Battle in the Mind Fields

In the beginning

Battle in the mind fields: the characters in this story are, for the most part, a feisty and pugnacious cast. They come prepared for battle, they rarely take prisoners, and they enter the fray defending the faith. These are philosophers, psychologists, linguists, cognitive researchers of all stripes, the inheritors of the great classical questions that may live forever: What is thought? How is it that we are conscious of ourselves? How is it that humans are endowed with the gift of language? Is the multiplicity of languages in the world an indication that there are many ways of viewing the world, or are all the languages of mankind cut from a common cloth?

This book describes the evolution of some of these ideas and provides a rough snapshot of some of these people, with the goal of understanding the present, and with the certainty that the only way to understand the present is to understand where it has come from. A glance at what is to come may give the impression that we have wandered a bit through the pages of the past, but we promise that what we have included has reverberated in some fashion right down to the present day.

One of the best reasons to study the history of our disciplines is that everything we think we have learned was once an answer to a living, breathing question, and it was an answer provided at a time when alternative answers were also being taken every bit as seriously. But once an answer is certified as true and placed among our certainties, we forget the question to which it was the answer, and the consequence is that we forget what the alternatives were that once had enjoyed some traction. In short, we become trapped by our beliefs—not always a bad thing, as long as that leads to no problems. But this phenomenon leads in a natural way to a sclerosis of the mind, a hardening of the mental arteries, and in the end a less adequate understanding of what the disciplines have learned the hard way.

Although much of our perspective in this book derives from personal experience, we have also gained a great deal from the sociologists and philosophers who have studied the evolution of thought in various disciplines. Pierre Bourdieu, for example, made the case for what he called “anamnesis,” with a slight nod towards Plato, though using the term in his own way. He argued that a necessary condition for scientific progress was understanding explicitly the conditions (not to mention the context and the constraints) under which dominant scientific ideas had emerged. He was referring not just to science, but also to the vast range of social endeavors that constitute human society. Whether we call it change, or development, or evolution, the fact is that the moment that we live in is always one of confrontation and contestation, for all the reasons we discuss in this book. Once that mo-
ment has passed, powerful forces enter into play to pretty up the past, to make it docile and submissive. Understanding and wisdom demand just the opposite, though; they demand that we know where we came from and how we got here.

Why? Because the *sine qua non* of scientific progress is what we might call the *disenchantment* of the scientific world. The student discovers a scientific world, ready-made and already endowed with simplified stories of the past. But the scholar who wants to understand must free herself of that thrall, and be on a first-name basis with that world; the scientist must eventually become their master, and in most cases, that means knowing how we got to where we are. Know where you came from, and you will know where you are going. And so we will have to begin in the past: not as far back as we might—in ancient Greece, say—but with a rapid introduction to the most relevant themes of the 19th century, when it seems that we can find the odd character here and there who is already contemporary, and many others who are almost there.

People respond and react to what they read, what they hear, and what they are told. That’s only human nature. No one locks himself in a closet and refuses to be influenced by other people. Yet it is not at all rare to encounter brilliant thinkers who try to wipe the historical slate clean—*tabula rasa!* as they say—and start over, afresh. Of course they *themselves* never do start over afresh, *themselves* unaffected by all the ideas and scholarship of the past, that would be impossible—but they send forth the message that the work of the past is unimportant. This seems very odd—and so it is. There is some willful forgetting going on, and we would like to know why, and to figure out what ought to be done to overcome it.

All thinking is a continuation of conversations that we have overheard or participated in. If we want to understand a book, we might need to have read perhaps not *everything* its author has ever read, but a quite a bit, and often what we find obscure in a difficult writer is obscure simply because we have to roll back some thought process that the writer had engaged in, when presented with other questions, other possibilities, and other ideas. Sometimes we engage in fast reading, just as we sometimes eat fast food; but just as there is with slow food, there is also a great need for slow reading, and we will engage the reader in such an activity in this book. We are tempted to say that a bibliography which goes back no more than five years is either unscientific or dishonest. Of course that is too simple, and of course we could *imagine* papers where a slender bibliography was all that was needed. But as a generalization, it has lot going for it. When it comes to the central questions of the mind, the giants of human thought have preceded us, and we must remember that if we often disagree with them, we never leave them behind. It is critical that we remind ourselves that part of the essence of scientific work consists of confronting a vast library of ideas. When we know a field thoroughly, we find that nine times out of ten we can summarize and on occasion even evaluate a book by doing nothing more than reading the bibliography carefully. 

---

2 Matthews makes a remark along these lines regarding Bloomfield’s *Language*; see p. 309 below. See Matthews, 1993.
3 Searle, *The Rediscovery of the Mind*, remarked, “The books I read in my philosophical childhood—books by Wittgenstein, Austin, Strawson, Ryle, Hare, etc.—contain few or no references to other authors. I think unconsciously I have come to believe that philosophical quality varies inversely with the number of bibliographical references, and that no great work of philosophy ever contained a lot of footnotes.” (p. xiv)
The second half of the twentieth century saw the development of an over-arching new view of mind which, despite its importance, has no simple name, and which will be a major concern of both volumes of this book. This new view is tightly bound to the machine that has changed our lives—the computer. But the connection is not a simple one. Computers, the real thing, first appeared during World War II, largely as part of the war effort, in the United States, in England, and in Germany. Computers were needed, at first to solve differential equations rapidly so that artillery could be more accurately aimed, and then in order to break enemy codes and encryption systems, and eventually to help in the development of the atomic bomb. But computers were not the simple source of the new ideas about the mind. If anything, it was the other way around: People were able to invent and create computers because these new ideas about logic and computation were already being developed. Technology, philosophy, logic, mathematics: all these fields were tied together in a complex unity that is no less real today than it was in the beginning of the twentieth century.

**Soft mentalism, hard mentalism**

A principal focus of our account is this transitional period and the change in the way the mind was understood. To give a name to it (though one that will need a good deal of spelling out over the course of the book), we will look at this shift from a soft mentalism to a hard mentalism. Soft mentalism focused on consciousness and self-awareness, while hard mentalism focused on representation, intension, and belief. Hard mentalism began as a fantasy: machines that could talk, play chess, and do sums. Pascal and Leibniz had some success with machines that could calculate. These fantasies began to take on form, if not life, and Charles Babbage came as near as anyone in the 19th century with his analytical engine. Hard mentalism sees Leibniz as its patron saint, while soft mentalism looks to Descartes.

And as logic is the science of what makes thought possible, there are two concepts of logic that correspond to these mentalisms: hard logic and soft logic.

The physical sciences over the past four centuries have been extraordinarily successful, and no thinking person could fail to see that. Like a sharp investor looking for a place to put his money, many thoughtful people have looked to the physical sciences to try to figure out what they are doing so right, and to see if there are lessons to be learned that could be applied elsewhere. The crass might call this physics envy; others will see it as prudence and good common sense. We will see how the fascination with science and with measurement came to the center of the stage in the 19th century, and well into the 20th century, as more kinds of objects came to be placed under the scientific microscope: the sound changes in language studied in depth and detail by philologists and linguists, especially German, in the 19th century, for example. Taxonomic structures of cultural and social systems, of biological species, and of chemical elements all developed quickly during this period. Some of these systems were shaken up again at mid-century by the Darwinian revolution, the revolution that gave a new perspective on how change over long periods could be understood without divine intervention.

---

1Both Descartes and Leibniz are rationalists, by today's reckoning, but this difference in how they regarding mentalism separated them every bit as much as whatever differences there might have been between rationalists and empiricists.
One of the messages that we expect our readers to take away is the idea that it is simply impossible to understand any of the mind fields—linguistics, philosophy, psychology, logic—over the past 100 years in isolation. Each field influenced, and was in turn influenced by, the others. This interaction, on the rare occasions it is discussed, is usually presented as a quaint corner of dusty history. We will try to show how wrong this view is, and how much these disciplines have suffered from being unaware of the origins of many of the most important ideas and values that have shaped them. And an important part of this intimate relation between the fields derives directly from the fact that these disciplines share deep historical roots, and in many ways were once one. There is much to be learned, for example, from watching how psychology fought for its independence from philosophy after the middle of the 19th century, and how linguistics continues to view its independence from psychology, and to reflect on that independence.

We will frequently see an idea appear in one discipline as if it were new, when it migrated from another discipline, like a mole that had dug under a fence and popped up on the other side. Disciplines may at times emphasize their limits, which is under most conditions a bad thing, but they also help clarify for a wide range of workers what the questions are that they should be addressing. Still, there are always individuals who are passionately interested in issues that transcend a single discipline and whose work therefore becomes multidisciplinary. It may be possible to write a history of a single discipline, but it is not possible to research a history of a discipline and restrict oneself to that discipline: the reality, the boots on the ground, has always seen thinkers read and write across the disciplinary boundaries.

We have found it useful to adopt some of Bourdieu’s perspectives, as we noted just above. Bourdieu generalizes the notion of capital from the economic domain to a wide range of social arenas, all the while recognizing that this capital can grow, diminish, accumulate, or even in some cases be wiped out in a crash. It is a banality to say that money is both a reality and a social construction. No one needs any explanation that money has its reality: it can be transformed into a sweater, a dinner, a car. And it is a social construction; without the force of a government behind it, a ten-dollar bill is just a slip of custom-made paper, not good for much at all. And while there is an arbitrariness to the units with which we measure monetary value all capital has the possibility of accumulating—of being added to by its owner.

In various social arenas, which Bourdieu calls fields, individuals enter into different relations with one another; most of the relations discussed in this book involve academic and scientific roles. In different fields, actors may work to accumulate capital, even though the capital is generally specific to each field. In the academic realm, the notion of capital corresponds to authority and influence, and under certain conditions it can transfer across

---

1 We are sympathetic to the remark made by Pietarinen in a paper on the Dutch symbolic group:

The limited recognition of this group is due not so much to individuals as it is to the philosophical community at large. During the last decades, philosophers have been guilty of a “crime against science” by withholding credit from developments in the history of linguistics, logic, and mathematics. The genetic origin of some of the key ideas routinely relegated to the analytic genre [of philosophy] may often be traced back to these largely-forgotten developments. p. 469.

We would simply add to this that the philosophers are no more guilty of this than any of the other disciplinary groups.

2 We use the academic present tense to describe Bourdieu’s sociological analysis.
fields—though the economic metaphor breaks down in such cases, since a transfer from one
field to another need not involve a decrease in accumulated capital in the first. But transfer
across fields, as Bourdieu underscores, is far from obvious and far from automatic: it is
indeed a complex alchemy, which can involve far more than an explicit or pre-established
set of rules; it may depend on a larger context, including ideas circulating on more extensive
fields, or a sensitivity to the widest field of all, the Zeitgeist.  

In the rest of this chapter, we will survey the principal themes that return frequently in the
story that will capture our attention. We have cast a wide net, from a chronological point
of view, so that we can see recurrences. And see them we will.

**Liberation moments**

Here is the first observation to take note of: new ideas that catch on are always perceived
by the catchers-on to be liberating them from not just a set of ideas, but from a dogma of an
erlier generation. Each successful new way of looking at mind, language, and reasoning
is viewed as a *notional liberation moment*. This way of putting it captures both the heady
revolutionary fervor that comes along with a new scientific perspective, and the sensation
that a new perspective brings out explicitly what was wrong with the old conventional
wisdom—and now, with the problem out in the open, we can get rid of it, put it behind us,
and move forward with new vigor. We see the dogma of our elders, and wonder how they
could have failed to see it for what it was, as we do now.

One of the ideas we will try to spell out is that we never completely drop old ideas: they
remain with us, often getting harder and harder to see consciously, which is generally not
a good thing. But one of the constants we will hear in the stories that are recounted by
participants is this: each person, individually and in concert, felt that he or she had had a
great weight lifted from their shoulders, and that weight was the weight of a heavy past
tradition. The behaviorists felt that way (p. 218), as did the logical positivists (p. ??),
the early generative grammarians, and then the later generative semanticists. Yehoshua
Bar-Hillel told of his similar conversion experience upon first encountering Carnap’s and
Reichenbach’s work (see page 372 below).

It follows from this that if you do not understand how a once dominant idea could have
captured the imagination of smart, young people, then you simply do not understand it.
All new ideas that grab the imagination of new people in a field do so because they are
perceived as liberations from some kind of orthodoxy of the past.

---

1 Randall Collins (Collins, 1998) has developed a sociological analysis of philosophy that shares some aspects
of Bourdieu’s work; we have found Collins’s work helpful, as well as some of his aphorisms, such as the observation
that “intellectuals are people who produce decontextualized ideas.” [p. 3] Our trees of intellectual genealogy
were inspired by some of Collins’s genealogies, and also by Boring. [294] Collins’s detailed look at intellectual
genealogies has left a strong impression on us, and we have been struck on more than one occasion by the justness
of his remark that “as usual, intellectual energy is propagated down the wires of interpersonal contacts, while the
content of ideas is rearranged by horizontal strains of opposition reconfiguring the attention space.” [718] One
may see Zuckerman, [1975] chapter 5 for an interesting discussion of similar genealogies among Nobel prize
laureates.
The whole history of grammar, for thousands of years, had been a history of rules and constructions, and transformational grammar in the early days, generative grammar, just took that over. So the early generative grammar had a very traditional flair. There is a section on the Passive in German, and another section on the VP in Japanese, and so on: it essentially took over the traditional framework, tried to make it precise, asked new questions and so on. What happened in the Pisa discussions was that the whole framework was turned upside down.

