However, from under what conditions and contexts did the shift from objective reason to subjective reason occur? Such a question is key for not only understanding this paradigm shift, but also for framing the problem of the positivist attitude and its revisionist perspective of the history of science. The history of science and its context, as framed from the idea of instrumental rationality, is presented in the following chapter.

## Chapter II – The Roots and Growth of Western Science

### Introduction

The affair of analyzing and understanding the history of human endeavor from an objective perspective is an entirely problematic task, as one does not only have to conduct extensive research to distinguish falsehoods from reality, but one must also actively work against what Carl Becker called the climate of opinion. This “climate of opinion,” or perhaps more clearly put, the dominant paradigms existent within a societal body, is the concept that “ideas and notions about reality do not spring forth from the mind in a social vacuum . . . they are pursued because they seem to fit into the ongoing climate of opinion” (Parenti 1). In the case of science, this has been no different, in both how historians have decided to write history to accommodate the dominant societal ideologies and, even further, the assumptions held by scientists and philosophers that led them in particular directions that complement those same assumptions.

In regards to claims of objectivity, this has been especially problematic, as “the notions that fit into the prevailing climate of opinion are more likely to be accepted as objective, while those that clash with it are usually seen as beyond the pale and lacking in credibility . . . [and] more often than we realize, we accept or decline an idea, depending on its acceptability within the ongoing opinion climate” (2). As will be thoroughly revealed in the second and third chapters, particular scientific paradigms have been and are still held that attempted to make claims to objectivity while within a bubble of opinion that ultimately corrupted that project.

It is with this understanding in mind that this chapter is divided into two distinct



sections. The first of these is the brief analysis of the Eurocentric history of science, wherein I use the work of Arun Bala to challenge Eurocentric narratives of science and provide an alternative account that reveals modern science as being a development stemming from multicultural intersections. The purpose of this section is to reveal the biased accounts of science and its history that Western historians have produced and that the public have accepted. These biased histories are particularly important for demonstrating unchecked and assumed beliefs held by both the society and the scientific community. The second portion attempts to frame the history of science as a movement oriented around the increase of human power via classification and reductionism. Towards this end, I primarily use Stephen Toulmin's book, *Cosmopolis*, in combination with Rolf Gruner's book, *Theory and Power*, to frame science – and, to some degree, the systems prior to science – as a system that works towards increasing human power while simultaneously attempting to divide humanity and the mind from nature and the body.

### **Science and Eurocentricism**

Europe took nothing from the East without which modern science could not have been created; on the other hand, what it borrowed was valuable only because it was incorporated in the European intellectual tradition. And this, of course, was founded in Greece (Hall 6).

Before any substantial analysis of science and its history can take place, the assumption of science as being a European endeavor must first be addressed. As Arun Bala defined in his book, *The Dialogue of Civilizations in the Birth of Modern Science*,

the Eurocentric history of science is “any account of the birth and growth of modern science that appeals solely to intellectual, social, and cultural influences, causes, and ideas within Europe, and that marginalizes the importance of contributions, if any, of cultures beyond Europe to the birth and growth of modern science” (Bala 21). Such a conception, even in the modern era, is far from dead, as much of modern science is often attributed solely to European culture and ingenuity. Such an expression of this idea is clearly understood from this section's beginning quotation taken from the prominent British historian of science, Alfred Rupert Hall, in his introduction to Marie Boas Hall's 1962 book, *The Scientific Renaissance: 1450-1630*.

Other writers echo similar sentiments, such as Ernest Hutten who wrote in 1962, “Western civilization is distinguished from all other civilizations by the fact that it has science” (Hutten 11). Whilst his classification of science – something he rooted entirely in Greek philosophy, only to be rediscovered during the Renaissance – has its own ambiguities, especially due to the lack of dialogue on non-Western cultures, he may be correct in one regard (13-14). As he wrote, “modern science . . . has proved itself more successful in solving problems than any other activity that human beings have so far invented . . . [it] has set the standards of reality and truth by which western civilization lives” (16). Although he may not have intended it as such, he is somewhat correct in that it has set the standards of reality and truth – a parochial set of standards based upon subjective reason that has been an enabler of new multiples of problems.

