PREMODERN EXPERIENCE OF THE NATURAL WORLD IN TRANSLATION

Edited by
Katja Krause, Maria Auxent, and Dror Weil
This innovative collection showcases the importance of the relationship between translation and experience in premodern science, bringing together an interdisciplinary group of scholars to offer a nuanced understanding of knowledge transfer across premodern time and space.

The volume considers experience as a tool and object of science in the premodern world, using this idea as a jumping-off point from which to view translation as a process of interaction between different epistemic domains. The book is structured around four dimensions of translation—between terms within and across languages; across sciences and scientific norms; between verbal and visual systems; and through the expertise of practitioners and translators—which raise key questions on what constituted experience of the natural world in the premodern area and the impact of translation processes and agents in shaping experience.

Providing a wide-ranging global account of historical studies on the travel and translation of experience in the premodern world, this book will be of interest to scholars in history, the history of translation, and the history and philosophy of science.

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Prologue

Experiencing *Wissenstransfer* in the First Episteme: Mesopotamia

*Markham Geller*

It can occasionally be useful to take a long view of knowledge transfer and the experiences of those who participated in it, by tracing its origins back to the earliest records in the long history of philology, for which abundant data can be found from Mesopotamia in the form of myriads of extant cuneiform tablets. These durable sources on clay and occasionally on stone, the earliest dating from the third millennium BCE and remaining legible until at least the third century CE, provide the first examples of many different writing genres, beginning with rudimentary accounts but soon progressing into narratives (myths, legends, chronicles, legal codes, incantations), as well as technical literature (medicine, divination, mathematics, astronomy, etc.). The same cuneiform script was used by students, scribes, scholars, and laymen for different, non-cognate languages such as Sumerian, Akkadian, Hittite, and Hurrian, which meant that knowledge transfer through translation was a key feature of this ancient episteme. There are some specific features of early writing that offer useful perspectives on ways in which the ability to record knowledge transformed society permanently and indelibly.

By approximately 3,000 BCE, mankind in the Fertile Crescent had discovered the art of record keeping, first with pictographic accounts but soon progressing into highly stylized cuneiform that soon became easily adaptable to expressing myths, incantations, and quasi-historical narratives. While on one hand we admire this emerging life-changing technology, it is comforting to fall back on the Eurocentric assurance that any writing system prior to the alphabet was too complex and cumbersome to become widely integrated into the lives of ordinary untrained individuals.

By the mid-second millennium BCE, a new and extremely concise writing scheme appeared on clay tablets, with some thirty modified cuneiform characters replacing the several hundred signs or characters used for Sumerian, Akkadian, and Hittite. Nevertheless, for the next two millennia, priests, bureaucrats, scribes, schoolboys, traders, merchants, and even kings kept using the original cuneiform script for letters,
documents, and literature, and presumably could read these tablets as well, to some appropriate extent. As in China and elsewhere, the alphabet did not replace other scripts, despite its fewer characters. In fact, the overwhelming majority of cuneiform literature was non-alphabetic, and for good reasons. For native speakers of a language, cuneiform writing offered numerous advantages since, unlike the rather sparse alphabet, it offered the possibility of fully vocalized orthographies, with consonants, vowels, and even vowel length clearly delineated.¹ Second, the writing materials, consisting of wet clay and a reed stylus, were both durable and readily available, which facilitated the spread of literacy throughout urban populations.² Third, the durability of tablets meant that written records could survive over very long periods in the dry climate of Mesopotamia, so that first-millennium BCE schoolmasters could inherit and interpret older literature from the second or even third millennium BCE, because it was still available and legible. Fourth, the writing system itself helped scholars create a complex episteme and school curriculum, since it was based upon an inherent multilingualism. Soon after the invention of writing, speakers of Akkadian were already adapting the original Sumerian cuneiform syllabary to writing their Semitic language (Akkadian) and later using it for an Indo-European language (Hittite), so that engagement with translation and interpreting other languages developed to a high level.

One of the significant features of multilingualism was the built-in polyvalence of the cuneiform script, which very early on departed from single phonemic values for signs. Once the sign /sag/ for “head” in Sumerian could be read as /rēš/ for “head” in Akkadian, the sign soon acquired both phonetic readings. Eventually, after Sumerian was no longer a spoken language, numerous Sumerian sign values were used in Akkadian as “logograms,” representing a concept rather than a sound, and were probably normalized or read as Akkadian.³ The same process adopted Akkadian words as logograms into Hittite and Aramaic words as logograms into Middle Persian. These complexities opened up numerous new avenues for hermeneutics, as we will see shortly, but at the same time created a new form of discipline-based genres not meant for laymen or a casual readership, which relied upon logograms in a similar way to that in which Latin was used in legal and medical jargon. Professional diviners, magical experts, physicians, priests, and astronomers, among others, developed their own peculiar writing styles, which no longer resembled the syllabic orthographies of an earlier era or of literary masterpieces such as the Gilgamesh Epic.