So, from that point of view, there is nothing left of the whole traditional approach to the structure of language, other than taxonomic artifacts, and that’s a radical change, and it was a very liberating one. The principles that were suggested were of course wrong, parametric choices were unclear, and so on, but the way of looking at things was totally different from anything that had come before, and it opened the way to an enormous explosion of research in all sorts of areas, typologically very varied. It initiated a period of great excitement in the field. In fact I think it is fair to say that more has been learned about language in the last 20 years than in the preceding 2000 years.

The last sentence is certainly a show-stopper: you either believe it—or you are stunned by its scientific immodesty. But immodesty (if that is what it is) aside, it illustrates the giddy feeling of liberation that so often comes along with being part of a movement that takes itself to be revolutionary. Martin Joos, an ornery member of the post-Bloomfieldian generation, must have had this in mind when he wrote that “linguistics has been preeminently a young man’s pursuit ever since the 1920’s.”

Sociology also reminds us that it is not always best to focus too much on the individual: as Bourdieu put it, it is not so much the heir that inherits the inheritance, in the world of ideas, as it is the inheritance that inherits the heir! We should not be too shocked to discover that systems of positions and dispositions are reborn in each individual in each new generation of scholars.

Here’s another way to think of it. There is a force that we can feel when we read the work of giants who have preceded us, an energy that comes with it an ability to make us think today. At the same time, the most profound contributions have always been the result of a thorough knowledge of orthodoxy and its dogma mixed with a passion for heterodoxy. There is no deep mystery why this should be so. It is the simple result of the fact that no one thinks alone, or starts over from scratch.

Here is something else to keep in mind, something that we will state more than once, because it bears repetition: if the constant reminders of our ideas makes the dead weight of the past seem inescapable, don’t worry. Escaping the dead weight of the past is usually very

---

1Chomsky, 2002, p.95.
2Joos, 1957, Introduction.
4A riff off of Marx, to be sure: the estate of a lord inherits his first-born son.
simple: all that is necessary is to become aware, to become knowledgeable. The liberation is virtually instantaneous. There are grounds for hope and optimism.

Our kind of science

Any observer of the linguistic scene would notice that every generation has wanted its field be scientific, and what’s more, each generation thinks that it will be the very first generation to have succeeded in the quest to become a science. Within the mind sciences (linguistics, psychology, philosophy, logic), each generation rebukes the previous one for having wrongly thought that it had its hands on a legitimate scientific method and framework, and then it goes on to offer what it takes to be a truly scientific vision.

It is much more interesting for the reader to see this directly (rather than just having us tell you so). Here is a modest sample of moments when linguists observe that finally linguistics has become a science. We will begin here with a typographical convention that we employ in the rest of the book: within a quotation, added emphasis appears in boldface, and original emphasis appears in italics. Feel free to skim.

Since the commencement of the present century, and especially within the last fifteen years, the philosophy of language has been pursued with great ardor, and the learned on the continent of Europe, by following the grand Baconian principle of induction, have placed this science on a solid basis, and are in the way of most important discoveries. These discoveries are modifying the grammars and lexicons of every language.... The new method of grammar has a thorough and proper unity, because it commences with the proposition, as the central point. The value of every word and of every form is made to depend on its relation to the proposition. This develops the organic relations of language, and gives to the new method a scientific form.... The new method...of course is the same for all languages. Different languages may all be analyzed in the same way.

1838 Josiah Willard Gibbs: 5 Philological Studies with English Illustrations p. 3. The passage is dated May 1838.

Another science, cultivated with great zeal and success in modern times, compares the languages of different countries and nations, and by an examination of their materials and structure, endeavours to determine their descent from one another: this science has been termed Comparative Philology, or Ethnography; and by the French, Linguistique, a word which we might imitate in order to have a single name for the science, but the Greek derivative Glossology appears to be more convenient in its form.

1858 William Whewell Volume 2:258.
In old classical usage, [philology] meant the love of literature; afterwards the scholastic mastery and exposition of language; more recently a sort of general amateur study of language, as a matter of mere pleasant curiosity; and last of all, the scientific exploration and comprehension of its interior mechanism, in relation both to its original elements, and also to their varied transformations, through a wide range of comparative analysis.

1859 Benjamin W. Dwight, page 215.

The science of language is a science of very modern date. We cannot trace its lineage much beyond the beginning of our century, and it is scarcely received as yet on a footing of equality by the elder branches of learning. We hear it spoken of as comparative philology, scientific etymology, phonology, and glossology. In France it has received the convenient, but somewhat barbarous, name of Linguistique... We do not want to know languages, we want to know language; what language is, how it can form a vehicle or an organ of thought; we want to know its origin, its nature, its laws; and it is only in order to arrive at that knowledge that we collect, arrange, and classify all the facts of language that are within our reach.

1862 Max Müller The Science of Language

In a course of lectures which I had the honour to deliver this Institution two years ago, I endeavored to show that the language which we speak, and the languages that are and that have been spoken in every part of our globe since the first dawn of human life and human thought, supply materials capable of scientific treatment...we can treat them, in fact, in exactly the same spirit in which the geologist treats his stones and petrifications, nay in which the botanist treats the flowers of the field, and the astronomer the stars of heaven. There is a Science of Language, as there is a science of the earth, of its flowers and its stars; and though, as a young science, it is very far as yet from that perfection which...has been reached in astronomy, botany, and even in geology, it is, perhaps, for that very reason all the more fascinating.

1868 Max Müller
Those who are engaged in the investigation of language have but recently begun to claim for their study the rank and title of a science. Its development as such has been wholly the work of the present century, although its germs go back to a much more ancient date. It has had a history, in fact, not unlike that of the other sciences of observation and induction—for example, geology, chemistry, astronomy, physics—which the intellectual activity of modern times has built up upon the scanty observations and crude inductions of other days. But to draw out in detail the history of growth of linguistic science down to the present time, with particular notice of its successive stages, and with due mention of the scholars who have helped it on, does not lie within the plan of these lectures. Its execution would require more time than we can spare.

1864 (1867) William Dwight Whitney: The Study of Language: 1

In 1871, August Schleicher described linguistics in a way that seems so modern that we cannot present less than the first two paragraphs:

Grammar forms one part of the science of language: this science is itself a part of the natural history of Man. Its method is in substance that of natural science generally; it consists in accurate investigation of our object and in conclusions founded upon that investigation. One of the chief problems of the science of language is the inquiry into, and description of the classes of languages or speech-stems, that is, of the languages which are derived from one and the same original tongue, and the arrangement of these classes according to a natural system. In proportion to the remainder but few speech-stems have hitherto been accurately investigated, so that the solution of this chief problem of the science must be looked for only in the future.

1871 August Schleicher. Page.

By grammar we mean the scientific comprehension and explanation of the sound, the form, the function of words and their parts, and the construction of sentences. Grammar therefore treats of the knowledge of sounds, or phonology; of forms, or morphology; of functions, or the science of meaning and relation, and syntax. The subject of grammar may be language in general, or one particular language or group of languages; grammar may be universal or special: it will in most cases be concerned in explaining the language as a product of growth, and will thus have to investigate and lay down the development of the language according to its laws. This is its exclusive province, and therefore its subject is the laying-down of the "life of language," generally called historical grammar, or history of language, but more correctly "science of the life of a language" (of sound, form, function, and sentence), and this again may be likewise as well general as more or less special.

Great progress has been made in phonological science during the past score or two of years, and it is hardly too much to say that the mode of production of the ordinary articulate sounds composing human language is now understood in all its main features.

1874 William Dwight Whitney: IX. The relation of vowel and consonant: page 277 of Oriental and Linguistic Studies...the East and West. Religion and...

Here is the objection, which we take to be more or less well grounded: you transform the study of languages into the study of Language, of Language as considered as a human faculty, as one of the distinctive signs of its species, as an anthropological, or even zoological, character...The most elementary phenomena of language will not be suspected, or clearly noticed, classified, and understood, if we do not insist on the study of languages from beginning to end. Language and languages [langue and langage] are one thing: one is the generalization of the other. If you want to study Language without undertaking the effort to study the quite evident diversity of what is found in languages, your effort will be in vain; on the other hand, if you want to study languages but lose track of the fact that in their very nature these languages are are governed by certain principles of Language, your work will be even more bereft of serious significance, and of all real scientific basis.

1891 Ferdinand de Saussure Saussure, 2002a: 115

A new science, called Phonetics or Phonology, has sprung up, and is now universally admitted to have created the modern science of language. In addition to this physiological and physical basis, the superstructure of the science of language has likewise been stated to be no longer a historical or a philosophical, but to have become a physical, science. It is true that, as with other natural sciences, so also in this case, the morphological, genetic, and biological aspects can be specially studied; also analogies can be drawn between geology and glossology as to their mode of inductive reasoning.

1903 John Theodore Merz

Merz adds, in a footnote:

In the modern science of language we have one among the many cases where a historical or philosophical science is becoming an exact science by attaching itself to physics and physiology. ... “It is phonology,” says Prof. Sayce (Introduction to the Science of Language, 2 vols. 1880, chap. iv) “which has created the modern science of language, and phonology may therefore be forgiven if it has claimed more than rightfully belongs to it or forgotten that it is but one side and one branch of the master science itself...It is when we pass from the outward vesture of speech to the meaning which it clothes, that the science of language becomes a historical one. The inner meaning of
speech is the reflection of the human mind, and the development of the human mind must be studied historically.”

The essential point...is...that de Saussure has here first mapped out the world in which historical Indo-European grammar (the great achievement of the past century) is merely a single province; he has given us the theoretical basis for a science of human speech.


In order to ascertain whether and to what extent linguistics is entitled to the name of a science, we must remember that in Modern English the term ‘science’ may be understood in two different ways, viz: (1) in a broad sense... i.e., scholarly knowledge; (2) in a more modern and more technical sense, so as to be applied exclusively to branches of learning concerned with permanent and invariable relations, such as mathematics, chemistry, physics. These and similar sciences, it is claimed, are able to make predictions for the future. If interpreted in this way, the term would not be applicable even to the evolutionary branches of natural science, such as geology and biology....The science of linguistics is...concerned with uniformities and permanent or steadily recurring conditions in human speech generally. We may count here, e.g., topics like the relation between language and dialects, the causes of phonetic change, the nature of phonetic laws, the mutual relation between appellatives and proper names, the various systems of counting, etc....As branches of linguistics concerned with permanent conditions, we may claim, above all, general phonetics and general grammar. Phonetics nowadays has assumed such proportions as almost to constitute a science by itself...In general or “philosophical” grammar, on the contrary, stress is laid principally on the relation between grammatical forms and mental categories.

1924 Hermann Collitz Collitz, 1925. Check original.

The layman—natural scientist, philologian, or man in the street—does not know that there is a science of language. Such a science, however, exists; its aims are so well defined, its methods so well developed, and its past results so copious, that students of language feel as much need for a professional society as do adherents of any other science.

1925: Leonard Bloomfield: p. 1
At the present time phonology is characterized by its structuralism and its systematic universalism. This direction of thought can be seen in physics, in chemistry, in biology, in psychology, in economic sciences, etc. Phonology is thus not isolated. It is part of a broader scientific movement.

1933 Nikolai Trubetzkoym "La phonologie actuelle." Trubetzkoym, 1933.

It is only within the last century or so that language has been studied in a scientific way, by careful and comprehensive observation....

1933 Leonard Bloomfield 3

Dynamic philology [which is what Zipf called his approach] has the ultimate goal of bringing the study of language more into line with the exact sciences. To this end it views speech-production as a natural psychological and biological phenomenon to be investigated in the objective spirit of the exact sciences from which its methods have been taken.

1936 George Zipf Zipf, 1935:3

The starting-point in such a science is to define (1) the universe of discourse and (2) the criteria which are used in making the classifications.


The native languages of our country had been studied by some very gifted men, but none had succeeded [before Boas] in putting this study upon a scientific basis.


The Kimhian [David Kimhi b. 1235?] theory placed the study of the Hebrew phonetics on a scientific basis....

William Chomsky 1945. page x.

There can be no doubt that Bloomfield’s greatest contribution to the study of language was to make a science of it. Others before him had worked scientifically in linguistics; but no one had so uncompromisingly rejected all prescientific methods, or had been so consistently careful, in writing about language, to use terms that would imply no tacit reliance on factors beyond the range of observation.

1949 Bernard Bloch. 92
Before the appearance of Bloomfield’s *Language*, linguistics was usually treated as an essentially humanistic discipline, often fruitful but not completely amenable to scientific method to procedure by postulates, hypotheses, and verification....Descriptive linguistics had, with few exceptions, remained on the level of our traditional West European normative grammar on the Graeco-Latin model; there had been scattered recognition of the need for improved methods of linguistic description (de Saussure, Boas, Sapir), but pre-Bloomfieldian efforts along this line had been relatively desultory and unsystematized. Bloomfield was the first to demonstrate the possibility and to exemplify the means of a unified scientific approach to all aspects of linguistic analysis: phonemic, morphological, syntactical; synchronic and diachronic.

1949 Robert A. Hall, Jr.

Modern scientific study has forced us to abandon many of the older commonly held views of language and has provided us with new principles and new assumptions which underlie new methods of analysis and verification. But the cultural lag in assimilating the results of this modern scientific study of language has been so great that the views and practices of a prescientific era still dominate the schools.

1952 C.C. Fries: 1

*Crossland*: Linguistics is still rather a young discipline. It’s only in the last 25 years or so that really serious attempts have been made to put the study of languages on something like a scientific basis. And the people who’ve been making them have been mainly occupied so far—and I’d say quite well occupied—in working at suitable procedures for recording and analyzing individual languages...

*Halliday*: I agree.... I think that in a sense what enables linguistics now to combine usefully with other disciplines is that it has been freed from entanglement with other subjects, such as psychology, and its establishment as an independent scientific study.