The bulk of the narratives of science thus far have tended to echo the Eurocentric History of Science, with alternative and multicultural accounts of history only being provided towards the end of the 20<sup>th</sup> century. The importance of noting the unrealistic

Eurocentric account of science is that it reveals the common body of knowledge as being founded on false presuppositions – something very important when we move to consider the claims of truth that tend to be identified with science as a whole. Even more importantly, however, the Eurocentric and non-multicultural narrative may actually limit our ways of understanding the world. As Bala wrote, “. . . in effecting the synthesis of modern science from premodern traditions, Europeans created a science that has obscured our understanding of some areas of reality now understood better by other traditions of science” (Bala 39). As will be revealed in this chapter, these limitations are contained within the common paradigms that Western science grew from, and in particular, the separation of the mind from the body which dominated the Western worldview for at least 300 years after Descartes established it. This paradigm, as well as other important ones, will be addressed in full later in this chapter.

It is also worth noting that the name of “science” itself is something that was retrospectively created to define the growth of a system of knowledge based upon a “new” form of reason, as hinted at in the preceding chapter. As John Henry wrote in his book, *The Scientific Revolution and the Origins of Modern Science*, “Our present use of the word 'science' was first coined in the nineteenth century and, strictly speaking, there was no such thing as 'science' in our sense in the early modern period” (Henry 4). This realization is important, as the naming of “science” aids in the separation of itself from all others – to the point of excessive distinction from the fields of thought it stemmed from in the first place. In the case of science, its preceding field was called “natural philosophy,” which sought to “describe and explain” the entirety of the world, just as science itself is claimed to do (4).

It now should be clear that Western science – which is parallel to modern science in general – and the scientific society that surrounds it has been particularly blind towards the reality of history, preferring to focus only on influences and accomplishments that stemmed from European roots. It is worth noting that these views, akin to most social movements, were not unanimously held by all, but neither were they actively discredited or fact-checked by the whole. This unthinking – and, ironically enough, unscientific – acceptance of the status quo is reflected not only by the wealth of Eurocentric publications of the history of science, but also by the poverty of attention to non-Eurocentric histories of science until recently.

The importance of noting this Eurocentricism is to clarify the history of bias and non-objectivity that has pervaded Western science, further discrediting any notion that science, as a combined social and technical phenomenon, is the panacea of knowledge inevitably leading to global well-being. While the technique may indeed work towards self-correction over time, as is supposed to be inherent within the scientific method, it is fallacious to mistake “science” as the de facto truth. With this bias of modern science recognized, that we can move to the larger discussion of where Western science originated from and how it adopted instrumental rationality and the separation of humanity from nature as its modus operandi.

### **'Scientia Propter Potentiam'**

Perhaps one of the most enlightening approaches to understanding science and its societal role is through the lens of power. Rolf Gruner, in his book, *Theory and Power*, described science as “a kind of knowledge that is acquired *through* action and that is

acquired *for action*” (Gruner 53). This form of knowledge directly translates to that of power, as “the aim and urge of modern [humanity] is power, because, in other words he is driven by the desire to be capable of effecting changes in the world as he pleases” (53). The correlation of knowledge to power, Gruner claims, stems from Francis Bacon who believed that the goal of science was to “endeavour to establish and extend the power of the human race . . . over the universe” (54). Thomas Hobbes further developed such views of knowledge as power, and pressed the notion of humanity as being separate from a heartless nature. On this basis, Hobbes claimed that reason is the force by which nature and its dangers could be suppressed and even manipulated towards the benefit of the human wielding it (54-55). Descartes also supported the utilitarian conception of science as being a good in itself, as it benefited and safeguarded humanity from nature (57). It is this distinction that became particularly important in the later worldviews of scientific utilitarianism and the separation of the human mind from the rest of nature.

It was this aspect of science and instrumental rationality that Horkheimer and Adorno were most concerned with, as the entire focus on means over ends lends itself well to the manipulation of the world through the application of knowledge, even if for destructive purposes. As expressed in the first chapter, the shift from objective to subjective reason marked a distinct change in the perception of the world and the place wherein humanity could place itself. With the self no longer looking for its place within the larger universe, nature could be subjugated and used towards some practical ends. Such perceptions gained a particular importance within the Western world, as dialogues presented nature as a separate entity to be dominated and fought against. However, from where did the concepts of the alienation of humanity and the domination of nature come

from? The answer to this question is found in the birth of Modernity and the Enlightenment and the important role Descartes played in its construction.

### **Modernity and Enlightenment**

“Enlightenment, understood in the widest sense as the advance of thought, has always aimed at liberating human beings from fear and installing them as masters” (Dialectic 1).