Translators of the extensive literature from Sumerian into Akkadian required tools and aids. Of these, the most important were lexical lists, which were extensive and virtually comprehensive lists of vocabulary and technical terminology, as well as grammatical paradigms and legal formulae. Together, these represented a system of lexicography known from
the earliest down to the latest phases of cuneiform writing. Many of these lists were bilingual, providing Akkadian translations of Sumerian words for material objects, gods, professions, flora and fauna, diseases, anatomy, and numerous other kinds of equations, not all of which can be easily categorized.

One of the key problems facing compilers of these extensive lists was determining the logical order and sequence of entries, since cuneiform had no ready means of taxonomy similar to the alphabet. Moreover, these same ancient compilers and lexicographers felt no particular need to compose memoranda for our benefit, with explanatory keys to their classification and ordering systems. For much of this material, we remain in the dark as to why seemingly unrelated data are listed in sequence. The other difficulty associated with these lists regards how and why they were constructed. The perennial question is posed whether compilers extracted vocabulary from texts and documents and collected it into glossaries, or created arbitrary lists of words that could be useful for literary reference, or some combination of both. It is clear that authors of highly learned Sumerian compositions closely associated with a school curriculum often employed rare or even obscure words, which they must have borrowed from lexical lists. These schoolboy dialogues lampooning academic life show an impressive mastery of the wide-ranging vocabularies, which the authors used to advantage in composing their texts.

The use of tables is a crucial tool for experiencing knowledge transfer, and another easily recognizable characteristic of Sumerian and Akkadian lexical lists is their tabular layout, with Sumerian in the left-hand column and explanatory Akkadian on the right. The tabular format is often highlighted by both vertical and horizontal rulings, to mark off columns as well as dividing entries into discrete sections. Data presented in this kind of table layout remained one of the primary means of conveying information, allowing the user to scan visually large amounts of cuneiform data quickly. The tabular format was not limited to lexical lists and glossaries; it was also one of the characteristic formats for hemerologies and astronomical tables, and generally any data set that provided information in a condensed form, with either numbers or short entries. Tables were also, however, widely used by scholar-commentators, who entered a word in the left-hand column and explained it by a word in the right-hand column, a format that resembled the lexical texts in many respects.

More than nine hundred commentary tablets have been found in Mesopotamian archives, often esoteric and difficult to understand, particularly since it is not always possible to identify the proof-text being commented upon. Nevertheless, the patterns of hermeneutics are well elaborated, based on studies of technical hermeneutical terminology and on methods of hermeneutics developed by Babylonian scribe-scholars. At the heart of this system of hermeneutics is Sumerian-Akkadian
bilingualism, which allowed for word-play, puns, and multiple meanings derived from the polyvalent cuneiform writing.

What is most remarkable about this system, apart from its complexity, is that the written record of commentaries attributes hermeneutics to oral teachings. Colophons of commentary texts regularly state that the contents of the tablet are ša pi ummâni, “from the mouth of the expert” (i.e., professor), or alternatively simply šut pi, “oral explanation.” According to Frahm, the ummânu—master-scholar—is usually anonymous, but this is a misunderstanding of school culture. Like other titles, such as “Pope,” it is hardly necessary to mention this person by name, since every student would know immediately who “The Prof” was. The commentary tablets themselves are mostly meant for internal school consumption, possibly even representing the notes taken in lectures by students. More generally, it is a hallmark of such commentary texts to be attributed to oral teachings from a master-scholar.

It is not only commentaries that are attributed to the pi ummâni, or oral tradition. Many other texts which could be considered esoteric, in fields such as medicine or astrology, are also noted as such in colophons, with the added injunction that the contents are not to be shown to the uninitiated or those not knowledgeable (la múdû). This emphasis on the importance of orality is not exclusively Babylonian—Plato’s Phaedrus comments on the same topic, insisting that teachings in written form are unreliable, since they diminish the memory and one cannot argue with the written word. Socrates adds:

You have invented an elixir not of memory, but of reminding; and you offer your pupils the appearance of wisdom, not true wisdom, for they will read many things without instruction and will therefore seem to know many things, when they are for the most part ignorant and hard to get along with, since they are not wise, but only appear wise.

Mistrust of written teachings indicates preference for oral ones. This is the same tendency we find in Late Antiquity in rabbinic Jewish tradition, which recognizes two separate compendia, the Written Law (the Torah) and the Oral Law (the Talmud). The irony of this scheme, however, is that the Oral Law was also committed to writing in separate phases, while still maintaining its association with orality. The Talmud is functionally a commentary on biblical law, although in fact it is an encyclopedia of collected opinion on all social and religious topics, formulated as doxologies or quotations from numerous scholars and rabbis from Palestine and Babylonia. The orality of the text is almost entirely artificial, since the seventh-century CE redactors purposely edited quotations and statements as if they derived from direct discourse between two or more scholars at the same time, when
in reality the cited speakers often never met. Nevertheless, the prestige and authority of the text rested on its orality, its being composed of opinions and direct speech attributed to noted scholars over the expanse of several centuries, and these statements represented collective wisdom of the rabbinic schools.

All of these aspects of Mesopotamian scribal culture, stemming from its writing system, inherent multilingualism, interest in lexicography and hermeneutics, and preference for orality, remained at the core of curricula and of philology long after Mesopotamian culture itself was forgotten. It is good to recollect that this first episteme was in existence continuously for more than three millennia, outliving successive cultures in Western Asia and Europe, and hence merits our retrospective attention and scrutiny.