If one wanted to characterize in a word the direction in which linguistics seems to prolong [the views developed by Meillet], one could say that they mark the beginning of a linguistics conceived of as a science, by its coherence, its autonomy, and its goals. To say that linguistics moves in a direction of making itself scientific is not only to insist on a need for rigor which is common to all disciplines—it concerns first of all a change of attitude towards its object, which is defined by an effort to formalize it.

1954 Emile Benveniste Benveniste, [1954]6f
All those who knew Bloomfield best seem to agree that his chief professional concern was to develop linguistics as a science... There has been considerable difference of opinion from time to time as to the demands of “scientific” linguistics, but concerning the label of the ultimate goal itself there has been unanimity.

1962 C.C.Fries “The Bloomfield School”

p. 198

We are now in sight, for the first time, of a well-founded scientific and quite general theory of a genuine science of language, thanks to rigorous statistical and mathematical method, rigorously applied.

1964 Joshua Whatmough

The essence of Chomsky's revolution in linguistics was his gift to the field of a truly scientific perspective.

1980 Frederick Newmeyer : 20

[Minimalist grammar] is well on its way to becoming a full-blown natural science, offering a serious promise of an advanced field of scientific inquiry whose idealizations, abstractions and deductions will eventually match in depth and subtlety those of the most advanced domains of modern science. Generative grammar is turning into a natural science already, because of what it is now, not because of what it might one day turn into...

1998 Piatelli-Palmarini In the foreword to Uriagereka.

2003 Peter Culicover and Andrzej Nowak Dynamical Grammar:5

In spite of its antiquity as an object of human enquiry, linguistics as a science in the modern sense is very young. It was only the last century [i.e., the 20th century] that the study of language moved beyond observation and superficial description to attempts to explain why human language is the way it is. The primary impetus for this dramatic and revolutionary shift was the work of Chomsky (Chomsky 1957, 1965).

2007 Boeckx and Piatelli-Palmarini

We are among those who are persuaded, on solid grounds we think, that in the past 50 years linguistics has progressively established itself as a genuinely scientific discipline.
When we read a few of these remarks from the 19th century, it is tempting to brush them off, but when one sees the same message published non-stop over 150 years, it forces us to pause and think about why scientists of the mind conclude, again and again, that they are the first to approach their problem scientifically.

Were they right or were they wrong? If later generations look back at the work of previous generations and doubt that what they find was the product of legitimate scientific practice, what is going on? Has the very meaning of the term science changed over time, or are the demands of scientific practice evolving in relation to how much has already been discovered? The answer to these latter two questions is undoubtedly yes, but we can also take away another entirely legitimate conclusion from this brief tour: the thoughtful actors in this story have always made special efforts to reflect on what science is, and how their discipline should develop in order to be taken seriously as a science by the neighboring scientific fields.

This, then, is a major theme that we will follow throughout this book: the best thinkers are constantly asking themselves the question, what does it mean to be a science and also to be interested in my questions? How should we be doing our work if we wish to be scientific?

The world of ideas and the world of social relations

As linguists who came of age in the late 1960s, we ourselves saw and felt the two effects we mentioned above among the generative grammarians we were proud to be a part of. We prided ourselves on our liberation from the shackles of behaviorism and other forms of empiricism, and we felt that generative grammar finally brought linguistics to the same playing field as other sciences. Finally, we thought, linguistics had developed formal theories that were worthy both of the complexity that emerges from a careful study of the data, and of the efforts of scholars who understood the power of formal mathematical models.

We forgot that we were ourselves the children of a revolution which itself had been equally forgetful: the structuralist revolution which did its best to forget its past, and reinvented the human and social sciences during the half-century stretching from 1910 to 1960 by setting up the abstract notion of structure as the king in the kingdom of concepts that could explain everything.

We haven’t forgotten the feeling, but we have come to realize that we are not the only ones to feel this way. We were preceded by a number of generations of researchers who felt just the way we did—and we have been followed by younger scholars who feel that linguistics is finally about to make it as a scientific field, for the very first time. We do appreciate the irony. When we go back and read the early publications of such benighted predecessors as John B. Watson, the father of behaviorism, or the followers of Ernst Mach, the godfather of the Vienna logical positivists, or the structuralist linguists whose work forms the basis of

\[^1\] For the impatient reader who wants an example to chew on, take the case of the theoretical object known as the syllable. During the 1890s, Saussure developed a theory of what he called “sonants,” which took high vowels to be not flesh and blood phonemes, but abstract voiced coefficients that were interpreted by virtue of the phonotactics of the “sound chain.” Saussure, 2002b. For two recent discussions, see Laks (Laks, 2012) Tifrit (Tifrit, 2005) and Goldsmith, 2011.
our field today, we don't find stupid statements—we find people trying to cast off the chains of an official orthodoxy that they are certain is superannuated and standing in the way of scientific progress. And yet in the versions of intellectual history written by later generations of victors of the battles in the mind fields, the earlier approaches are described time and time again as so simple-minded that we can hardly take seriously anyone who went down that particular road. But we do know that those people, our intellectual ancestors, were no more stupid than we are today. Something must be wrong with the history books.

Well, maybe it's not simply the history books that are at fault. Maybe it's the simplistic conception of history that is wrong. There is nothing wrong with seeing history as a linear sequence of events, marked with dates and places—but that's only part of the picture. We cannot see the whole story unless we see the shifting tectonic plates of our history, composed of and populated by ideas and ideologies, including many global visions of the world that continued to have an impact on how scientists constructed and viewed the objects of their investigations.

Let's take an example. For the vast majority of contemporary linguists, regardless of the school to which they adhere, structuralist linguistics as it was practiced between 1925 and 1965 is as foreign as the blast of light that still reaches us from the Big Bang, a blast that is now reduced to a background buzz in the sky. Even contemporary views that recognize a debt to structuralism seem to view it as a dried-up well that was once the inspiration of a golden age.

In the history of science and that of ideas, the thickness of time is not uniform. Forty years and more separates us from the publication of *The Sound Pattern of English*, the manifesto of generative phonology published by Noam Chomsky and Morris Halle in 1968. And still it seems to be alive, living among its contemporaries in generative phonology. On the other hand, if forty years separated Leonard Bloomfield's "Set of postulates for linguistic analysis" for linguistic theory from Chomsky and Halle's *opus*, linguists in the 1970s could conceive of classical structuralism only as an obscure theory from an obscure time, a time that was almost literally prehistoric. It is as if space-time had been warped to such a degree that neither light nor information could reach us from that time. And this is all the more surprising given that any linguist over the age of forty, to say nothing of the founding fathers of our current schools, were trained in the methods and concepts of structuralism, whether we knew it or not. There isn't a student in linguistics from that generation who didn't burn the midnight oil trying to solve problems built from data torn from the pages of *IJAL*, the *International Journal of American Linguistics*, to say nothing of problems xeroxed out of the standard textbooks of the 1950s: Gleason 1955, Hockett 1958, Joos 1957. We know whereof we speak: we were there ourselves, we burned that midnight oil.

What is the cure for this selective amnesia that leaves us blind to our own origins? This is the work that we alluded to above under the rubric of Bourdieu's *anamnesis* (p. 7 above), the first goal of any study of the history or the epistemology of a discipline. If it sounds suspiciously like psychotherapy, then so be it! We need to bring out into the light of day the hidden linkages among ideas, sometimes denied because they show connections to ideas that seem embarrassing somehow. We need to bring out the underground ruptures that were never publicly acknowledged.
We are not willing to think about intellectuals as a spontaneous product of a virgin birth, or as creative powerhouses free of any and all external influences. We cannot understand theoretical frameworks without understanding the linkages and influences that helped to meld and form them. To speak today of intellectual *genealogies* is a bit loaded, as the word suggests thoughts Foucault and his take on the history of thought, much of which finds no resonance in our account. But genealogy is important, both for understanding a patrimony passed down in ways both conscious and unconscious, and for trying to unravel the conflicts and tensions which sometimes are passed down more as that-about-which-nothing-should-be-said than as any sort of explicit inheritance. One of the themes that promises to teach us a lot about ourselves is the deathly silence that has for so long hovered over the question of how the work of Bloomfield, Sapir, and their students has been a fundamental component of all subsequent American linguistics, including the most dominant perspective, generative grammar.

We have learned that the value of studying our genealogies was greater than we expected, and we will share with you quite a number of intellectual genealogies over the course of this book. To some degree, we were inspired by the study of Collins, 1998, a book in which the study of individual and personal influence seems to shed considerable light on the way in which influence and authority is defined and aligned in academic fields.

While Kuhn’s book, *The Structure of Scientific Revolutions*, plays a role directly in some of the literature that we will discuss, it is more generally viewed as part of a longer intellectual tradition that includes contributions by Pierre Duhem, Karl Popper, Imre Lakatos, Paul Feyerabend, Larry Laudan, and other people who have developed ways of understanding the history of science (or of sciences) and the way in which the nature of science as we know it includes alliances and conflicts. We are indebted to all of these authors for their insights, and we will refer to them at various points. Our primary goal is not to construct an over-arching theory of science, and we do not intend to align ourselves more with one of these scholars than another, but we are very much indebted to them in ways that will be clear throughout this book.

The history of the mind sciences is one of both rupture and continuities, and our principal task is to figure out how this can be so. A simple generalization can carry us quite a way: When we focus on the *ideas* in this story, what we see is a braid of ideas that interconnect and develop over time, and our story is one of continuity. When we focus on the *positions* taken by the individuals in the story, we find bold statements that separate rival camps, and ruptures of various sorts. Both of these perspectives are real, but neither of them, taken individually, is the whole story: this is found only in seeing both, together, at the same time.

---

1 Our discussion in this book is also at times a struggle against a popular, romantic, and often indefensible interpretation of Thomas Kuhn’s view of the history of science, an interpretation that glorifies the rupture of a scientific paradigm with respect to its predecessors. We will return to Kuhn at the moment when his *Revolutions* fits into our story in volume 2, but we can remind the reader now, without revealing any secrets, that Kuhn’s greatest impact came from the way in which he brought to life the sense that scientific research was not plodding and ahistorical. Quite a number of scholars and linguists have tried on Kuhn’s model for size, and found it wanting when they focus on linguistics. Our interest in Kuhn is elsewhere: we see him as part of the larger story, as someone providing intellectual tools in the very history that we are describing. Matthews, 1993.
We have, therefore, given ourselves total liberty to abstract away the human and social context, when that is useful for our study of ideas, and also to ask how the intellectual positions of an individual or of a group are affected by the fact that such human agents are living in a world composed of human beings. The first is sometimes called internal history, the second external history; both are important for us. At times we do the first, and follow the trajectory of an idea as it arises in one domain and evolves, perhaps touching down in two or three other domains. At other times, we examine the way in which real people interacted with other real people, and even if they shared an interest and a passion for the study of the mind, they were all along flesh and blood human beings as well.

How do styles and forms of social interaction have a direct and immediate impact on the growth and spread of ideas? Some ways are simply obvious. No one would deny the role that personal charisma can play in the spread of ideas. Some of the people we will discuss in this book were, or are, tremendously charismatic: we think of Franz Brentano, for example, or Edward Sapir, or Noam Chomsky. Others—like Leonard Bloomfield—were anything but.

The complex relationship that exists between a dissertation advisor and his or her doctoral student is another social bond that will be part of the story we consider. We have provided quite a few genealogies that indicate the relationship between a thesis advisor and a student. And an equally important relationship, one that will play a major role in our discussion, will be that of authority, a complex notion that involves both people (who is the authority? in whose judgment is she the authority?) and fields (she is the authority when which questions are at stake?). As human beings, we all live in a complex patchwork of such fields: a Catholic may agree that in religious matters the Pope is the final authority, but if the Catholic is a biologist, or for that matter a pharmacist called on to sell products her church does not approve of or condemns, she has to come to a decision on how the forces and relationships in one field carry over into another. None of these ways of thinking should be taken as tools to oversimplify complex issues; none of them deny the fact that the scientific world enjoys greater autonomy in some respects than others, due precisely to the commitment to increase knowledge that lies at its heart.

We must not leave aside the very personal passion that a scientist has for knowing, which can be just as strong as any social ties with other human beings, or even stronger. We are very aware of this; we think it is well characterized by Augustine and his interpreter Pascal, who speak of libido scienti, a human pleasure—passion might be a better word—that comes from snatching glimpses of truth. The seeker after truth is often willing to sacrifice a great deal if that sacrifice is the price of knowledge. That seeker after truth also prizes the awareness that he or she is not alone in trying to pose questions to Mother Nature and in finding ways to quantify and calculate and specify explicit models of nature. A scientist discovers who he is—or rather, that he is a scientist—by recognizing that he finds pleasure

---

1 There exists a relatively small literature that addresses the history of linguistics from a point of view informed by the sociology of knowledge and of science. Amsterdamska [1987] developed just such an account of 19th century comparative linguistics, in a book that grew out of a dissertation that she wrote with Robert K. Merton and Harriet Zuckerman at Columbia University. She defined a school of thought—the focus of her analysis—as “a group of scholars or scientists united in their common divergence, both cognitive and social, from other schools in their discipline or specialty or from the discipline or specialty as a whole.” (9)

2 “He who does not know the torments of the unknown cannot know the joys of discovery, which are the most powerful that a human mind can ever feel. But yet by a quirk of nature, this joy of discovery which is so sought for, so hoped for, vanishes as soon as it is found.” Claude Bernard.
and even joy in working, both alone and in teams, to better understand the natural world. We emphasize this point in order to underscore our view that we do not make science profane by considering its sociological aspect; that social side is one part, but only one part, of the larger picture.