As is the case with all social movements, it is difficult to trace the origin of modern science to any one particular agent, as no movement is born in a completely isolated environment wherein preceding modes of thought do not influence or shape it. In the case of modern science, it was no different. In the broadest sense, its origins can be traced within the context of Modernity. Modernity, in abstract, is a retrospectively constructed frame of time that denotes the age of scientific progress and rationality. Although the exact date of origin is contentious, it is most commonly tied to the seventeenth century, with Galileo's science and Descartes methodology acting as the ushers of modernity (Toulmin 8). However, for Stephen Toulmin, the origins of Modernity begin in the sixteenth century. As he wrote, the tracing of modernity to such a time allows for an understanding of the shift in thought from the humanists of the sixteenth century, such as Montaigne, to the rationalists of the seventeenth century, such as Descartes (37). This is a similar separation that was noted in the work of Horkheimer in the first chapter. Although this distinction is important, as it allows for us to understand the progression of modernity as not emerging fully grown during the 17<sup>th</sup> century, for the

purposes of critiquing modern science and its origins, the shift in philosophy towards reductionism and categorization did occur primarily during the 17<sup>th</sup> century via Cartesian dualism.

This shift is best understood as the Age of Reason or, more commonly, the Enlightenment. As evidenced by this section's quotation, in Horkheimer and Adorno's cooperative work, *Dialectic of Enlightenment*, the Enlightenment sought to establish humankind in a position of dominance over the unknown, allowing for humanity to effectively become its own master. Indeed, as explained in Alan Kors' *Encyclopedia of the Enlightenment*, it was, in brief, a Western cultural movement that occurred during the 17<sup>th</sup> and 18<sup>th</sup> centuries that denoted a retreat away from superstition towards the “scientific method” and the application of “reason” (Kors). This application, as both Horkheimer and Adorno noted, was of a form that focused solely on the reasonableness of means towards particularly subjective ends and not upon the reasonableness of the ends themselves. The key role in the creation of this rationality, however, falls predominately to Descartes. As Stephen Toulmin wrote, “the chief girder in [the] framework of Modernity, to which all other parts were connected, was the Cartesian dichotomy” (Toulmin 108).

### **The Cartesian Dichotomy**

During the 17<sup>th</sup> century, rationalists such as Descartes sought to establish a new method which would allow for the creation of a unified system of understanding that would “purify’ the operations of human reason” and allow for the attainment of certainty (Toulmin 105). Towards this end, Descartes attempted to entirely deconstruct the very

foundations of knowledge that existed at the time, preferring to establish “an entirely new system from solid, certain foundations” (Fara 125). Contrary to other philosophers, Descartes established his foundation from a particularly mechanical perception of the world, preferring to compare the universe to “billiard balls, whirlpools, and screws” rather than to organic analogies. One such key mechanical analogy of the cosmos would lie in that of clockwork – an invention which dominated both religious and economic sectors during his time (125). In Descartes' view, the universe – or cosmos – was akin to the functioning of a clock, wherein all relations between things could be completely explained through simple laws of mechanics. What Descartes' mechanical worldview removed was the perspective of the world and matter as being “alive,” supplanting it with the idea that matter itself was dead and inert. As a result of this, humans were described as being machines in which the various physical processes, such as digestion, stem from organs which operate just as clockwork (Gaukroger 180). Even further, the processes of “memory and deliberate actions were also covered by his clockwork model,” risking the consequent implication that humans were effectively mindless automaton (Fara 129).

Indeed, the question of the mind – and the soul – posed a particular difficulty for Descartes' mechanistic account of the world, as it not only would be difficult – and then controversial – to establish the complexities of the human mind as a mere soulless mechanism, but it also was entirely contrary to the Christian views of life after death that Descartes himself held (129). Descartes' solution to this, which would provide a long-lasting dichotomy, was the separation of the mind from the body. This view placed the soul or mind of the individual as existing separate from the physical body it was connected to. The mind would process sensory data from the body through a connection



in the pineal gland, “almost as though . . . [the mind was] . . . a miniature person detachedly watching the body's sensations play out on a screen in front of it” (129-130).

While this dichotomy allowed for the coexistence of otherwise contradictory worldviews, it consequently worked as a foundation for the separation of humanity – its mind – from the rest of material nature. As Toulmin wrote, “the more the extent to which natural phenomena were explained in mechanical terms, as produced by cosmic clockwork, the more (by contrast) the affairs of humanity were allotted to a distinct sphere” (Toulmin 108). Indeed, the separation of humanity from nature, mental from material, created a context under which humans could see themselves as ever more separate and unique entities from the rest of nature. This view was bolstered by the then lack of understanding of nature being “an ecological network of biological systems,” because the bulk of “human actions did not yet seem to affect the workings of nature significantly” (109).

This distinct separation of the mind from inert nature eventually led to a plethora of dichotomies which allowed for humans to fantasize existing separate from the rest of world. As Gruner expressed, “since man and the specifically human characteristics are usually assigned to one side of any such a pair, the dualism is prone to become an opposition of man vs. the rest, vs. the world” (Gruner 151). In the case of Descartes, Gruner finds that he “radically divorced mind from matter and mind from nature” (151).