Notes

1 The original Semitic alphabet only preserved vowel sounds under exceptional circumstances.
2 The usual assumption that fewer characters in the alphabet encouraged the spread of literacy is likely to be incorrect or at least exaggerated. The original alphabet was not easily adaptable to writing a foreign language unfamiliar to the reader, since the system of writing only approximates language. Moreover, writing materials (such as leather or parchment) were expensive and hence not always available to the general population, and this would impede literacy.
3 Sumerian continued to be read and translated in Akkadian schools after its demise as a spoken language, but the system of Sumerian “logograms” used within Akkadian texts (e.g., È instead of bi-tu for “house”) often developed special meanings of their own, no longer corresponding to the original Sumerian meanings of the signs.
4 The fullest discussion of the lexical system can be found in Veldhuis, History.
5 For an example of a school composition relying heavily upon lexical texts, see Johnson and Geller, Class Reunion, 11.
6 This is a general scheme, with variations such as in Ugarit, c. 1300 BCE, from which one lexical list was found in four languages: Sumerian, Akkadian, Hurrian, and Ugaritic. Veldhuis, History of the Cuneiform Lexical Tradition, 232.
7 One lexical text in particular, called Malku-šarru, was a list of synonyms, a precursor of the modern thesaurus. The difference between this “lexical” text and a commentary is that a commentary drew its words to be explained from some other primary source, while the lexical list is simply a lengthy list of synonyms. See Hrůša, Die akkadische Synonymenliste.
8 Frahm, Babylonian and Assyrian Text Commentaries, is the best (and only) up-to-date survey of Mesopotamian commentaries.
9 See Gabbay, Exegetical Terminology, for a useful overview of the technical terminology of commentaries, which explains much of the logic of hermeneutics.
11 Ibid., 86.
6 Markham Geller

Bibliography


Introduction
Making Sense of Nature in the Premodern World

Katja Krause with Maria Auxent and Dror Weil

When, every year for six years, we watch a pair of eagles hatch one young despite having laid two eggs,¹ how do we make this natural phenomenon part of scientific knowledge? How do we share with others across space and time what we have experienced of nature? Aristotle offered one answer:

So from perception there comes memory, as we call it, and from memory (when it occurs often in connection with the same thing), experience; for memories that are many in number form a single experience.

(Aristotle, Posterior Analytics II.19, 100a3–5, trans. Barnes)

For Aristotle, perceptions, memories, experiences, and scientific knowledge were all captured in the soul of a single, perhaps ideal scientist. For those who came after him, perceptions, memories, experiences, and scientific knowledge were captured in the souls of many scientists. Equally, they were captured in the voices of many teachers, on the parchment of manuscripts and on printed paper, in the visual imagery of works on cosmology, elements, minerals, plants, animals, and human beings. In short, experience in the premodern world—empeiria, experiencia, tajriba, nissayon—made its home in many media.² The history of that experience and its translations is the history our book will tell.

In the premodern stories related here, experience was a way of encountering, structuring, and probing into nature. But it did that in very different forms—by means of very different mediations between human subjects and artifacts. As our historical actors worked on and with experience, they subjected direct perceptions of nature in the moment, what we call here “live experiences,” to a kind of domestication or cognitive assimilation.³ Assimilation of this kind was part of premodern science no less than modern science,⁴ but scientific knowledge in the premodern era was not subject to the exclusive rule of rationally processed sense perceptions. It was free to domesticate live experiences according to a range of epistemic norms, addressing different objectives and audiences.

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Such processes of domestication have momentous consequences. Direct sense perceptions of nature—live experiences—are ephemeral events, if events at all. Only when recorded in a more enduring medium do they lose this ephemerality, and they may lose even more: through attention, even hyper-attention, to just one or some of the qualities present in the event. Some qualities become more visible, others fade. The cognizing scientist did not simply collect live experiences, but correlated, organized, and refined them into the processed products that have come down to us. That internal processing was inextricable from acts of externalizing, as experience was put down on parchment or paper. It was made to endure and to communicate through media that could extend it beyond a human lifespan or even many lifespans.

When our actors externalized experience in this way, they often did so with the aim of enabling it to be internalized again by audiences in their classrooms, at their desks, or wherever scientists sought to share experience. In their acts of listening and reading, the premodern scientists of the next generation repurposed their predecessors’ experiences by performing their own acts of cognition on them. In some (though not all) cases, they added their own, domesticated, live experiences to form a new, combined type of experience that was often more certain and assured. The second, third, fourth, and subsequent generations each began the act of externalization again, initiating yet other cycles of the epistemic translation of experience.

These cycles did not remain within the boundaries of a single language or a locale. No less than the scientists, interlingual translators—who were often scientists themselves—domesticated and repurposed experience. Just like the second-generation scientists, translators took recorded, externalized experience and internalized it, subjecting it to translation between different languages, codifications, and media. Externalizing it again, along with all other scientific knowledge within which recorded experience was embedded, they repurposed it for the third, fourth, fifth, and subsequent generations of audiences across linguistic space.