Isaiah Berlin, the most profound raconteur one would ever hope to meet, wrote about his life in philosophy, and he put his finger on an interesting phenomenon that is not at all uncommon, and by its very nature involves the group within which one works—and in part, but only in part, its size. He wrote about the case whereby one chooses an artificially small and personal group of associates to serve as one's intellectual cohort. Oxford University was his home for many decades.

One of the shortcomings of these meetings is something that seems to me to apply to Oxford philosophy in general, at least in those days. We were excessively self-centered. The only persons whom we wished to convince were our own admired colleagues. There was no pressure upon us to publish. Consequently, when we succeeded in gaining from one of our philosophical peers acceptance or even understanding of some point which we regarded as original and important, whether rightly or, as was more often the case at any rate with me, in a state of happy delusion, this satisfied us completely, too completely. We felt no need to publish our ideas, for the only audience which was worth satisfying was the handful of our contemporaries who lived near us, and whom we met with agreeable regularity.

Berlin went on to say that the philosophers in that Oxford crowd did not feel that they had anything to learn from anyone outside the group. “This was vain and foolish and, I have no doubt, irritating to others.” Of that, there is no doubt. As we will see below, this description is echoed by linguists in the early years of generative grammar, linguists who were not from MIT and whose remarks were not taken seriously by young generativists.

Berlin ended with another telling observation: “But I suspect that those who have never been under the spell of this kind of illusion, even for a short while, have not known true intellectual happiness.”

Now, there is no way to tell if Berlin's conjecture, offered in passing, is really true, his point was this: For those seeking true intellectual happiness—what we referred to above as libido scienti—the adventure must be done in a community, not as a solitary individual, and the optimal size of that community may be measured in scores or hundreds, but certainly not larger than that. And not only is the work done within that community: it may well be that membership in this community goes hand in hand with an icy indifference to what is going on, intellectually speaking, outside of that community.

The significance of Isaiah Berlin's remark is that it reminds us of the importance of thinking about research in social terms—indeed, in sociological terms. Scientists quite rightly focus their attention on the subject of their science—whether that subject is language, rock forma-

---

1 Berlin, 1983.
tion, or mitochondria. But in doing science, each scientist is part of a social group—in fact, of many social groups, including the people from whom she learns directly (her teachers), indirectly (the authors of her textbooks and all the people who have established the field), and potentially (her cohort in grad school, her competitors, and so forth). We humans do very little that does not involve us as members of social groups—and that is what our real advantage is, as a species.

Scientists spend most of their time thinking about science: that is their work. From time to time, they think about the nature of knowledge, and the relationship between their theories and the world they study. We will have many occasions over the course of this book to hear the voice of scientists reflecting on the relationship between scientific theory and the reality that science aims to study. But rarely do scientists turn their attention to the more abstract question of the social structure of their activity.

Sociology is a field that could, in principle, be used to study the social structure of the scientists and their milieu. Indeed, over the last several decades, sociologists such as David Bloor, Bruno Latour, and Steve Woolgar have done just that, developing a perspective that has been called the strong program in the sociology of science. We do not see our work as fitting within that perspective, but we do believe that it is of the greatest importance to include in our account of how science works an explicit understanding that scientists work in a complex world, one that is part of a larger human culture, situated in time and in space, and we can learn from sociology how to ask questions that allow us to better understand how scientists accomplish what they do. We view the contributions of sociology to the questions we consider here to be entirely complementary to a study of the explicit logic of scientific research.

It is both helpful and important for us, as we organize our exploration of science and scientists, to draw a distinction between the pure world of ideas and of theory, and the social world in which scientists and disciplines exist and interact. Of course this is to some degree an artificial distinction: every paper is written by somebody who is a human being, every lecture is given by a person with strengths and foibles, and the audience in each case has a pretty good idea of who is writing and speaking—and this “pretty good idea” certainly has an effect on how the paper or lecture is received and understood. But the distinction is nonetheless important, and it allows us to view the developments in each of our sciences (and the activities undertaken by all of the scientists) in a way that provides new insights.

Our focus in this book is the nature of continuity and of rupture in the mind fields, and we are in a position now to observe that it is in the social world where rupture tends to be present and, indeed, to be a dominant characteristic, for there can be a clash between scientists over questions of authority even when there is little difference between their ideas. Of course there are important scientific debates over real scientific issues, and it can easily happen that these debates align with different scientific groups vying for scientific ascendancy—and in a sense that is what we might hope to find. But that is not all we do find, a good deal of the time.

---

1 Boudon has written a good deal of sensible material along lines that are entirely congenial to our perspective, such as Boudon, 1993 ch. 7.
Here, then, is what we propose to show: as we look carefully at the development of linguistics, we find far more continuity in the world of ideas than the extant literature would have us believe. Ideas move from one discipline to another—from logic to linguistics, for example—and from one embattled subdomain to another—generative semantics to interpretive semantics, for example. Good ideas tend to flourish.

Things are much more complicated on the social level, where people are born, grow up, and enter a discipline, and look for colleagues—compatriots—and a job. The world that they see before them is different from the world that their teachers saw in front of them a generation earlier. Those who persevere and remain active in their own discipline see it evolve, slowly or quickly depending on their own internal clock, and they do their best to help their students and those tendencies in their disciplines that they view as promising. And then they retire and leave, and all the while the process continues.

The social world of the scientist is built up out of relationships of communication, cooperation, and competition. No surprise there. Scientists communicate? Of course they do; they read and they publish papers, and they go to conferences. What more could we ask for? They cooperate: they share their results, and they go to extraordinary lengths to get their results out in front of their colleagues as fast as they possibly can. And they compete for such things as resources, and they compete for priority, and all of this competition makes the frontiers of knowledge move forward as quickly as possible.

As we say, that much is generally accepted. But there is more.

There is a far more important sense in which colleagues in a discipline support one other: they support each other’s views as to what the important questions are that must be answered, and how those questions should be defined; they support each other’s views as to how their discipline relates to neighboring disciplines.

They compete because life’s resources are finite and limited; a scientist wants his work to be taught in courses being given by his colleagues at other institutions, and there is just a finite amount that can be showcased in a course. There is only so much space in a syllabus, and adding one new piece of work typically means throwing out something else: that’s what it means for time to be finite. One could draw an analogy here to real-life commerce. We hear talk about “selling” a theory; but there is one enormous difference in the academic world (as Bourdieu pointed out): by and large, the people to whom one wants to sell one’s work are the very same ones who are out selling their own work. Much of science is a large souk, a bustling marketplace, where there are no customers for any merchant other than all the other merchants present that day. This simple fact has an enormous impact on the social structure of science.

Let’s be clear: there is nothing wrong with this, and if a person knows how to do science well, then one of the consequences of that is simply that others will be interested in his work. There is no way to criticize a scientist for having made his work interesting: the closest one can get to that is the jealous response we sometimes hear that Professor So-and-so’s presentations are flashy (which typically goes along with the follow-up that the

---

1Bourdieu, 1975.
material is not deep): flashy is a form of interesting that is not filling, and does not last long, and one wonders afterward just what it was that seemed so appealing during that flashy presentation.

The issue of what questions are interesting and important is second only to the question of what is true (and sometimes may seem even more important). In some disciplines, external funding agencies can wield enormous influence in this regard, and they may be quite aware of the role they play in influencing what questions are viewed as interesting and important. If a federal agency decides to support documentation of endangered languages, then the importance of that field will quite simply rise. Much more often, however, it is the senior workers in a field, those in their mid-forties or older, who make the case, in public, as to what the important questions are that should be addressed, and these scientists work to create a reputation that will encourage others to take their suggestions seriously.

Over the next few pages, we will discuss three ideas from sociology that are useful for understanding the evolution of the mind sciences: generations, authority, and a fierce fighting word, ideology.

Generations

Generations play a large role in the story we tell in this book. Across cultures and across time there are many different ways in which generations have been viewed. One view sees little but simple pairs of parent and child, as in the book of Genesis: And Arphaxad begat Salah; and Salah begat Eber. And Joktan begat Almodad, and Shelep, and Hazarmaveth.... Such a view is useful when we are interested in keeping track of who is a descendant of whom. But there are other views, much richer in texture.

In Greek mythology, the most important organizing force in the pantheon of the gods and heroes is the generation: mother and father come together, and engender a child—or more often, a whole set of children. Children of the same parents (and even to a large extent, children of the same father) tend to form groups of solidarity. The Titans were twelve children of Gaia and Uranus. Just as important, there is more often than not a presumption of serious conflict between a father and his offspring.

We all know that Sigmund Freud alluded to the Greek legend of Oedipus, who killed his father, King Laius, and Freud took this as a way of talking about the challenges a young boy experiences as he grows up. But the powerful dynamics of generations plays a much larger role than that particular one. Listen: Gaia was the very first solid thing that emerged after the aboriginal Chaos (whose name says it all), in Greek mythology. Gaia is the terra firma of our universe. After she came to be, she somehow managed to generate Uranus out of herself, without engaging in the usual procreative practices. Uranus was the sky, he was younger than Gaia, and he became her partner and her mate. The very first sexual union was thus that of Gaia and Uranus.

They were a fertile couple, but Uranus was a terrible father, and he refused to let any of his children emerge from Gaia—the first dozen of the offspring were the Titans, and the
rest were equally awe-inspiring. The Titans knew their father would not let them become people in the world: they were in a much more dysfunctional family than Oedipus's, and that is already saying a lot. If we want to bring this myth back to 21st century academic life, these Titans were the role models for the graduate students whose academic father never wants to let them finish their degree and go out into the world.

Back to Greek mythology. Uranus forced his children to stay in the underworld, which caused Gaia great pain, as well as great grief. Gaia conferred with her children about what could be done, but it was only the youngest of the Titans, whose name was Cronos, who was willing to take on his father (we must bear in mind that everyone in this story, unlike Oedipus's, is immortal, even if they are vulnerable to attack). Cronos took a sickle, and castrated his father Uranus. This symbolism requires no exegesis.

Life in dysfunctional families generally stays bad. Cronos himself was warned that he would someday have a son who would overpower him, and so Cronos in turn smothered his children. In his case, he did it not by keeping them inside their mother (as his father Uranus had done), but by swallowing them whole, which is a process in mythology that does not lead to imminent destruction—it is much like being swallowed by a whale in the Pinocchio story, or the story of Jonah in the Bible. Cronos's children were the role models for all of the graduate students whose urge to strike out on their own is met by their fierce teachers' will to keep them lashed tightly to the teachers' established truth.

Now, Rhea, who was both Cronos's sister and the mother of his children, saved her last child from being swallowed by Cronos. The last child was named Zeus, and she saved him by passing Cronos a surrogate child (always referred to as a “stone” in the myths) and secretly saving the real Zeus. When Zeus grew up, he managed to get his siblings out of his father (sources differ as to the method he used, though the use of an emetic remains the best hypothesis), and they all banded together to wage war on their hapless father Cronos and his siblings, the Titans. That ten-year war was the first great war in Greek mythology, and it pitted one generation against another, and in fact one set of siblings against another. Zeus's side (the younger generation) won the war, and their home, Mount Olympus, came to be known as the palace of the gods.

The power of these myths is that they bring together in one story the kinds of psychological and social forces that play major roles in how people act, individually and in groups. We certainly could understand intergenerational conflicts without bringing up Greek myths, but they do help us to focus on what makes us tick as the humans that we are, and they help us to understand, if only in a prescientific way, the kinds of forces that give rise to particular challenges that we will see in the chapters to follow, such as the rupture between the Neogrammarians and their teachers during an important moment in the development of modern linguistics.

But by no means is it necessary to embrace the metaphors of mythology to think seriously about generations. Sociologists since Karl Mannheim have explored the consequences of knowing this very simple fact about humans: we are born, we mature, we age, and we leave the scene to be replaced by others. Given the kind of creatures that we are, we leave behind

---

1Mannheim, [1952] [1923]:299.
a record of what we have seen and what we have learned, but the next generation after ours never experiences the same things that we did. Each generation faces challenges (social, economics, political, and other sorts) that were never seen in quite the same way before, and each generation has just enough time and interest to learn what it can from what was left to it by the previous generation. Science progresses fast because it gets rewritten by each generation: rethought, restructured, and rewritten. Some things get lost along the way, but hopefully not too much and hopefully nothing that we will regret having lost.

Or perhaps that is an oversimplification. Mannheim believed that it was just as important for society to forget as it was to remember, especially if the forgetting was a precondition for progress, or anything like it. He likened the lack of experience in the young to a lightening of the ballast in a ship: a lighter ship may be more agile, but then again, it may capsize in a storm. But on the whole, the inevitability of forgetting is, if not a good thing, a necessary thing, and a society (Mannheim wrote) composed of people who never died would have to come up with a new way to forget.

Any two generations following one another always fight different opponents, both within and without. While the older people may still be combating something in themselves or in the external world in such fashion that all their feelings and efforts and even their concepts and categories of thought are determined by that adversary, for the younger people this adversary may be simply non-existent: their primary orientation is an entirely different one. That historical development does not proceed in a straight line—a feature frequently observed particularly in the cultural sphere—is largely attributed to this shifting of the ‘polar’ components of life, that is, to the fact that internal or external adversaries constantly disappear and are replaced by others.

Let’s illustrate this point with an example. We will look in Chapter 4 at Wilhelm Wundt’s effect on the rise of psychology in the second half of the 19th century. One of his students was Edward Titchener, who thought of himself as bringing Wundt’s ideas to the United States—by way of Cornell University, in the event. And Titchener, in turn, had a student named Edwin Boring, who became a successful and influential professor of psychology at Harvard University, and whose writing on the history of psychology left a profound impact on how American students of psychology perceived the origins of their ideas. More recently, Kurt Danziger has questioned Boring’s efforts to go behind Titchener’s own words to see what Wundt himself was arguing for. “Boring was himself,” Danziger has written, “deeply committed to the positivist philosophy of science whose influence on the early development of psychology is at issue here. But his is the commitment of the second generation: What had been for his teachers conclusions carefully arrived at and boldly asserted, have now become matters to be taken for granted, implicit certainties not open to debate or even worthy of mention.”