To return to the concept of instrumental rationality, this separation of humanity from nature, although not the first of its kind, allowed for nature to be considered not as a living thing, but rather as something inert to be used by the “rational” mind of humans. As Gruner wrote, “Nature is no longer seen or experienced but tried or constructed . . .

this is ultimately connected with the mechanistic interpretation and the fact that nature is no longer seen as 'alive'" (159). This conclusion will be particularly important in the third chapter, as it not only has had peculiarly negative consequences by enabling the alienation of humanity from nature and nature's role neglected to utility, but also enabled hierarchical worldviews which sought to reduce the role of other humans to mere means.

### **Objectivity and Separation**

Following the Cartesian worldviews of alienation and mechanism, the notion of abstract objectivity gained much popularity from the 18<sup>th</sup> to the 19<sup>th</sup> century, with figures such as Isaac Newton being marked as ideal "external [observers]" (Fara 215). However, the separation of the observer from the reality existed in was rejected by the *Naturphilosophen*, a collection of romantic philosophers who instead believed that ". . . as human beings, we are inextricably entangled within the natural world . . . [and as such] we cannot prevent our own minds from constructing in advance how we are going to analyse and interpret what we see" (215). Even further, they rejected the mechanical analogy of the cosmos, instead believing in "an organic, growing nature, a cosmos that is itself alive" (215).

In support of the *Naturphilosophen*, Fara notes that one particular "entry point for subjectivity" is simply that "selections and summaries must be made," so as to prevent a "record of the Universe as big as the Universe itself" (217). One such form of inaccurate summary came in the form of the concept of the ideal, wherein an object is reduced to an ideal form that encapsulates all quality within its category. However, this resulted in a particularly dangerous subjectivity, as anatomists themselves conformed to societal

expectations through the construction of the *Homo sapiens* into the *Homo perfectus*, an idealized human that represented the then-standing ideals of skeletal structures (217-218). Although steps were taken by Victorian era scientists to attempt to ensure the objectivity of science, such as the adoption of accurate recording instruments, the problem of personal subjectivity continually haunted the scientific process.

The problem of subjection to biased idealism as preference causes science to function not as a system of objectivity that provides humanity with accurate information, but rather as a tool that is subjectively used as a means toward the particular ends of those that wield it. One important example of this tendency is revealed by the growth of statistics during the 19<sup>th</sup> century and, in particular, the attempt of Charles Darwin's brother, Francis Galton, to identify criminality through pictorial statistics. His process was to composite a collection of photographs of people from particular categories, such as murderers, officers, and privates, and then to use the physical characteristics as ways of identifying someone's criminality (220-221). In the case of criminals, Galton found that "they had receding chins and long arms, suggesting that they were somehow degenerate beings of a lower grade than Victorian gentlemen" (221). While it is true that Galton mis-attributed criminality to physicality, his statistical process mimicked the appearance of scientific objectivity, allowing it to be perceived as a valid and objective study. Such an example, by no means rare, as will be shown in the following chapter, reveals the subjectively instrumental nature of science and the failure to provide humans with genuinely objective systems of understanding.

## Conclusion

This chapter has outlined an historical rationale for the shift from objective reason towards subjective reason. Further, the notion of alienation of the mind from matter and humanity from nature is exposed as a key component not only of instrumental rationality, but of the scientific movement as a whole. By reducing the world to separate collections of categories, humanity is allowed to use the knowledge derived as a form of exacting its unrestrained will on that which is around it. However, this introduced a tremendously troublesome corollary of enabling the appearance of objectivity – and the use of objective methods – in that which is subjective. As presented in the following chapter, the authority of objectivity in the subjective has led to particularly problematic pseudosciences, much akin to Galton's notions of Victorian class status informing his “scientific” conclusions about the causes of criminality.

## Chapter III – History Erred

### Introduction

As briefly revealed in the preceding chapter, the cultural biases and norms of a practitioner of science may ultimately influence the direction, classification, and conclusions of a scientific study. Practically speaking, it is excessively optimistic that the objectivity of a scientist, who is a product of culture and society, can be maintained. The foundational belief that scientists are capable of attaining an objective understanding of the world is ultimately flawed, for even if scientific technique manages to be self-correcting, science will only forever be in a state of self-correction, thereby nullifying any claims to objective authority. It follows from this that the overconfidence in science as absolute truth, rather than a technique, as promoted by scientism and the positivists, is deluded and a portent of destructive outcomes.