For our actors, then, interlingual and intermedial translations of experience were not sharply separated, but part of a continuum of epistemic acts and processes. For this reason, we propose the broad analytic category of “epistemic translation,” which usefully embraces the many different acts of translation, with their multiple purposes, that emerge in this book.

Beginning with ancient researchers into nature, most of the premodern actors we present domesticated and repurposed experience without elevating it to a universal concept. They seem to have tacitly agreed that the realm of the mind is separated from the realm of the senses by an invisible ontological line. Curiously perhaps to our modern eyes, this division extended to all the media by means of which experience could be externalized. Whether in terms, arguments, tables, diagrams, or images, experience (direct or indirect) and universal concepts were regarded as
playing in separate leagues. During the many processes of translation that premodern experience underwent, it maintained its core epistemic character: as a kind of knowledge that did not immediately fulfill the highest epistemic ideals of truth and certainty, but remained tied to the conditions of time and space. This is not to say that experience could not overturn universal judgments, if they were wrong—but it is to say that the epistemic relationship between experience and the universal was such that in most cases, and in different ways, the universal ranked above experience.

This hierarchy did not prevent experience from taking a central place in the study of natural phenomena. Our volume investigates processes of translation that elicited and extricated certain qualities of experience, mentally fixing or ontologizing them (or certain of their properties) as a way to approach the natural world. We thus ask: What kinds of acts were available for translating live experiences into the experience captured on parchment and paper? How did these acts of translating, in their own configurations, impact upon what was attended to in experience and what was lost?

This approach is partly inspired by discussions on the ontology of scientific objects, described by Annemarie Mol: “It is possible to refrain from understanding objects as the central points of focus of different people’s perspectives. It is possible to understand them instead as things manipulated in practices. If we do this—if instead of bracketing the practices we foreground them—this has far-reaching effects. Reality multiplies.”

The multiplication of reality is key to our broad analytic conception of translation. Rather than on objects manipulated in practices, however, we focus on experience manipulated in epistemic translation. In the premodern sciences of nature as in other scientific settings, experience is manipulated both as object of knowledge and as instrument for knowledge-making. That accords ample space to types of experience that are empirical in the Baconian and post-Baconian sense of the word: direct access to nature, embodied practices of systematic observation, new sense-enhancing instruments and record-keeping technologies, induction from collected observations, work in the laboratory or the field, and many more.

But at the same time—and this is crucial—it opens up a space to integrate other types of experience, ones that are empirical beyond the methodological practices usually associated with early modern science and natural philosophy in Western Europe. For instance, it includes sense perceptions of spoken words: hearing the voice of the teacher in the classroom is a perceptual act giving rise to mediated cognitions in the student that might cover the entire epistemic spectrum of perceptions, images, memories, experiences, and universals. This conception of experience gives rise to the two new questions that this collection raises: What is experience in the premodern sciences of the natural world? and How,
and to what ends, was experience used in them? By responding to these questions, the chapters and section introductions aim to contribute to a new field in the history of experience in premodern science.

We focus on four media in which experience was domesticated and repurposed through translation in the broad sense we set out above: terms, arguments, pictorial formats, and expertise—a list by no means intended to exhaust the possible places where premodern experience found an intellectual home. How experience endured as a way to probe nature in these various forms is a common thread running through the studies collected here. They reveal that experience’s instrumentality sometimes meant a direct relationship between the natural object under investigation and the scientist pursuing that investigation. At other times, and perhaps more often, experience played a part in more indirect relations between the object of nature and the scientist. Such indirect relationships included the scientist’s acts of imagination and memories in the absence of the object, acts of reading or listening to witnessed experiences, and acts of passing on and sharing experiences along with wider corpora of scientific knowledge. In these cases, experience was crystallized—even ontologized—into an empirical impression and expression, but not into an empirical method that was deliberately shared qua method, with its own epistemic standards of constituted facts, induction founded on collection and comparison, and so on.

These indirect relationships between nature and the scientist have long been subsumed under what some prominent sixteenth- and seventeenth-century thinkers, endeavoring to break from the past, denigrated as “bookish knowledge.” But this was, and is, a constructed divide between what is empirical about experience (most evidently the visual: what we sense before us) and what is not empirical about it (most evidently the oral: what others have told us that they sensed). Criticism of indirect, bookish knowledge—or rather “inscribed experience,” as we might more appropriately call it—promoted certain empirical practices and demoted others, in order to establish particular methods of investigating and cognizing the natural world. It was a handy device to concentrate the experience relevant to science into a tighter definition (the empirical method) than its previously multifarious meanings. When the methodological approaches to experience were poured into this form, as Lorraine Daston and Elisabeth Lunbeck have eloquently put it, experience was “shaped and sharpened to scientific ends.” It was honed down to particular epistemic norms, chief among them respect for direct sense perception and objective verification. This is doubtlessly true for the period we have come to know as “early modern.”