Danziger underscored the pernicious effect that this leads to: psychologists fail to see that many of their decisions about how to treat phenomena are the consequence of prior philosophical commitments, not realizing that there are indeed a range of philosophical positions that can legitimately be taken, all of which have an impact on the work of science.

11”A science which hesitates to forget its founders is lost.” Alfred North Whitehead 1916: 413.
23Mannheim. [1952[1923].
in psychology. “This is a comforting attitude,” Danziger wrote, “for those who have no wish to question fundamental assumptions, and that usually includes the conservative majority.”

The more a philosophical view merges with the mainstream, the harder it can be to identify, even by those whose thinking is influenced by the idea all day long.

We should bear in mind that the effects on disciplinary knowledge that arise from the eternal shifting of generations are of two sorts. We have emphasized one kind, the more epistemological sort, which arises from the fact that the understanding of any one thing by a given generation will be different from the understanding of it by the preceding generation because the totality of what the newer generation has to learn has changed. The most striking instance of this occurs when a generation that struggled to learn something new and revolutionary passes the baton on to the generation that follows it, a generation which learned the revolutionary material in the classroom from textbooks.

The second kind of generational shift arises out of the fact that each generation begins young and then gets older and grows up, taking on greater personal and disciplinary responsibilities with each passing decade, expecting the generation of its teachers eventually to cede to it the positions of authority that once had been held by the older generation. This transfer of authority and influence is inevitable, but how smoothly and how graciously it occurs depends on many factors.

Let us look at an example of a shift in perspective that grows directly out of different generational perspectives. We will look at two remarks, made at different times by the same linguist, the first when he was a young man, and the second when he was an older and very distinguished figure (we'll let you know who he was after you've read what he wrote).

As a young man, he described what had happened when he sent a manifesto to an organization he belonged to. He thought the manifesto audacious—and he referred to the specific items as “theses”:

There were no substantial objections to the theses defended by [his group], and especially the resolutions about the tasks of [the larger organization] was accepted unanimously. If, however, [the manifesto] had been submitted to a secret ballot, it would have certainly provoked a few votes against it. Such was, at least, the impression gained from talks in the corridors. But, as a matter of fact, do the votes against mean much when they are devoid of any attempt towards argumentation? Such silent voices belong to those who realize that the recognition of the principles of ... [linguistics] generates the necessity for fundamental changes in the field of synchrony, in linguistic history and geography, and in the description of literary languages, whereas such a thorough reorganization does not suit the adversaries’ temperament.

This is a highly political view of the social structure that this young man was describing. He was just setting out on a career, in a period in which writing political manifestos was as natural as breathing the air. In the writer’s fantasy, a vote was being taken, a secret vote, and there was a certain frisson that came from the thought that perhaps the theses would have been objected to if the pusillanimous scholars had let their true beliefs be known. And
in that world of fantasy, those nay-sayers, those linguists who would have voted against, are not worthy of the privilege of having a vote: even if they had said “No,” it would have been the meaningless votes of the democracy in which everyone gets the same vote—just one—regardless of whether they really understand what they are voting on or not. This writer is a young man who is sure that he knows better.

Forty years later, this man, not so young any longer, has become the elder statesman of the field—it is Roman Jakobson, a major figure in 20th century linguistics. It is no longer of any value to think that the field of linguistics is riven by disagreement: what good is it to be a senior statesman if one isn’t listened to? Now Jakobson preferred to see accord and unity, even when the rhetoric in the street seemed to say otherwise.

“Linguistic theory of our time seems to offer a stunning variety and disparity of clashing doctrines,” Jakobson wrote, in 1970. But that is misleading, he suggested. Do we think we see “intensive contentions and tumultuous controversies”? That is mere appearance: do not be deceived. ‘A careful, unprejudiced examination of all these sectarian creeds and vehement polemics reveals an essentially monolithic whole behind the striking divergences in terms, slogans, and technical contrivances.” (p. 12) That is quite interesting, if only because it invites us to face the question: when is it appropriate to tell two sides of an academic dispute to stop their disagreement, because the rest of the world sees them as arguing about how many angels can dance on the head of a pin? In the story that we will see, over the course of this book, there are many occasions where the heated words and intemperate rejoinders seem, from our position today, quite out of proportion to what was at stake.

In 1970, Jakobson urged the younger linguists to see that “most of these allegedly irreconcilable contradictions appear to be confined to the surface of our science, whereas in its deep foundations the linguistics of the last decades exhibits an amazing uniformity.” He wanted linguists to understand that when he was a young man, the field was rent asunder by real disagreements. Today, though, what linguists have in common “is particularly impressive in comparison with the substantially heterogeneous tenets that characterized some earlier epochs of this discipline, in particular, the nineteenth and the early years of the twentieth century.”

Jakobson urged linguists not to be led astray by terminology. “Most of the recent discord is based partly on dissimilarities in terminology and style of presentation and partly upon a different distribution of linguistic problems chosen and pointed out by single scholars or teams of inquirers as the most urgent and important.” Be more open minded, Jakobson suggested, and recognize that what interests you need not set the limits to the questions the entire field is engaged in answering.

We do recognize that it is not possible to remove the role played by personality in matters of generational conflict. Consider the noted philosopher Ernst Cassirer (who is deeply connected to our skein of psychology and linguistics as well), born in the 19th century and chased to the United States by Hitler, like so many of his peers. His view of generations was

---

1 Cassirer and his wife were traveling on the same boat as Roman Jakobson and his wife. The two men spent the duration of the voyage discussing the same subjects that we are discussing here.
different, and he felt no attraction to the notion that “there is a deep and insurmountable
gap between the generations; that every new generation must feel in its own way, think
its own thoughts and speak its own language. I regard this as a misleading and dangerous
dogma—and as a dogma that throughout my life I found constantly contradicted by my
own personal experience.” His intellectual equilibrium was not matched by many others
in this story.

Then there is the question of age. Many people have pointed out, with varying degrees
of graciousness, that the older one is, the harder it gets to change one’s views about ba-
sic scientific questions, but even that observation (which is no doubt correct) stands in
need of explanation: is it to be explained by hormones and brain deterioration, or by ratio-
nal risk-aversion, or by the possibility that the older scientists understand better than the
younger ones the range of good reasons why the current orthodoxy came to be dominant?
Whichever account turns out to be correct (and all of those sound quite plausible) makes a
difference for the conclusions that we draw from it.

Let us draw the tentative conclusion that some of the explanations for conflict and change
may relate directly to a difference of generation. Still, that remark by itself leaves open a
wide set of interpretations: the older generation may be irrationally clinging to a bygone
tradition, the younger generation may be seeking something that is simply different from
what came before, the older generation may be suffering from inadequate technical skills,
the younger generation may be seeking job perks, or simply jobs. Technologies and domi-
nant ideas may change, and a younger generation may be more willing or more capable of
adapting and adopting them.

The generational character of a discipline is distinct from the effects growing out of the
strong mentor/student relationship that invariably arises in the training of a young scholar;
this latter lies properly in the domain of individual psychology, while the generational char-
acter of a discipline lies at the social level. This is a distinction that is useful, though we
cannot pretend that it is always easy to draw neatly. Actors in our story make this point,
in fact: we have already met E.B. Titchener, a psychologist important in the early years
of American psychology, who had lost his father early in life; he remarked, “Until one is
thoroughly settled for oneself, it must be good to have someone responsible in the prior
generation upon whom one can lean.” He wrote of William James, a bit older than himself
and established as a psychologist, “James especially owed it to American psychology I think,
to take some interest, and to deal out praise and blame.”

That is a very interesting and revealing remark, even if it is one with which we do not agree,
and it is one that steps well outside the bounds of what can be justified on traditional
scientific grounds. It is, at the end of the day, one of those things that one may say to

1Quoted in Hendel, 1949, p.56
been a student of Hermann Cohen, not an easy man to be a student of. Cassirer’s wife described Cohen (after
Cassirer’s death): “His stormy temperament was combined with a burning desire to get his way—using all means
at his disposal—in matters close and important to him... Cohen was a zealot, who could not understand or tolerate
opposition... Cohen regarded himself with great pride as the head of the “Marburg School” which he had founded...
[He] would animate his pupils with all the fervent love of truth that was in him. Every deviation from his point of
3Bjork, 1983: 75.
oneself when one feels that the world is not feeling quite fair, and not quite the way one's parents had said that things were going to be when we were grown up. We will see other cases where one generation disappoints another—sometimes the older one disappoints, and sometimes the younger one.

Authority

A second aspect of science that arises because of its social character is the presence of authorities. There is no getting away from accepting the word of authorities, and what an authority declares is better protected from being falsified than is something that is declared by someone not viewed as an authority. What the great Charles Darwin wrote, with his characteristic modesty and his charm, is just what we all hope we can say:

No doubt errors will have crept in, though I hope I have always been cautious in trusting to good authorities alone.

Alexis de Tocqueville offered a number of astute observations regarding precisely this point: to accept an authority means to trust, and there is no option that avoids this:

Tocqueville, 1835,1840:2 Volume II, Chapter 2, Of the Principal Source of Belief among Democratic Nations.

A man who should undertake to inquire into everything for himself could devote to each thing but little time and attention. His task would keep his mind in perpetual unrest, which would prevent him from penetrating to the depth of any truth or of making his mind adhere firmly to any conviction. His intellect would be at once independent and powerless. He must therefore make his choice from among the various objects of human belief and adopt many opinions without discussion in order to search the better into that smaller number which he sets apart for investigation. It is true that whoever receives an opinion on the word of another does so far enslave his mind, but it is a salutary servitude, which allows him to make a good use of freedom.

Darwin and Tocqueville look at one side of the authority market, the demand side: we need authorities. As long as there is research to be done, there will be a demand for authority. The other side of the coin is the supply side (although the marketplace metaphor begins to feel a bit contrived): what the scientist wants above all else is to be the provider of authority to others, which is to say, to be the authority. The very word authority contains within it two important things: it is, first of all, relational. One can only be an authority for

1On the Origin of Species. Darwin, 1859:2
2Tocqueville was responding to a more familiar, but opposing, point of view, one which was expressed well by Thomas Hobbes in The Leviathan: “someone who in reasoning about something—anything—starts by taking on trust the conclusions of authors, and doesn’t derive them for himself from the proper starting-points in every calculation (namely, the meanings of names as settled by definitions), wastes his labour; and at the end of it all he doesn’t know anything but merely believes.”
others, in the sense that one is never an “authority” to oneself (it is not even clear whether it makes sense to ask whether one is an authority in one’s own eyes). If someone is an authority in an area, it is to someone else that he is an authority. Being an authority is by its very nature a relational, a social, phenomenon. And being an authority in science has much in common with the more general use of the term authority, as when we say that “he took his complaint to the appropriate authorities.” The authorities have a certain power invested in them, and we expect them to exercise that power in a legitimate fashion, not overly influenced by self-interest.

It seems to us that the natural history of science can only be understood if we look carefully and sensibly at both aspects of science. Each individual scientist works as hard as possible to move the accumulated wisdom of a discipline forward, and in doing so to establish himself as an authority, in some fashion, among those with whom he works, and among those with whom he communicates.

The notion that a scientist strives to be an authority is hardly surprising; when we train beginning graduate students, we tell them that their work towards their doctorate will focus on their becoming the world’s expert on some particular (and almost always) small domain. We expect them to control the literature in that area, and we hope that when they are done, no one else will be able to publish something on that topic without having to cite our student’s (eventual) doctoral dissertation, or a journal article derived from it.

To a certain limited degree, the goal of achieving authority may under some circumstance act as a force binding larger groups and mitigating forces towards smaller groups, in the sense that the total amount of authority an individual reaps is heavily weighted by the size of the group in which that authority is recognized. Oversimplifying a bit, this is just to say that if one is invited to give a keynote address at a meeting of an association and derives from this invitation some measure of authority in his future interactions, the amount of authority (if we can speak of such a thing) is directly linked to how large the association is.

**Group identity**

It does not take very much for a human act to become a social act: when the act involves language, all that is necessary is for the person to imagine that he is addressing someone else, or that he is speaking along with someone else—as a linguist would say, all that is necessary is for there to be a 1st person plural, or a 2nd person engaged in the conversation, real or imagined. That is a very low bar. Once those conditions are satisfied, the person begins to develop an understanding of thinking as a social act.

When an individual acts, he typically acts as a member of a group in which he views himself as participating, and as that participation grows, he adopts and develops an account of what that group is. And so we will speak of a person’s self-in-group identity—or group identity,

---

1Boring, 1963b, p. 21: “Mankind wants its heroes... The history of science is spattered with the aggressive demands of great and lesser men for recognition and acceptance as leaders, but one hears less about the equally urgent need for followership, because the ranks of disciples are not limited by anyone's range of apperception.”
for short—and of the person’s group identity account. Charles de Gaulle viewed himself as a Frenchman, and he had a historic account of what it meant to be a Frenchman, associated with many noteworthy moments, not the least of which was the French Revolution in 1789. A graduate student submitting a thesis proposal views herself as a graduate student in a particular discipline.

As such groups arise, it is in the nature of human beings to develop accounts for themselves and for others as to just who they are. These accounts will often include a simplified story of a group’s origins, its original aims, and its current aims. Often this story can play an additional role: helping to maintain group solidarity, or even sending an encouraging message to those who are outsiders. In this way, the story can begin to take on a function of justification of the project that formed the group.