From the foundation of the preceding chapters, the objective of this chapter is to reveal the destructive aspects of instrumental science, especially in regards to its application during the nineteenth century. Towards this end, I use the work of Stephen Gould and Patricia Fara to outline the errors of science, in the form of Phrenology and other such similar studies, revealing how biased science has historically been, particularly towards Eurocentricism. This is important in not only revealing the putatively a priori nature of scientific study, but also in revealing how science has historically functioned as a tool in service of the biases of society.

## Subjectivity as Objectivity

Perhaps one of the most egregious aspects of instrumental science has been that of establishing subjectivity as truth under the guise of objective methodology. In the history of the Western world, this has thoroughly played out in the construction of racial hierarchies and the establishment of its wielders at the apex of that hierarchy. As a result of the Enlightenment, “a period obsessed with grouping data, objects, and knowledge into systematic categories,” systems of categorization and classification had to be created (Fara 154-155). One of the first of these was Carl Linnaeus who attempted to provide an objective system for classifying plants by categorizing them according to “one single criterion – the number of reproductive organs” (156). However simple this system may seem, it was founded on Enlightenment-era concepts of morality and sexuality. The Linnean organization system first divided all plants into categories according to the number of male stamens in the flower, then followed by the number of female pistils, subdividing them into “less important orders, all numerically arranged” (156). As Fara notes, this distinction applies the male-female dichotomy that was held in “the highly chauvinistic society of eighteenth-century Europe” (156). Even further, by providing this apparently objective categorical system which placed the male above the female in a hierarchical ordering of nature, the dominance of men over women was simply yet another example of the natural superiority of men. In this way, the categorical practice of science was used to “not only [mirror] social prejudice, but also [to reinforce] it” (157).

As arrant as Linnaeus's biased categorization system is, it was accepted and embraced due not only to its societal implications, but also due to its convenience in classification. As noted in the preceding chapter, the process of classification requires

summarization, a process susceptible to subjectivity and cultural bias. This process inevitably works against claims to truth, as the very categories used to describe the world must be constructed in the first place.

However, even more destructive than classifying plants according to a male-female dichotomy, was that of Linnaeus' – and other prominent naturalists' – division of humanity into a hierarchical system of races. As would come of no surprise, these systems, which claimed to be providing an objective classification of the world, placed their own creators at the very top of the hierarchy. Linnaeus' system in particular divided humans into four races stemming from the “four continents,” with “the ingenious and sanguine white Europeans” at the top, and the others as “the melancholy yellow Asians, the idle black Africans, and the happy-go-lucky Red Indians of America” (160). Within his taxonomy, *Homo sapiens afer*, being his term for the “African black,” was “ruled by caprice,” while the *Homo sapiens europaeus*, being Europeans, was “ruled by customs” (Gould 66). Even further, Linnaeus attributed strong sexual characteristics to Africans, such as *mammae lactantes prolixae*, or “breasts lactate profusely” to African women.

While Linnaeus' system eventually had to be reconstructed due to the discovery of the continent of Australia, concepts of the superiority of the European race continued to be created and reconstructed. Even in the case of more benevolent scientists who believed the variety between humans to be merely superficial, subjectivity continued to warp the outcomes of supposedly objective studies. One such example was the Dutch anatomist, Pieter Camper, who attempted to prove such superficiality by measuring the angular facial slope on skulls. His process, involving the application of mathematics, graded humans on a scale from a primate's skull to the statue of Apollo, with Africans and Asians

closer to the primate and Europeans closest to the Greek god (Fara 160). Although Camper's project attempted to establish racial differences as superficial, it not only imposed subjective Eurocentric concepts of aesthetics, but also “made racial prejudice scientifically respectable” (160). As Fara notes, this process of validity through quantification would continue to be used to “justify discrimination between races and sexes on the grounds of inherent physical differences” (160). Such examples are by no means few in numbers, as revealed in the following section.

### **Monogenism, Polygenism, and Craniometry**

Order is Heaven's first law; and, this confessed,

Some are, and must be, greater than the rest.

Without this just gradation, could they be

Subjected, these to those, or all to thee?

- Alexander Pope, *Essay on Man* (1733)

Beyond Linnaeus' Eurocentric taxonomy of humanity, the nineteenth century saw much of the same, with figures such as Georges Cuvier, Charles Lyell, and Charles Darwin declaring the Caucasian as the ideal and the African as the most degraded of the human races (Gould 69). Revealing the self-referential nature of instrumental science, inherent in their argument was the claim that humanity must also mirror the hierarchical classification of animals that they had created in the first place (69-70).