There was a price to pay for the empirical bent that insists on a direct sensory relationship with the object as the precondition for making scientific knowledge: the sidelining of other types of experience, that mediated between scientist and object in other ways. Following the early modern proponents of the empirical method who defined scientifically relevant
experience in this way, present-day historians of science, too, have often insisted in one way or another on the lasting epistemic hegemony of early modern empirical practices of science such as direct sense observation, systematic recording, induction, and verification.\textsuperscript{17}

The practical turn in the history of science has complicated that picture, particularly with respect to the many roles and types of direct experience at work in investigating, sensing, and observing nature and in communicating and verifying natural knowledge.\textsuperscript{18} Nevertheless, there is more to be said about the range of possible relationships between scientist and object through the medium of experience, for both the premodern world and contemporary science. Three examples must suffice to make this point. First, experience as live experience of an object (sensory perception), as event, practice, routine, aesthetic act, and work, remains part and parcel of the various ontologies of experience—yet many of these ontologies have been somewhat downplayed in discussions of scientific experience, because we tend to focus on the epistemic features in scientific practices that resemble empirical methods.\textsuperscript{19} Second, the personal and professional experiences that we use without theorizing them remain key to the making of science in the twenty-first century—but still await more attention from historians to note, collate, and assess them.\textsuperscript{20} Third, inscribed experience undergoes significant, and epistemically functional, transformations during its rewriting—but the work of tracking those changes has only just begun.\textsuperscript{21} The present collection takes up that challenge, opening the field to problems that still intrigue the history of science \textit{tout court}.

Our history of premodern experience in translation studies those epistemic acts of domestication and repurposing that are related to the evidently empirical, but also those that may seem unempirical to our modern eyes. Precisely in those spaces where our perception differs from that of our historical actors’, we find experience being put to use and rendered epistemically functional for scientific knowledge of nature. To perform that function, experience was carefully selected, positioned, framed, and shaped by our historical actors—even though, or perhaps because, it was only gradually structured systematically into methodological practices.

Perhaps one reason for this was premodern science’s trust in the ideal scientist or expert. Well trained in logical reasoning, often also as physicians, scientists knew how to internalize experience from any given source, integrate it into the science they already possessed inside themselves, and repurpose it to fulfill a panoply of epistemic functions. Scientists acted as epistemic translators of experience, and so did interlingual translators in their own distinctive ways. What we see today on parchment and paper are the externalizations of these acts of trust, testifying to their stability even at a time when premodern epistemic norms of certainty and truth were already undergoing a profound reevaluation. But when trust in the epistemic powers of the scientist faltered to a large degree, new mechanisms and reorientations of experience arose, creating
an experience that was more sharply delimited, actively regulated by norms of reason, and increasingly standardized in form and function.\textsuperscript{22}

The issue of trust recurs throughout the book, but we focus on the scope of premodern experience in translation in four different media across time and space. These ontologizations of experience are chosen to highlight the similarities and differences in the preservation and transformation that each medium brings forth, on its own account and through the experiences it inscribes into science.\textsuperscript{23} They mean that our book can be neither chronological in its structure nor comprehensively global in its coverage.

To narrow down the immense field of premodern experience in translation, we take as our starting point scientific practices around the \textit{corpus Aristotelicum} and the sciences that twined about it. The science of medicine centering on the works of Galen and Avicenna arose in dialogue with Aristotle’s writings, as did the evolving early modern sciences of nature. By focusing on closely related “epistemic cultures,” to apply Karin Knorr Cetina’s term to our own inquiry,\textsuperscript{24} we are able to overcome the boundaries of periodization and localization that are still commonly applied to the premodern world.\textsuperscript{25} What once was divided by the labels “ancient,” “medieval,” “early modern,” and various “area studies” here comes together under the two prisms of the premodern world and the epistemic cultures clustering about the \textit{corpus Aristotelicum}.

Given this focus, our book does not and cannot aim to be comprehensive. Quite the contrary. The four case studies in each part, addressing the translation of experience across terms, arguments, pictorial formats, and expertise, range over many languages, centuries, and continents. They will give only glimpses into the acts and processes of experience in translation. Yet those glimpses can contribute to global histories of science. Looking at translations within and between closely related epistemic cultures, we do not aim to retell older histories of the diffusion of Western science,\textsuperscript{26} but neither do we adopt the frameworks of science, empire, and postcolonial studies with their interest in asymmetries between metropolis and colony, indigenous peoples, and hybrid cultural objects. Those dichotomies are not our analytic categories, because they highlight contact zones between epistemic cultures that were worlds apart.\textsuperscript{27} Our own interest is in the history of an identifiable set of filiated epistemic cultures as it moves through different linguistic and temporal terrains. We ask how a shared set of epistemic norms—for instance, that science should aim to define and demonstrate things in nature; that science should rely on the scientist and the natural workings of his faculties—guided and framed the epistemic acts performed upon experience, and the epistemic uses and functions that experience was granted in return.\textsuperscript{28}

Such a history may also suit other cases where particular scientific corpora were nodes about which epistemic cultures took shape. Our book on the \textit{corpus Aristotelicum} and the works that conversed with it may
thus offer a methodological framework for other parts of the world and other historical periods. The transregional expansions of the Confucian or Vedic corpora, along with their related epistemic cultures and scientific practices, are just two examples. In this sense, we hope that our volume will contribute indirectly to the study of other epistemic cultures that do not touch upon European lands at all.29

The emphasis on media in this volume may also be favorable for histories after the era of Eurocentric macrohistories and periodizations. As Bernhard Jussen has recently put it, “the new, mediological orientation in historiography that is currently taking shape looks set to be the most natural and productive path toward a realignment of our material, categories, and questions.”30 To be sure, only the externalized media of experience have been preserved over time. The subjective media—the sensory and intellectual actions of the scientists—are transmitted only (if at all) indirectly, in the objective media. Whether in terminology, in arguments, in pictorial formats, or in personal expertise, the translations we study are set about with the constraints that we face as historians of science whose scientists are long dead.