As an example, let’s look at part of the preface of an important work that we will discuss later, when we turn to early 20th century philosophy. After stating what he intended to do in his book, the author (whose identity the reader will learn in due course) turned to the question of how his work related to the work of others, and he made this observation: “The basic orientation and the line of thought of this book are not properly an achievement of the author alone but belong to a certain scientific atmosphere which is neither created nor maintained by any single individual.” Today we might paraphrase this by saying that knowledge is a social good that we share, rather than the possession of an individual, but when we say that, who is the we we have in mind when we say that we share it? We will come back to that. “The thoughts which I have written down here are supported by a group of active or receptive collaborators.” We will look at the genealogical ancestry of this philosopher later, but for now we may observe that he was not referring to the larger movement his work was indebted to, and in particular he viewed himself as part of a much smaller group. He explained that members of the group had “in common especially a certain basic scientific orientation.” In fact, this smaller group was as much as anything defined by what it had found, tested, and deemed to be no good at all in other philosophers’ work. As for the group’s own work, the fact that it rejected a traditional philosophy “is only a negative characteristic,” he wrote. “The positive features are more important: it is not easy to describe them, but I shall try to give a loose characterization.”

At this point he began to describe specific characteristics of this group. “The new type of philosophy has arisen in close contact with the work of the special sciences, especially mathematics and physics. Consequently [members of the group] have taken the strict and responsible orientation of the scientific investigator as their guideline for philosophical work, while the attitude of the traditional philosopher is more like that of the poet.” His group’s members did science, and they did not associate with people who thought like poets. “This new attitude not only changes the style of thinking but also the type of problem that is posed.”

That is a very important point for us, who are interested in the development of scientific groups; at the end of the day, nothing is more important than the characterization of what the questions are that we are interested in, and working on. We will see that in the area of the mind sciences, groups define strong principles that establish what these questions are for them. Those principles remain in a murky area that is neither quite a statement of
fact, nor quite a statement of value; these are the principles that define what an interesting question is for people in the group. This group was the Vienna Circle; the author was Rudolf Carnap, writing in 1926, just as his fame and that of the Vienna Circle were about to expand. We will return to his views below, in Chapter 7.

To sum up, then: for each social group that we belong to, we develop an account of that self-identity. This constitutes a story that we tell ourselves about who we are: about who we are as members of a certain group. In these stories it is convenient and useful to include what E.G. Boring called Great Events as well as Great Men. Boring was a psychologist, as we have observed, and he was talking to other psychologists, though he knew that they viewed him as a historian as well, and that he was therefore permitted to speak more freely than others might be. Nonetheless, he softened his point by using ironically Capitalized Nouns. He was discussing the fact that a discipline comes round to sharing stories of when its movements began and how they started, and anyone who makes an effort to understand the intellectual landscape will know that the Great Events are peaks in a chain of mountains: high and visible, but not isolated and not always the highest altogether. Boring said these Great Events helped “meet man’s need to make history comfortable to understanding by personalizing it.” He went on to observe that these stories often incorporated specific Great Events that were taken as moments when a movement started. His examples all came from the early decades of psychology, but we will see examples of this throughout the course of this book. Fechner thought his basic view of psychophysics first visited him in his bed on October 22, 1850. “People find pleasure in birthdays. To date the birth of a thought is to dignify it, and biographers pick up these anecdotes and embed them in history.”

Boring was all too aware of the inaccuracies that these comfortable stories might contain, despite the function they play. Should we try to get rid of the stories altogether? That was not possible. “The practical solution for all these predicaments seems to be to allow them, to use them, but to recognize them and every now and then to take measures to offset them.” [p. 21] This seems like a sensible piece of advice.

Twenty years earlier, Boring had been a bit less tolerant of the ways of the behaviorist movement. “A formal movement is thus a protest and the psychological reason for protest is, of course, insecurity. No established science feels insecure or protests, for, being secure, it turns to work without attention to itself.” He was reflecting on the state of psychology in William James’s day, which he thought was “insecure, self-conscious, protestant, and full of the business of founding itself”; it was aggressive and it exaggerated the importance of what it brought to the table.

---

1Boring, 1963a.
2Boring, 1963a, p. 18.
3Boring, 1942.
The term ideology ineluctably enters into the picture at this point, in light of the fact that one of its definitions is the account that the members of a group construct to define who they are as a group—what we referred to above as a group’s account of its identity.

Still, that is not how the term has always been used, in serious literature and not just the media. We can recall the far more tendentious accusations of ideology found in discussions of the radical left during the 1960s, including Lewis Feuer’s intertemperate Ideology and the Ideologists. Feuer developed a Freudian view of ‘60s rebels that has become part of the anonymous recollection of that time. For his part, Feuer proposed three core items in any ideology of rebels: “an invariant mythological structure, an alternating set of philosophical tenets, and a historically determined chosen group.” The myth is some variant on the Moses story, a man leading his people to freedom. “What is distinctive in ideology,” Feuer wrote, “is the drama it sets forth as the ‘meaning’ of the historical process, together with its assignment of the roles of leadership elite, chosen-class, and historical culmination.” In The Conflict of Generations, he wrote, “Student movements are the product of selfless, altruistic idealism combined with the resentment and aggression of one generation against another.”

The word ideology has, to be sure, an ingloriously checkered past, and it continues to be used today in everyday life in a casual and ill-defined sort of way, typically in a polemical context where a writer who is critical of somebody else’s position calls it “ideological.” “Free schools are a dangerous ideological experiment,” thundered one British politician, concerned that the schools were teaching Islamic beliefs. Another writer on the political scene describes as “ideologists” people who have a need to see more purpose in life than they find in staid bourgeois existence. A third commentator draws a parallel between militants who devoted their lives to the Communist Party and those who devote their lives to Islamic fundamentalism, declaring that such people have in common a need for an ideology (unlike the commentator). Yet another will characterize the “dominant ideology” of Western society as that of progress or reason. In case and after case, what is described as an ideology is a belief that is held to with great strength, but a belief which the writer is sure no one would take seriously if it were brought out into the open and debated rationally by people of good will. That very fact calls for an additional explanation of why those people over there do cling to that belief.

---

1 As with so many topics we deal with in this book, the subject of ideology is one with a vast literature. The term is analyzed largely by sociologists; Mannheim, 1938 is an important classic. We have profited as well from the discussion in Boudon, 1986, and in much that we have found in Bourdieu. The use that we describe here is quite close to that proposed by Paul Ricoeur (in Ricoeur, 1974). A case can be made that Francis Bacon was the first in the Western tradition to explore what has come to be known as ideology. He was wearing his hat as a sociologist avant la lettre in his Novum Organum, 1620, where he talks about what he calls idols.
2 Quotations from page 1 and page 4 in Feuer, 1975; and page viii for the quotation from Feuer, 1969.
3 The strong political attachment to the notion of ideology will return in Chapter 9 when we discuss Eurasianism, a political philosophy that Trubetzkoy was instrumental in founding. One recent writer noted, “According to one witty commentary, the Eurasianists had lost Mother Russia and also failed to find a Mother Europe. When Europe proved an alien world, there followed a fundamental reexamination of the self—what was Russian in a Russian.” Torbakov, 2008, p. 8. The urge to sort out the profound identity crisis was thus one of the most potent driving forces of Eurasianism. As one perceptive observer, Russian philosopher V.V. Zenkovsky, himself an émigré who left Russia at the end of 1919, noted, “Not ideology, but psychology, is essential and influential in Eurasianism.”
There is no getting away from the fact that in the broader world in which we live, the usage of the word ideology is both charged and tendentious. This fact is regrettable, because the notion of ideology, as developed by sociologists, could have been of use to us; as we observed just above, it could have served to refer to the group identity account. We will have to be very careful as we consider the power and strength of adhering to groups, whether they are political or intellectual in their grounding.

The term ideology was coined by Destutt de Tracy at the end of the 18th century, and he used the term to describe the study of the sensory origins of ideas. That usage did not last long. Napoleon, seeing in the Ideologists—a particular group of influential thinkers—critics of his political aims, began to use the word idéologue pejoratively to refer to a political actor whose abstractions are of dubious worth. Marx, and marxists after him, have often used the term as part of a way of arguing that most of the fundamental and tacit principles of a society emerge out of the economic relations found there, and these principles—the society’s ideology—may be self-serving, oversimplified, and nearly invisible to those held in its sway.

There are essentially three ways in which we find tacit criticisms packaged under the rubric of ideology.

Ideology, in the first place, may be detected where there is an unhappy and unfortunate mixture of value and description. What passes itself off as description on the surface turns out to be heavily value-laden. Raymond Aron suggested, “Political ideologies always mix (with varying degrees of aptness) propositions of fact and judgments of values. They express a perspective on the world and an intention regarding the future. They do not fall neatly into the category of true and false statements.”

We will see an example of this in finer detail in volume 2, when we explore the influential work of Thomas Kuhn on scientific revolutions. One of his colleagues accused him of writing ideology disguised as history of science. Paul Feyerabend wrote to him:

> What you are writing is not just history. It is ideology covered up as history. Now please, do not misunderstand me....[I do not] pretend that in history a nice distinction can be drawn between what is regarded as a factual report, and what is regarded as an interpretation according to some point of view. But points of view can be made explicit....Nobody will think that the history of crime justifies crime, or shows that crime possesses an inherent ‘reason’ or an inherent morality of its own. In the case of the sciences or of other disciplines [for] which

---

1. There was a complex political background to this development. The circle that came to be known as the Ideologues was a group that included such notables as Madame de Staël, Destutt de Tracy, Maine de Biran, and Benjamin Constant, who viewed themselves as continuing the concerns of the Encyclopédistes and the Enlightenment more generally in the decade following the French Revolution, notably in the period 1794 to 1803. They were committed to the fight against “metaphysicians” and others searching for first causes and essences, and they sought the origins of thoughts in sensation, with the belief that once this method was writ large, it would lead to a better and more stable vision of society. The origin of the term positivism also lies with this group. Madame de Staël, following Buffon before her, used the phrase positive science to refer to a quantitative method based on observation and measurement. Saint-Simon (who was close to Madame de Staël) adopted this usage as well, and Auguste Comte, who was a discipline of Saint-Simon early in his life, continued the use of the word; it is his usage of the term positivism which is generally acknowledged today. See Pickering. 1993: 61ff.

we have respect the situation is much more difficult and the distinction cannot be drawn with equal ease. But in these cases it is of paramount importance to make the reader realize that it still exists. You have not done so. Quite on the contrary, you use a kind of double-talk where every assertion may be read in two ways, as the report of a historical fact, and as a methodological rule. You thereby take your readers in...

A second criticism that is often brought under the general umbrella of ideology involves the accusation that one’s opponent adheres to a belief that is much firmer and even intransigent, when compared to other beliefs that one might maintain: a real clinging to a belief. People may be more resistant to acknowledging this belief, and they may find it harder to give up that belief in the face of what others see as reasons to abandon it. In short, they may be overly or irrationally committed to an idea—though not, needless to say, from their own point of view—and they may be unwilling or unable to formulate it explicitly. Lurking behind this view, more often than not, is the hope that the study of ideology can play the role of psychoanalysis, by curing and freeing the person who had been held under ideology’s sway.

Finally, charges of ideology are sometimes leveled when the accusation is really that one’s own self-interest is at stake. A more complex version of this is that it is not so much one’s own self-interest as it is the interests of those who already dominate (those who are “hegemonic,” in Gramsci’s usage). This sense of the word is often associated with a marxist orientation. But it can be interpreted in various ways, and some of them are more appropriate for a discussion of science, and of scientists (and their behavior as scientists). Researchers in a given field may all agree with one voice that tremendous advances have been made in the last ten years, say—and even if the person who repeats that sentiment out loud may not have any papers published that represent some part of that great leap forward, it is nonetheless true that he has a stake in the on-going health and wealth of the discipline. That stake can be as simple as the belief that his work is part of a legitimate scientific enterprise (and not a waste of his time!), or as complex as an effort to increase the money and jobs devoted to his style of research.

The first point (dressing up shoulds as ares) speaks directly to the content of the ideological belief; the second to the too-close-for-comfort relationship between the human believer and his belief; and the third, to the relationship between the objective economic conditions of the believer, his society, and the social role played by the belief.

Within all three uses of the term ideology—three uses which at times just barely contain the indignation of the accuser—there is one thing in common: they are ways in which an individual’s thought process is deflected from the true path it would have taken if that person existed in a world where there were no friends, colleagues, competitors, self-delusion, idle curiosity, deadlines, mortgage payments, conferences, books, publishers, fatigue, tenure decisions or time constraints. And because we often do our best to evaluate ideas abstracting away from those factors, we may naturally be led to the thought that when those factors do play a role in what we (or our colleagues) do, there is something deeply wrong. Raymond Boudon, whose work we have cited several times, takes such a point of view; he uses the term ideology in his effort to better understand how it is that otherwise rational people can
hold to a position that seems to rest on science, and yet does not, and which is nonetheless clung to with a force out of all proportion to what is rational.

Jehovah’s problem, and Noah’s solution

Nothing is more usual and more natural for those, who pretend to discover anything new to the world in philosophy and the sciences, than to insinuate the praises of their own systems, by decrying all those, which have been advanced before them.


There is an odd and curious phenomenon that occurs and recurs in the history that we will tell. We call it “Jehovah’s problem”—you may not have realized that Jehovah had any sort of problem. Let’s begin with a story that you know.

The reader will recall the state that Jehovah found Himself in, early in Genesis, just before the Flood. He looked at the sorry mess that the human race had made for itself and for the rest of the world, and decided that He had had enough. He was going to eliminate it all, and start all over again, but do it right, the next time. After a bit of reflection, He realized that Noah was not at all half bad, and it would not be fair to eliminate him, or his family; He would spare them, and the world would start all over again, but this time with just Noah and his closest kin. Noah built the ark; Jehovah sent the rain. Forty days later it was all over, and the only ones left were those who had made it onto Noah’s ark.