Concurrent with evolution-based justifications for racial hierarchy, the dominant concept was that of monogenism, an understanding rooted in creationism. The belief was



that all of humanity originated from a one source, but over time degraded into separate distinct races, of which whites were the least degraded and blacks the most (71). One defender of this view was Etienne Serres, a French medical anatomist, who attempted to provide a study that established the degenerationist view as an objective truth. His effort, which was based on the theory of recapitulation – “the idea that higher creatures repeat the adult stages of lower animals during their own growth” –, stated that “Adult blacks . . . should be like white children, [and] adult Mongolians like white adolescents” (72). The evidence for his theory was that given the distance between the navel and penis was of an equal distance among babies of all races, and that the navel “migrates upward during growth,” the races that saw the least amount of growth would be the ones most inferior (72). From this foundation, Serres found that whites had the largest distance in adulthood while blacks “never [got] very far at all” (72). In retrospect, this theory certainly suffers from a priori extremes, but given that its claims were supported by both the cultural biases of the time as well as the existing scientific theories, it was accepted as a scientifically sound theory.

Beyond the monogenist or degenerationist view, there was the theory of polygenism, a view that believed all “human races were separate biological species, the descendants of different Adams” (71). Although this theory saw far fewer supporters than monogenism, it had its fair share of intellectual support, ranging from the English surgeon, Charles White, to the Swiss naturalist, Louis Agassiz. Louis Agassiz, although originally not a polygenist, shifted his belief towards polygenism after the revulsion he felt towards a black waiter once coming to the United States in 1846. As he saw it, “[the races] cannot have originated in single individuals, but must have been created in that

numeric harmony which is characteristic of each species; men must have originated in nations, as the bees have originated in swarms” (78). His justification for this claim lay in the dominant cultural stereotypes of the time, with the “indominable, courageous, proud Indian,” the “submissive, obsequious, imitative negro,” and the “tricky, cunning, and cowardly Mongolian” being the facts which indicated “that the different races do not rank upon one level in nature” (78). While it is clear that Agassiz failed to provide even an attempt at an objective study, instead defaulting to cultural stereotyping, others worked to justify the same conclusions of polygeny using apparently objective means.

One of the most ardent defenders of the polygenist view was the renowned objectivist of the nineteenth century, Samuel George Morton. Morton, who was famed in his time as “the great data-gatherer and objectivist of American science,” began gathering human skulls in the 1820s, amassing over one thousand before he died in 1851 (83). The reason for this great collection was not out of mere interest, but rather that “he had a hypothesis to test: that a ranking of races could be established objectively by physical characteristics of the brain, particularly by its size” (83). Towards this end, he first attempted to rank the cranial capacity of the “races” by filling “the cranial cavity with sifted white mustard seed,” but found that the end-results were not consistent due to uneven packing (85). As a result of this, he settled on using one-eighth-inch-diameter lead shot, resulting in apparently objective and consistent results amongst his collection (85). The results of his studies found, in terms of cranial capacity, “whites on top, Indians in the middle, and blacks on the bottom,” matching, as Gould does well to note, “every good Yankee's prejudice” (85-86). This work would be reprinted and constantly cited as objective, scientific evidence that proved the racial superiority of whites and the natural

inferiority of blacks. However, as his results were examined by individuals such as Gould, an astounding amount of subjectivity and “fudging and finagling in the clear interest of controlling a priori convictions” were found throughout his work (86-87). This “fudging” is described by Gould as “favorable inconsistencies and shifting criteria,” “subjectivity directed toward prior prejudice,” “procedural omissions,” and “miscalculations and convenient omissions” (100-101). Examples include the rounding down of the “negroid Egyptian average,” the rounding up for Germans and Anglo-Saxons, and the exclusion of subsamples and skulls which did not match his a priori assumptions (101).

Most important to note, however, is that in Gould's in-depth study of Morton's work, he “[detected] no sign of fraud or conscious manipulation . . . [as] Morton made no attempt to cover his tracks . . . [and] explained all his procedures and published all his raw data” (101). The only explanation, as Gould finds, is that Morton's project suffered from “an a priori conviction about racial ranking so powerful that it direct his tabulations along preestablished lines” (101).

While both polygenism and degenerationism are now retrospectively understood as flawed sciences, they do well to upset the idea that science, as a whole, has successfully worked to clear away “the underbrush that stands in the way of knowledge.” If science was truly successful in this regard, then such theories should never have been accepted into the intellectual and scientific bodies of their respective times, and to claim otherwise would be to suffer from an acute historical amnesia. The example of Morton quite conclusively reveals how a priori assumptions can drastically alter the supposedly objective outcomes, even in the case of the scientist attempting to maintain objectivity.