That temporal distance comes to center stage with the opening essay of the book, where Markham Geller looks at the role of orality through the lens of Mesopotamian science. In the next piece, Michael Chase introduces key strands in the work of Aristotle and his successors with regard to the status of experience, in a survey that will be particularly relevant to the volume’s studies on terms and arguments. Chase tracks the conflict between reason and experience in Greek thought, from the Presocratics, through the Greek rationalists (Plato, Aristotle and his Peripatetic successors, and the Stoics), to the Roman physician Galen and his reception in the Arabic tradition. Problems of translation, the limits of language and the ineffability of individuals, and the complementary tension between different types of “knowing” turn out to be closely linked throughout the epistemological history he presents.

Following Chase’s chapter chronologically, Part II asks how experience is expressed in scientific language, specifically in terms. Chapters in this section study the formation, negotiation, and domestication of some key experience terms as they are translated within and across languages. The authors analyze how experience terms altered and preserved their ontologies during such processes, and investigate the impact of cognitive and intellectual practices.

Turning to a larger purview of inscribed experience, Part III addresses the translation of experience into scientific arguments. The four chapters present essential features, status, and functions of experience in arguments, and show how these were affected by premodern epistemic translations, whether intralingual or interlingual. They ask how scientific translations of experience changed scientific norms and how, in turn, scientific norms facilitated or limited the possibilities of scientific translations of experience in arguments.
Part IV moves away from experience in letters to experience in pictorial systems. The chapters investigate how experience was translated into symbols, tables, and images, and how visual formats of this kind offered different ways of articulating, framing, and standardizing experience than did the verbal systems discussed in the previous two sections. As we will see, pictorial formats followed modes of expression that intertwined imagination with reason, and these different modes of expression generated new experiences and new scientific norms.

The book’s most ephemeral and hard-to-access object comes to the fore in Part V: the expertise of the translators. The chapters in this section investigate how translations of scientific experience were shaped by the cognitive and intellectual practices, habits, and authority of the translators and their sources. They show that such expertise was inseparable from its agents’ social and cultural environments, and that, in turn, these environments shaped and reshaped the transmission of experience in the sciences.

How does experience take shape in premodern scientific terms and their translations? How is it expressed in scientific arguments? How is it articulated and arranged in pictorial formats? And how are translations of scientific experience molded by the expertise of the translators? In her epilogue, Lorraine Daston completes the volume’s historical arc by tracing these themes around the translocation, transformation, and assimilation of experience up to the science and scholarship of the present day.

Notes

1 On this example from Albert the Great’s De animalibus, see Harvey in this volume.
2 Our use of the term “media” starts from the classical Aristotelian sense, of vehicles that carry certain properties of impressions to the senses, but extends it to the linguistic and physical vehicles that carry these properties on to other people. This usage interlocks with some media scholarship (e.g., Kittler, Discourse Networks) and history of science that applies insights from media studies (e.g., Schmidgen, Hirn und Zeit).
3 Though our notion of “domestication” is affiliated to that debated in translation studies, for example in the work of Paul Ricœur, Antoine Berman, and Lawrence Venuti (e.g., Venuti, Translator’s Invisibility), we use it to describe not interlingual acts, but the epistemic acts in which experience moves from the event of live experience into the cognitive field of the scientist.
4 “Science” is used here not in the modern sense, but as a variety of practices for organizing and systematizing knowledge of nature. See Gieryn, “Boundary Work.”
5 Recently, historians of philosophy have addressed theories of sense perception in the Aristotelian tradition. See, e.g., Glenney and Silva, Senses; Baltuta, Medieval Perceptual Puzzles; Bennett and Toivanen, Philosophical Problems.
6 On the role of writing in the transmission of scientific knowledge, see, e.g., Derrida, Edmund Husserl’s Origin of Geometry.
Classics on this matter are Ong, *Orality and Literacy*; Clanchy, *From Memory to Written Record*; Yates, *Art of Memory*.

Recent work in translation studies has likewise blurred the conventional orders between different types of translation, though without our focus on experience. For an overview, see the Forum on “cultural translation” in *Translation Studies* 2, no. 2 (2009) and 3, nos. 1 and 3 (2010); also Burke and Hsia, *Cultural Translation*; Dupré, “Introduction.”

Writing on the thirteenth-century Latin West, Katja Krause and Henryk Anzulewicz (“Albert the Great’s Interpretatio”) show that the Latin term *interpretatio* unified epistemic practices of interlingual translation and commentary on the *corpus Aristotelicum*. Similarly, Daniela Bleichmar (“Pictorial Knowledge”) describes two different meanings of translation in the early modern period, physical movement of things and linguistic movement between languages, and adds a third type, “acts of interpretive translation.” This last category comes closest to our own discussion, but it moves on the textual and material level rather than examining the roles of subjects and their experiential and cognitive inputs.