Noah was indeed a lucky man. He, and all of his descendants, did not have to contend with any competition from any of Noah’s former friends, enemies, or teachers. They were all gone, all washed up and washed away. All of Noah’s contemporaries, after the flood, were

---

1 Paul Ricoeur makes the case that people who tie ideology to social domination (as many marxists do) fail to see that what is interesting about ideology is something broader with greater reach. Too great a focus on domination, especially of one class by another, leaves us with nothing to say about a wide range of questions, and to the extent that ideology is understood as lying not very far from error and deception, it becomes all the more difficult to say anything useful about the story that one constructs for oneself as a member of a group. The difficult part of all this is that one’s interest—both self-interest, and the interest of the groups to which one belongs—can play a role in making one’s assumptions about the nature of the group’s activities seem natural and hardly open to challenge of any sort. Ricoeur, 1974.

It seems to me that we must escape from the clutches of the fascination of the problem of domination in order to deal with a larger phenomenon, which is that of social integration, of which domination is one dimension, but neither the unique condition nor the essential one. However, if we take it for granted that ideology is a function of domination, it means that we also admit uncritically that ideology is an essentially negative phenomenon, not too far from error and lies, and even closer to illusion; in the contemporary literature on the subject, one no longer even subjects the all too familiar and natural idea to serious criticism that ideology is a false representation, whose function is to hide the allegiance of individuals, professed by an individual or a group, that they have an interest in not recognizing. Therefore if one does not want to come to grips with this complex of distorted and unconscious [self- or group-] interest, nor simply take it for granted, we must, it seems to me, untie the knot that binds the theory of ideology and the strategy of suspicion, even if it means showing by description and by analysis why the phenomenon of ideology brings out suspicion as the immediate response.

2 Book of Genesis, chapter 6 to 9; Quran, Sura 71.
highly beholden to him. The book of history was henceforth rather short, too, because it consisted of everything that Noah wanted it to, and nothing else at all.

We will find many a mover and thinker in the mind sciences over the course of this book who felt himself to be both in Jehovah's shoes, and in Noah's. This is someone who looks out on what he sees, who looks back on what he has been taught, and does not like it, not one bit. This is someone ready to chuck it all, and start over: someone who would like to be able to call down 40 days of rain and a huge flood, to wash away the competition, someone who is sure he could ride it out in an ark of his own design. Alas, no one can do that. Still, we find characters who do the best they can, characters who send forth the message that everything that is being done today is a worthless waste of time. They have a new story to tell, a new way to study the mind, and we can do it right this time.

We call this Jehovah's problem—and obviously, it is not a “problem” in the usual sense; it's more of a mind-set and a marketing strategy, and a particular interpretation of how one's own work relates to the preceding scholarship. But it is very common in the mind sciences, and coming to understand it, in all of its nuances, is one of the challenges that we will face. Most often, this mind-set goes hand in hand with the view that everything that has preceded has failed to be scientific, and now we can go forth and be scientific—a pattern we have already discussed briefly. We will see this in psychology, first when John Watson introduced behaviorism in 1913, and again when behaviorism was overthrown (note the metaphor!) by cognitivism in the 1950s. We see it in linguistics when Bloomfield declares (with his students’ proud acclaim) that linguistics has finally become a science, in the 1920s, and again in the 1960s when Chomsky declares (with his students’ proud acclaim) that linguistics is finally a science.

In philosophy, we see this over and over again, in any number of different guises. The most famous philosopher who invited down upon himself a flood to wash away all assumptions and all former teachings was René Descartes, in the 17th century: he declared that he would doubt all things, wash away all certainty, and try to build up his beliefs and his knowledge from scratch. While some philosophers have been content to build upon the work of their predecessors, many have called for a complete washing away of what preceded them, on the grounds that it was all spoiled and rotten and worthless. The most ambitious of these was the logical positivists of the Vienna Circle, who urged a program that would relegate almost all of the work of their philosophical predecessors to the dustbin of history, where hopefully no one would ever read it again.

Towards the end of the 19th century, the philosopher Josiah Royce (perhaps the last American philosopher whose thought could be said to be squarely and firmly tied into the European currents of philosophical thought) made a similar observation. He began by saying that scholars and thinkers all recognize their ties to earlier thinkers: “The time is long past when really intelligent thinkers sought to do anything outside of intimate relations to the history of thought,” he wrote in 1892. But he thought about that again, realized that was

---

1 That this is a traditional strategy in philosophy is no news to philosophers, who have often remarked on it. John McCumber notes, for example (McCumber, 2001: 105), who refers to the “gesture of consigning all one's predecessors to the status of mere babblers,” and he calls it “standard for modern philosophers from Descartes to Reichenbach,” and refers to “Descartes's dismissive note on the prejudices he had imbibed from his education.” (243)

2 Royce, 1892, p. 343, and also Barrett and Aiken, 1962, p. 84.
not quite true, and continued, “It still happens, indeed that even in our day some lonesome student will occasionally publish a philosophical book that he regards as entirely revolutionary, as digging far beneath all that thought has ever yet accomplished, and as beginning quite afresh the labors of human reflection.” He obviously had an example or two in mind, but he did not choose to share them with us. “Such men, when they appear nowadays, as once in a while they do appear, are anachronisms; and you will always find them either ignorant of the history of the very subject that they propose to revolutionize or incapable of reading this history intelligently.” Yes, he clearly had some examples in mind. “What they give you is always an old doctrine, more or less distinguished in a poorly novel terminology, and much worse thought out than it has already been thought out, time after time...” And having acknowledged that such people do exist, he went so far as to point a finger about modern liberalism: “It is one of the defects of the current liberalism in matters of opinion that it does encourage, only too often, this sort of thinking; and the sole corrective of the error is a certain amount of philosophical study of an historical sort before one begins to print one’s speculation.”

It will be one of our main tasks in this book to document this pattern, and to try to come to grips with what is wrong with it, what is, occasionally, right about it, and why it is that it is so common. It is not just a personal problem; we are not interested in a psychological analysis of anybody, and certainly not of the people who have helped move these fields forward. The point is rather that we see a pattern, and not only that, we fail to see it reported in the literature as a generalization. When it is remarked upon, it is always as someone’s personal failing—usually that of the would-be Jehovah (or Noah). But clearly there is more to it than that. The proof that there is more to it is simple: in the real world, there is no Flood. There is nothing that washes away the books and the publications of the earlier scholars. And yet—and yet John B. Watson was able to convince people not to read literature from before behaviorism, and B. F. Skinner’s students were delighted to never have to read anything before Skinner. Chomsky’s students did not have to read what had been published before 1957, and so it goes. Why did the world of scholars permit itself to become dumb?—that is the question! Anyone can tell you not to read something. But what is it that makes you willing to follow that advice?

Credit problem, and heroes

There is a problem encountered by the kind of approach we develop in this book that we should point out here: it does not provide any help in solving the problem of credit attribution. If anything, studying the scholars’ work up close makes it all the harder to solve the problem of credit attribution. The more we learn about the evolution of the mind fields, the harder it may be to figure out who the real heroes are, and we find ourselves forced to question the reasonableness of asking that question.

In his brilliant book on Galileo, Kepler, and Newton, I. Bernard Cohen, one of the great historians of science of the 20th century, found himself trapped by the conflict of the two regimes of the world of ideas and the world of human beings. He surveyed the evolution of the ideas of motion, impetus, and inertia, and the development of these notions in the centuries before Galileo. One thing is perfectly clear: the world did not jump directly from
Aristotle's view of motion to Galileo's, even if Galileo, and more modern scholars, would like to give that impression. Cohen wrote\(^1\)

Galileo's originality was therefore different from what he boastfully declared. No longer need we believe anything so absurd as that there had been no progress in understanding motion between the time of Aristotle and Galileo. And we may ignore the many accounts that make it appear that Galileo invented the modern science of motion in complete ignorance of any medieval or ancient predecessor.

If you actually read the physics literature in the centuries preceding Galileo's work—that of Nicole Oresme, for example—you cannot fail to appreciate the continuous conceptual development during these centuries, and Cohen knew all of that material well: that was his discipline, after all. Cohen clearly sensed that there is a conflict at some level between demonstrating continuity in the development of ideas and the pointing out the brilliance and creativity of the work of such men as Galileo. And so he wrote,

By making precise exactly how Galileo advanced beyond his predecessors, we may delineate more accurately his own heroic proportions. [105.]

**Heroic**: that word says it all. When we focus on individuals and their life stories, we build heroes, and occasionally villains, and certainly buffoons. We explore the jealousy, we wonder at the rages, but the more we learn about the actual life of the ideas, the more we grow to distinguish the personal strengths and flaws from the advance of ideas.

Cohen was one of the greatest historians of science of the 20th century, and we do take his perspective seriously, even if we do not agree with it. He insists on the importance of great leaps of individual minds\(^2\)

We do not fully understand why or under what conditions, a few hardy individuals are from time to time led to think in wholly new directions, but the fact is that they do.

though he adds,

New ideas are rarely creations unrelated to the general background of ideas.

We would add: not only the general background of ideas but also the general sociohistorical background. In our own time, for example, it would be difficult to understand the internal debate and the upsurge of new ideas and themes without taking in account the rupture that 1968 introduced in every field—politics and music, economy and society, art and sciences, families and universities.

Here is another way in which the conflict between the regime of ideas and the regime of people has been treated. Claude Allegre, a well-known French scientist, introduced the

---

\(^1\)Cohen, 1960, p. 105. [Verify page: 111.]

\(^2\)Cohen, 1952, p. 506.
history of the notion of tectonic plates, first suggested by Antonio Snider-Pellegrini in 1868, and developed in the following years by others, including Elisée Reclus, and Frank Taylor. But it was Alfred Wegener, writing in the second decade of the 20th century, who is generally given credit for the idea. As Allegre notes,

He defended his theory firmly but without excessive aggressivity until his dying day. And so it is that he should be considered the father of the theory of shifting continents. As Georges Duby put it, in matters of reference and precedence, we must establish a simple rule, one which distinguishes clearly between an opinion which is simply one among many, expressed fleetingly, and a work that is built, argued for, and developed around a central idea. [In Duby’s words:] “Reference to one is anecdotal, to the other is central and necessary.”

Allegre is trying to solve a problem that simply does not exist, which is to say, he is trying to resolve the conflict between the continuity that inheres in the world of ideas and the rupture that we insist must exist in the world of actors so that we can fairly and justly apportion credit for originality. Perhaps that is too crude a formulation. Of course there is a problem, a problem of credit assignment, because that is how our modern world today works: we expect there to be an answer to the question of who deserves the credit for the idea of continental drift, the idea that continents are floating on tectonic plates. But this credit problem is not one which aligns sharply with any significant, or even meaningful, question in the history of ideas. In the world of ideas, continuity is the dominant characteristic.

In the next chapter we will look at the rise of European linguistics in the 19th century, and in many of those accounts, the author feels the need to decide just was responsible for the emergence of this new science. Two of the earliest candidates are William Jones and Friedrich Schlegel, but as one scholar notes, “despite the various claims that have been made in favor of Sir William Jones or Friedrich Schlegel in the history of linguistics, it is still generally held, and I believe with some justification, that Bopp’s Conjugationssystem of 1816 constitutes the ‘breakthrough’ of the New Philology.”

Trying to determine who should get the credit for an intellectual advance is asking the wrong question. Sometimes it is an unavoidable question to ask in the heat of the moment, as when we make decisions about whom we should hire or who should receive an honorary doctoral degree, or a Nobel prize. But no such concerns drive us as we write this book. To adopt a metaphor dear to the heart of Americans, science is a team sport, and while we know that individuals will win prizes for outstanding performances that are statistically measured, and individuals will be selected as Most Valuable Player at the end of each season, it is still the teams who play and win the games.

There is another reason to downplay the credit attribution problem. Deciding who should get credit can drown out consideration of other questions that are also important. One such question concerns the natural passage of ideas from one of the mind sciences to another—from philosophy to psychology, from psychology to philosophy, and so on. The actors,

---

1 Allegre, 1985, p. 21.
2 Koerner, 1975:725.
the thinkers who are themselves engaged in this, are by no means the people who best understand how this passage happens. In a recent study of the origins of Karl Popper's influential position on the nature of modern science, Michel ter Hark argues convincingly that the important position Karl Popper published in the early 1930s involved ideas that Popper had not had in 1928, when he wrote his doctoral dissertation, and that the ideas were solidly rooted in his study of Otto Selz, a psychologist who had written his second (Habilitation) dissertation with Külpe just before World War I, and who by the early 1920s was professor of philosophy and psychology in Mannheim.

Ter Hark is well aware that his reader is likely to say, “who?” when he first encounters the name of Otto Selz. “Selz was, I think, the greatest scientist to emerge from the brief but extraordinarily creative phase of German psychology at the beginning of the twentieth century in Würzburg,” a member of a group that included Oswald Külpe and Karl Bühler. Now, it is true that neither Külpe nor Bühler is well known today, but anyone who has read a bit about the history of psychology will have encountered them, something that cannot be said of Otto Selz. It is clear that ter Hark senses an injustice that began over 80 years ago. “Not to be credited for his scientific achievements seems to have been Otto Selz’s destiny (and fear),” ter Hark writes. And he proceeds to show in detail how Selz’s ideas about creative thought were adapted and adopted by Popper. That Popper’s work was an important example of the flow of ideas from psychology to philosophy is fine, and admirable. But ter Hark goes a step further, and compares the intellectual influences that he has found with the stories that Karl Popper developed in his intellectual autobiography decades later. “Reading Otto Selz... brought about a significant change of perspective in this early psychology, one which would ultimately lead to his evolutionary stance in epistemology and philosophy of science. Because Popper never explains this formative role of Otto Selz in his published work, I even began to think of him as seriously distorting the historical record.” (ibid.) Ter Hark ultimately set his goal to be to “reconstruct the immensely fruitful interaction that took place between psychology of thinking and epistemology”—between psychology and philosophy—and “simultaneously to give Otto Selz the credit that he especially deserves.” [xiv].