## **Conclusion**

The aforementioned examples reveal how mere quantification leads to an authority of objectivity, even if the process of quantification is subjectively flawed. Given the cultural biases in which such studies were conducted, there existed little incentive to disprove such theories. It would seem that science, in general, holds no absolute guarantee of freedom from cultural subjectivity, as it is only self-correcting to the extent that the culture permits. Even further, to return to the concept of instrumental science, such examples also reveal how easily scientism can be applied and warped towards confirming the subjective biases of a society.

However, this is not to say that an appropriate level of trust may never be placed in science, but rather that the objectivity of a scientist or a scientific study should never be taken for granted, a priori. Considering the many errors of scientists in history, to do so would be engaging in the reconstruction of science into something it is not. With the historical weakness of practical science revealed we can move to the final chapter of this work.

## Chapter IV – The False Panacea

### The Project Thus Far

At this point it would serve us well to summarize what has been completed by this project thus far. In the first chapter, the concept of instrumental rationality was defined as an Enlightenment-era creation that sought to place the concept of reason within the confines of a means-oriented perspective. This shift away from ends-oriented reason enabled an astounding burst of scientific growth, as it swept away the previous system of objective reason that sought to place humanity and its strivings within the context of the whole of nature. The conclusion was that modern science can be understood as a form of this instrumental rationality under the name of instrumental science. Instrumental science, then, was defined as a tool used by society for the study and objectification of the world.

In the second chapter, the origins of instrumental science were placed in the context of Modernity, and in particular, the Enlightenment. The Cartesian concepts of Mind-Body dualism and the mechanistic worldview were created at this time, culminating in the belief that humanity and the human mind are distinct from the dead and inert world of mechanisms that surrounded them. Furthermore, the notion that humanity is separate from nature gained much credence, allowing for the belief that humans could become entirely separate and objective observers of the natural world. This became a faith that science could provide definitive answers, as the scientist would be free from subjectivity.

However, as the third chapter revealed, this optimism proved to be misplaced, for scientists continually failed to completely escape subjectivity. When combined with

scientific quantification that gave the illusion of objectivity, this failure led to deceptive pseudosciences that made the subjective appear to be definitive and objective truth. The importance of noting this problem is that the scientists who performed such fallacious studies believed themselves to be maintaining objectivity, even if, in retrospect, their cultural biases had obviously distorted their conclusions. Consequently, the citation of science as de facto truth must be met with great skepticism, for just as in the past science was believed to be objective, so too could this reoccur in the present. Also within the third chapter the instrumentality of science was unmasked as not benignly leading to good, but too often was rather a tool misused for the justification of a particular societal status quo.

What these three chapters reveal to us is that the positivist claim that a reductionist science is the ultimate panacea for humanity is naïve at best and destructive at worst. This first stems from the overstepping of boundaries wherein instrumental science is successful – namely, to act as a tool towards the discovery of efficient means towards any ends. Instrumental science is a mere technique, not an end in itself. The misapplication of means as ends leads to an ultimately amoral system that provides irresistible instrumentality for whatever end its wielders fancy, even if those ends are so destructive as mass genocide.

None of this is to say that the use of science has not enabled many positive developments, but rather that it is dangerously presumptuous to believe it a force for good. Given the vast amount of power that scientific technique has endowed upon its wielders, it is all the more wise to be aware of the potential for destruction. The failure to do so could, through a blind faith in inevitable progress, a cultural supposition

unwarranted by experience and history, end in apocalyptic disaster. This particular blindness easily leads to the assumption that science is capable of overthrowing ethical and religious systems in which it is seen as being in conflict with, a misapprehension that Stephen Gould remarked.

It is with modern science placed in proper historical perspective that we can move to the final criticism of instrumental science before addressing the limitations of this project and the potential it holds in academia.

### **The Problem of Domination**

Within our discussion thus far, the problem of instrumental science's potential for absolute domination by its practitioners has been brought up in brief. As proposed in the first two chapters, the Enlightenment-based concepts of instrumental rationality did enable an unprecedented assault on the natural world, as the mechanistic worldview desanctified the whole of nature. As Carolyn Merchant wrote in regards to the role of domination and power within Francis Bacon's musings on science, the “scientific method, combined with mechanical technology, would create a 'new organon,' a new system of investigation, that unified knowledge with material power” (The Death of Nature 156). Even more indicative of the role of domination in Bacon's writings was that “the most wholesome and noble [of human ambition] was 'to endeavor to establish and extend the power and dominion of the human race itself over the universe . . . [the human race could] recover that right over nature which belongs to it by divine bequest” (156). This concept of “power and dominion” strongly matches the structure of the means-oriented reason of instrumental rationality, as it exists only as a means to the most effective way of

exacting human change upon the world.