Work on translation in the history of science has mainly applied hermeneutic or semantic approaches to the epistemic acts performed on knowledge. See, for instance, Brentjes and Fidora, *Premodern Translation*; Fransen, Hodson, and Enenkel, *Translating Early Modern Science*; Cook, *Translation at Work*; Manning and Owen, *Knowledge in Translation*.

Empiricism is one example of loss through attention, as Bruno Latour indicates (alluding to Whitehead): “Empiricism, conceived as a clear-cut distinction between sensory impressions on the one hand and mental judgment on the other, cannot certainly claim to be a complete description of what ‘we should be attentive to in experience.’” Latour, *Reassembling the Social*, 110.

Mol, *Body Multiple*, 4, also quoted by Lloyd, “Clash of Ontologies.” See also Daston, “What Can Be a Scientific Object?”

We dispute the conventional exclusion of premodern science from such wider currents, often made on the basis that premodern scientific experience is not an empirical method. See, e.g., Hossfeld, *Albertus Magnus*; Jacquart, “Die Medizin”; Dear, “Meanings of Experience.”

Other media, at different levels of resolution, could also be studied in this way—for instance, particular theories (as media on the meso level) or even entire systems of sciences (on the macro level).

Francis Bacon famously declared that natural knowledge needed new methods of direct perception, observation, recording, and verification: “We can’t do without experience; but so far we haven’t had any foundations for experience, or only very weak ones.” *New Organon* I, aph. 98. On Bacon’s method, see Jardine, *Francis Bacon*; Jalobeanu, “Francis Bacon”; on “bookish knowledge” more generally, Blair, “Humanist Methods.”


Many biographical studies of scientists do address their personal and professional experiences (e.g., Daston and Sibum, “Scientific Personae”), but a more inclusive history of reading and writing practices in the modern sciences is still required. See Landecker, “Matter of Practice,” 259–60. Some of Landecker’s desiderata have already been applied, e.g., Kaiser, Pedagogy and the Practice of Science.

See, e.g., Krause, “Source Mining”; Leong, Recipes.

See, e.g., Daston and Lunbeck, Histories of Scientific Observation, 2; Wolfe and Gal, Body as Object; Allen, Empiricisms.

This approach also brings some recent trends in the history of science—visual studies and global history—into conversation with the more traditional approaches of textual study and the history of ideas.

Knorr Cetina, Epistemic Cultures. Her view of “culture” differs from that in most other studies on translation in the history of science, such as Burke and Hsia, Cultural Translation.

One paper where this common practice is usefully problematized, but nevertheless applied for lack of a better solution, is Shank and Lindberg “Introduction.”

Basalla, “Spread of Western Science.”

Valuable historical studies on such contact zones can be found in Marroquín Arredondo and Bauer, Translating Nature. See also Lloyd, “Clash of Ontologies.”

For an insightful discussion on norms and normativity in history and how they evolve, see Daston and Gallison, Objectivity.

On localizing Europe, see MacLeod, “Nature and Empire”; Pimentel, “Sighting and Haunting.”


Bibliography


Part I

Contextualizing Premodern Experience in Translation
Part I  Experience and Knowledge among the Greeks
From the Presocratics to Avicenna

Michael Chase

Do things gradually lose their names in your mouth?
Where once were words, flow discoveries,
Freed, with surprise, from the flesh of the fruit.
Dare to say what you call “apple.”
This sweetness, that starts by thickening; in order lightly raised to the status of taste,
To become clear, awake and transparent,
Ambiguous, sunny, earthy, local,
O experience, feeling, joy: immense!
(Rilke, Sonnets to Orpheus 1. 13, translation Michael Chase)

Introduction: Translation and Experience

Both “experience” and “translation” are what Aristotle called pollachōs legomena, terms with many meanings, the underlying unity of which may be hard to discern. In the present contribution, taking the notion of experience as formulated and utilized in ancient Greek thought as my focus, I will investigate the extent to which our current linguistically determined concepts of knowledge and experience help us, or hinder us, in understanding analogous concepts as used in the premodern culture of ancient Greece and Rome. To what extent does our language condition our thought? Are there aspects of experience that cannot be adequately formulated in a natural language?

However we may wish to define “experience,” we usually assume it has something to do with knowledge. But the English word “knowledge” is itself a pollachōs legomenon, and in this case the relative poverty of English may inhibit our understanding. Romance languages have two very different verbs corresponding to the English “to know”: savoir and connaître, saber and conocer, sapere and conoscere. In all these cases, the former verb generally denotes a kind of propositional knowledge, “knowledge-that x is the case,” while the latter tends to denote a kind of “knowledge of x” or “knowledge of what x is like,” to express which English is constrained to fall back on paraphrases, such as “knowledge
by acquaintance or familiarity.” Ancient Greek also possesses at least two nouns that correspond to English “knowledge,” *epistēmē* and *gnōsis*, as does Arabic (*ʿilm* and *maʿrifa*—often translated as “experiential knowledge”—respectively), and I would argue that their meaning broadly corresponds to the Romance language distinction between *savoir/saber/sapere* and *connaitre/conocer/ conoscere.*