Ter Hark may or may not have accomplished the task of getting Selz the credit that he deserved. But he comes very close to raising a question to which his work gives a partial answer, one that is more important for our task: how should we read accounts constructed by our mind scientists? How should we interpret their choice of what to talk about and what not to talk about? Their choice of whom to talk about and whom not to talk about? Their choice of what to remember and what to forget? Sometimes the answer to those questions is as simple as noting that the mind scientists are hoping to engage in the credit assignment problem, or to engage in honorable or dishonorable efforts to influence future scholars engaging in credit assignment. When they do that, the stories they leave behind for us are not worth very much. But there may not be a better way, a right way, to carry out the credit assignment problem. We are not convinced that there is.

Let’s be clear on this, then: the distinction between the ideas and the intellectual positions taken by people that we will study is an artificial one, in the sense that one cannot exist

---

1 Hark, 2003, p. xii.
without the other. There is no history of ideas to study if there are no scientists around to develop the ideas, and there are no scientists to make bold claims if there are no ideas. Nonetheless, the difference is both useful and important if we are to get a better understanding of much of what happens in the history of ideas, and in particular, if we are to understand how the history of the mind sciences could be simultaneously a story of rupture and of continuity.

If we could, we would simply dismiss the credit assignment problem from all intellectual history: nothing so distorts the discussion of the development of our ideas than the passionate attachment to the assignment of personal credit. But we can’t; there is some inevitable and unavoidable reason to take on the credit assignment problem, as we will see. But the cost of going down that road is very high indeed.

**Mind and materialism**

One of the largest themes that will follow us throughout the book is the development of our understanding of mind, matter, and mechanism—and machines. Over the four or five centuries in which the Western scientific view has evolved, there has always been a sense of complementarity between mind and matter. For some, like Descartes, that complementarity is the reflection of a sharp division between the two, while for others, the separation has been less clear and more gradual. For almost everyone, the worlds of mind and matter differ at the very least by the ways that we describe and think of them, and the principles that we see guiding those two worlds. Over this time, our understanding of both mind and matter has changed considerably—indeed, radically.

A profound shift in Western thought occurred during the late 16th and the 17th century in which a new picture of materiality emerged, one in which the most important aspects of what is real in the world we live in was directly tied to material shape, to location and movement, and to a new, measurable quantity called mass. This shift was deeply connected to the scientific advances that were made in the study of the movement of objects both in free flight and under the influence of gravity. Galileo, René Descartes, Isaac Newton and others developed an understanding of the world according to which straight-line motion was a natural state for objects to remain in, and there was something about objects (not their size or shape, but something else) that determined both their resistance to change in speed and the degree to which gravity acted upon them. This is what Newton called mass.

Since mass was revealed, in part, by the way it interacted with gravity, the mass of an object could be measured by setting it on a scale, to see by how much force it was pulled to the earth.

---

1. On these questions, see Gross, 1998, p. 163, who observes, “belief that a happening is a discovery (and therefore entitled to priority) arises in the relevant scientific communities when a set of normative requirements is satisfied as a consequence of reading scientific articles.”

2. Wright and Bechtel (Wright and Bechtel, 2007, pp. 44-54) discuss the connection between views of mind, machine, and modern ideas of mechanism, with a somewhat different emphasis than ours. They present a useful analysis of the notion of mechanism in this context, focusing on the importance of deciding whether the essence of a scientific account is one that provides a model that is in harmony with observations by virtue of generating or justifying statements about observables, or an account that provides a description of what the things themselves in the real world are actually doing, observable or not. More crudely put, the question for the scientist is whether her model should be understood as providing a structural account of a hidden process that exists in the real world—if not, then the model is justified by the fit between its predictions and the observables. Strong arguments have been made that the fit alone is sufficient to justify the model, even if it is a hidden process, as long as the observable part is explained by it. This view is controversial, but is endorsed by many physicists and historians of science. In any case, the point is that the scientist should be conceptually clear as to whether she is justifying her model by the fit between its predictions and the observables, or by the hidden process that it models. This approach is useful for us in trying to understand how the credit assignment problem has been dealt with historically in the mind sciences and in other sciences.”
This was the first great scientific advance of the Western world, and it gave us a new sense of how the inorganic world fit together both beneath our feet and above our heads, both on the ground and in the heavens. But this scientific advance did not come with a mission to deny the reality of other aspects of the world, including most notably the spiritual side. Neither God nor the human mind was eliminated from the world views of Galileo, Descartes, or Newton. If the planets moved in paths that obeyed systems of quadratic equations in ways that people had never suspected, that was hardly a reason to doubt that a great mind lay behind the creation of this marvelous solar system that we live in. Yes, there was a revolution in how we viewed the physical universe; no, the revolution did not call for the deportation of God and spirit from the universe of the scientist. It was no accident that most of the greatest physicists were also great mathematicians: they were dazzled by the discovery that the language of nature, of God’s creation, was mathematics. 1

Our modern material view of the world was born in this period of 150 years—a view in which location, movement, and mass were central and essential properties, but several outstanding puzzles remained. The puzzles left little doubt that there was a great deal more about the universe than the distribution of matter in it. One mystery was why so many things retained fixed shapes. We call them solids, but why do some objects maintain a fixed shape as they move or rotate? Sticks, rocks, and bones (but not water or air) have a shape, a form, which means that the stuff inside them was bound together with a set of internal forces that remained to be explained. Whatever is responsible for holding things together is not matter itself. If there are atoms, what keeps the ones that are in solids in place? What keeps them from moving too far apart, or coming too close together? When two objects collide, why do they collide? Why do two solid physical objects refuse to mix and mingle, though two streams of water do? And how is it possible that things with the same size and shape can differ with regard to how much of this stuff called mass they are composed of? That is, why does a block of iron have more mass than a block of wood? Are there more tiny things jammed together inside a small piece of iron than there are in a small piece of wood? These were very basic questions about the fundamentals of the materialism that was emerging, and they had no obvious answers.

Behind these reflections was a hope cherished by our trio of scientists (Galileo, Descartes, and Newton) and those who came after them: they hoped that all interaction between things made of matter could be boiled down to two kinds of interaction. One was the local interactions between things that are colliding with one another, and the other was the non-local interaction that we call gravity, which mysteriously acts between massive objects over long distances.

---

1The secularization of the Western worldview has, of course, complicated history, but Isaac Newton was a strong defender of the voluntarist view that God continued to act in the world, and that He had not simply created the world and then contemplated it from afar. For a detailed account of this view, and how it related to Newton’s conflict with Leibniz, see Shapin, [1981]. A different understanding of God’s role was developed in the wake of this new view of physics which was called deism, and which thought God was maintaining a hand’s off attitude toward the universe, but that movement came later.
This modern world-view began with an effort to carve out some aspects of the world we can understand, but succeeding generations wanted to explore the idea that this material world is all there is. Suppose we allow that there is matter that is revealed quantitatively by how much mass it has, that mass can somehow congeal into objects with shapes and sizes, that these objects can move in space, and that they interact with each other only when they collide with one another (and then there is gravity too). But suppose we say that that is all there is; there is nothing more. What then?

As we just noted, the mechanical view of the world that Galileo, Descartes, and Newton proposed did not require that there be nothing else, certainly; Descartes could not have been clearer on the subject, explaining that there is both mind and matter in the universe. He understood the limits of explanation coming from the study of mechanics: mechanics has nothing to tell us about the way people think, or the way we use language. But others would follow who went to extremes, and of these the most famous was Descartes’s fellow Frenchman, de la Mettrie, who famously declared that man was a machine. De la Mettrie was born a half-century after Descartes died; from de la Mettrie’s point of view, he was adopting Descartes’s idea and pushing it to its logical extreme. If Descartes had been there to disagree, he would have told de la Mettrie that he himself had been drawing a distinction between mind and matter, that he could not have been clearer about this point, and that he was not trying to get rid of everything on the non-material side of that distinction. De la Mettrie would have shaken his head, saying that he was just taking Descartes’s ideas seriously. If he could have, Descartes would have told de la Mettrie that what was important was not the mechanical side of the material world, but the over-arching power of the rationalist point of view, capable both of informing us about how things work in the material world and of assuring us beyond any possible doubt that we ourselves exist as minds, and furthermore that God exists as well. Descartes was both a mechanist and a spiritualist. But it was de la Mettrie’s position that gained greater and greater traction.

De la Mettrie’s position, the materialist position, was that once we understand how material objects interact (and we were very far from understanding that, but at least we had begun), we would find that all interactions other than gravity are local, and they are strictly governed by the shape of objects, by their rigidity, their mass, and their motion.

And so materialism was born. It was a philosophy that was more smug than it had a right to be, because it declared that all that existed was material in space, yet there is a great deal that we do not know about material and that we do not know about space. But it was a very attractive philosophical position that will follow us throughout our story.

The biggest blow to materialism was the onward march of the scientific analysis of the material world, which never for a moment remained fixed and secure. Here are some of the things that science came up with that were serious challenges to early materialism: just as the amount of mass is conserved over time (matter can neither be created nor destroyed), so too energy is conserved. Like matter, energy can neither be created nor destroyed, but

---

1Descartes’s position was less attractive to Christians as well in the years that followed. Blaise Pascal, just a generation younger than Descartes, would be more in the spirit of his times, because Pascal was more comfortable with a belief in God that was based on faith and on grace granted by God, rather than on rationalist argument, as Descartes had argued. If Descartes were alive today, he would wonder why so many people thought that belief in God was based on faith rather than reason. For 21st century Christians who value faith above reason, Descartes is harder to understand than Pascal.
it can hop from one object to another during one of those local collisions. Heat is also an important part of the universe, and cannot be reduced to matter; the laws that govern how objects can heat up and cool down differ from the laws of motion, and the laws of heat are what made possible the greatest inventions of the 19th century, starting with the steam engine. Gravity was not the only exception to the rule that all things interact only locally. There were also magnetism and electricity too, which came to be seen as part of a single invisible electromagnetic field that pervades the universe, allowing objects to interact at a distance as far as our eyes can tell.

The materialists continued to argue that man is a machine (or better yet, man is nothing but a machine). In this, they knew that they were waving their hands at any number of difficult questions that they were not prepared to answer, such as how it is that people can use language in a meaningful way. We will see three major themes in the battle (for that is what it is) between the materialists and all those who were not materialists.

In the first place, the non-materialists continued to devise better arguments that there were aspects of mind that were not explicable by known mechanist principles. Second, science itself gave up on the principles of mechanism (as we have just mentioned) to a degree unimaginable by someone like de la Mettrie. The world-view of late 20th century physics is astonishingly different from Newton's understanding of the universe. And third, the very idea of machine and of mechanism was taken and adopted by the anti-materialists, as we will see in Chapter 8, when mathematicians and logicians began to talk about “Turing machines,” “things” that had all the trappings of machines and yet which could be defined outside the world of material objects.

The materialists continued to do their best to chip away at the challenges posed by the non-materialists. They did this by choosing various behaviors that revealed the presence of mind and spirit in the human, and then accounting for the behaviors in a way that was purely mechanical. Clever inventors would devote years to creating machines that could play chess: that would show that gears and wheels suffice to display intelligence, would it not? There was much discussion of self-moving machines, though this phrase did not carefully distinguish (as we would want it to do, today) between a machine that keeps on working without providing it with an external source of energy and a machine that controls its motion and movement in what appear to be intelligent ways. Some inventors have come down to us as hoaxters: Johann Bessler is remembered as the man in the mid 1700s who claimed to have a working perpetual motion machine, and if we cannot prove that he was a fraud, we are certain that he was one nonetheless. But machines that controlled themselves? There was nothing fraudulent about that idea, and it became very important as soon as the steam engine was invented, at the end of the 18th century.

But while materialists (and agnostic engineers) continued to develop machines that could control themselves in significant ways, machines were always playing catch-up with humans. It was humans whose behavior defined what counted as intelligence, and it was for machines to show that they could do a few small things that could be seen as intelligent.

---

1This is a difference that even a child understands today: a gadget can stop working because its battery is dead, but we do not confuse having an internal source of energy and intelligent (or intelligent-seeming) behavior.
As we will learn in chapter 8, there was a time when that balance began to tip: it was the moment when Alan Turing invited the machine to move from the world of material into the world of ideas and mathematics, the non-material world. And now, in 2016, we are once again placed in a turbulent moment when the materialists and the non-materialists are at daggers drawn.

Conclusion

In the next three chapters, we will briefly cover the important currents of the 19th century that inform the development of linguistics, psychology, and some aspects of philosophy and logic. After that, we will consider more carefully five connected stories. The first chronicles the development of American psychology up through behaviorism, and the development of Gestalt psychology in Germany, followed by the transplantation of the Berlin gestaltists to the United States. The second story is the rise of the linguistics of Edward Sapir and Leonard Bloomfield in the United States. In Chapter 7, we look at a third development, involving two important philosophical movements in the early part of the 20th century: the work of Edmund Husserl, and the development of the Vienna Circle of logical positivism. Chapter 8 explores some of the important developments of logic, and our understanding of mathematical logic, while Chapter 9 explores the fifth and final story, the origins and the ideas of the European structuralists, focusing on Nikolai Trubetzkoy and Roman Jakobson.