As written in the second chapter, the alienation of humanity from nature was furthered by Descartes' separation of mind from body, providing “two absolutely distinct substances, thinking and corporeal . . . [which] radically divorced mind from matter and man from nature” (Gruner 151). When this concept was combined with the definition of the universe being composed of inert particles, nature itself “lost all spirituality and become truly 'dead'” (151).

From these philosophical foundations of alienation and domination, joined with the widespread acceptance of instrumental rationality, I posit that such a perspective not only promotes the domination of nature, but also promotes the hierarchical domination of humanity and the alienation of one from another. Given that humanity itself is not separable from nature, any mentality that promotes the domination of nature without limit also risks the domination, even destruction, of humanity. To quote Horkheimer, “the history of man's efforts to subjugate nature is also the history of man's subjugation by man” (Horkheimer 105).

This problem becomes emphasized by an over-application of the subject-object or I-It relation to all things, as even the individual's existence no longer is a beneficial end in itself, but rather a provisional means to be used by others toward some end. The reduction of the individual to a means not only rejects intrinsic individual worth, but swiftly relegates the individual to a position of subjugation. Understanding this as a fallacy, what must be moved towards is a worldview that does not reduce all to subsidiary objects to be used, but maintains all as a priori existing as ends in themselves. This concept best correlates to Buber's concept of the I-Thou, wherein the totality of the



“other” is understood as being a subject in itself, and not only a reduced object. Such a concept promotes a thoughtful interaction with the world that allows for study and understanding of the universe, better finding a place within it whilst avoiding the alienating reduction of it to mere means.

### **Where to Go from Here**

It is with the concept of instrumental science now defined, even if only loosely, that the limitations of this body of work should be addressed. Instrumental science has only been defined in the broadest sense, with many intricacies and societal implications left unexamined. For instance, much as other movements emerged during the birth of Modernity, the growth of Western science was also energized by the intersection of economics, colonialism, imperialism, individualism, and many other developments that not only shaped one another, but also often conflicted with each other.

With this in mind, works on instrumental science and rationality such as this and more may act to segue into more holistic and non-reductionist discussions of science rooted in the context of a more diverse human history.

## BIBLIOGRAPHY

- Bala, Arun. *The Dialogue of Civilizations in the Birth of Modern Science*. New York: PALGRAVE MACMILLAN, 2006. Print.
- Buber, Martin. *I and Thou*. New York: Charles Scribner's Sons, 1958. Print.
- Fara, Patricia. *Science A Four Thousand Year History*. New York: Oxford University Press, 2009. Print.
- Gaukroger, Stephen. *Descartes's System of Natural Philosophy*. Cambridge: Cambridge University Press, 2002. Print.
- Gould, Stephen. *The Mismeasure of Man*. New York: W. W. Norton & Company, 1996. Print.
- Gruner, Rolf. *Theory and Power: On the Character of Modern Sciences*. Amsterdam: B.R. Grüner Publishing Co., 1977. Print.
- Hall, Richard. "General Introduction." *The Scientific Renaissance: 1450-1630*. Marie Boas Hall. London: Collins, 1962. Print.
- Henry, John. *The Scientific Revolution and the Origins of Modern Science*. New York: PALGRAVE, 2002. Print.
- Horkheimer, Max. *Eclipse of Reason*. New York: Oxford University Press, 1947. Print.
- Horkheimer, Max, and Theodor Adorno. *Dialectic of Enlightenment*. Stanford: Stanford University Press, 2002. Print.
- Hutten, Ernest. *The Origins of Science*. London: George Allen and Unwin Ltd., 1962. Print.
- Kors, Charles. *Encyclopedia of the Enlightenment*. Oxford: Oxford UP, 2003. Print.
- Laudan, Larry. *Beyond Positivism and Relativism: theory, method, and evidence*. Oxford: Westview Press, Inc., 1996. Print.
- Merchant, Carolyn. *Radical Ecology*. Second Ed. New York: Routledge Taylor & Francis Group, 2005. Print.
- Merchant, Carolyn. "The Death of Nature: Women, Ecology and the Scientific Revolution." *The Scientific Revolution*. Ed. Lisa Sarasohn. New York: Houghton Mifflin Company, 2006. 149-156. Print.

Parenti, Michael. *The Face of Imperialism*. Boulder: Paradigm Publishers, 2011. Print.

Toulmin, Stephen. *Cosmopolis: The Hidden Agenda of Modernity*. New York: The Free Press, 1990. Print.

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