Since English lacks these conceptual nuances, in this chapter I will use the term knowledge, to designate *epistēmē* as certain, objective, propositional “knowledge-that,” and knowledge, to denote *gnōsis* qua personal knowledge by familiarity or acquaintance. As we will see, this distinction is crucial in Greek epistemological discussion, not least because, according to the Aristotelian tradition, *epistēmē*, knowledge, characterized by certainty, is reserved for universal and necessary truths. There can be no *epistēmē* of the sensible, perceptible individual things that constitute our *Lebenswelt*, nor can there be any definition of them. In short, in this tradition, there can be no knowledge (*epistēmē*) of experience; only knowledge, (gnōsis). Nevertheless, for the Aristotelian tradition it is experience, *qua* knowledge, of individuals, that provides the raw material out of which knowledge derives, in the form of technique (*technē*) or certain, demonstrative, disciplinary knowledge (*epistēmē*). Yet how can certain knowledge (*epistēmē*) arise out of individual experiences, each one of which is an instance of knowledge? However we translate them, *technē* and *epistēmē* were generally held to be quite different notions, but both were distinct from mere experience (*empeiria*). For Aristotle, following Plato, technique, unlike incoherent experience, necessarily presupposes a knowledge of causes and an ability to teach what one knows. Yet while this Aristotelian doctrine remained dominant down to the end of Greco-Roman Antiquity and into the Middle Ages, it was not quite the only game in town. There were rival views, which questioned the complete epistemological and sociological superiority of knowledge, maintaining that experience itself, when suitably organized and preserved in memory, is quite sufficient for the constitution of a technique (*technē*) such as medicine.

Although a minority view, this revaluation of “technical” knowhow persisted throughout Antiquity as an underground current, and was influential on some exponents of Islamic thought, especially Avicenna. This may have been due to the realization that the Aristotelian edifice of theoretical, certain, demonstrative knowledge, precisely because it declares itself incapable of providing knowledge of individuals, was inadequate for practice-oriented techniques such as medicine. In what follows, therefore, I will trace the history and development of this conflict between reason and experience from its origins in Greco-Roman Antiquity, as an instance of intercultural translation that can be studied “as a method of revealing difference and similarity.”
Some Presocratic Exponents of Epistemic Modesty

I will limit myself to a few examples from the Presocratic philosophers, beginning with a text that may derive from the physician and physiologist Alcmaeon of Croton, active sometime between 500 and 470 BCE. In Plato’s *Phaedo*, when Socrates, while recounting his intellectual autobiography, is describing the doctrines of “natural science” (Gk. *phusiologia*) that fascinated him in his youth, he mentions one of the questions such “physiologists” discussed:

Is it the brain that gives us the sense of hearing, seeing and smell, and from these come memory and opinion, and from memory and opinion remaining fixed we get knowledge, *epistēmē*?

Here we have the following epistemological scheme:

\[
\text{brain} \rightarrow \text{senses} \rightarrow \text{memory/opinion} \rightarrow \text{knowledge},
\]

Note, for the moment, two aspects that will be prove to be important later: the presence of memory as a key faculty in the cognitive process, and the absence of any separate intellectual faculty that could be identified as reason or intellect. This last feature makes our text perhaps the earliest testimony to the doctrine that Michael Frede has dubbed “memorism”: the ancient tradition in Greek thought that did not posit the existence of a separate faculty of reason, but believed that memory alone was sufficient to explain the acquisition of knowledge. It is not certain that this text can actually be attributed to Alcmaeon, but if it can, then its interest is even greater, since Alcmaeon was a late-sixth- or early-fifth-century BCE thinker who came from southern Italy, just like Acron and Polos, whom we will meet later.

Alcmaeon was also an exponent of proto-Skeptical and/or Empirist views, such as the following: “About invisible and about mortal things, the gods have clear knowledge, *saphēneia*, while humans can only form conjectures, *teknairesthai*.” Alcmaeon thus seems to have been an exponent of what has been called epistemic modesty: the stance, prevalent in archaic Greek thought, that set limits on what human beings can know about nature, the gods, and reality. Another proponent of this stance was Alcmaeon’s near-contemporary and countryman Philolaus (c. 470–385 BCE), who, although he admitted the legitimacy of “nature in the cosmos” as an object of study, claims that “nature in itself”—that is, the sector of reality that is beyond direct experience—is inaccessible to the human mind, and reserved for the gods. Summing up this archaic tradition of epistemic modesty, Jonathan Barnes remarks that “belief and verisimilitude, not knowledge and truth, mark the goal of man’s cognitive journey.” It is this attitude that, as we shall see later in the
chapter, best characterizes the theory and practice of the Empirist medical school.

**Plato on Experience and Technique**

Traces of what one might call an empiricist attitude toward medical treatment are already found in the Hippocratic Corpus, a disparate assemblage of works written at different periods. Clear evidence of a developed empiricist viewpoint, however, first emerges in Plato, especially in the *Gorgias* and the *Laws*.

At *Gorgias* 448C–D, the rhetorician Polos, praising his teacher Gorgias, points out that many of the techniques (*technai*) have been discovered by means of experience. It is experience that “makes our life proceed in accordance with technique,” says Polos, while inexperience (*apeiria*) makes our lives be governed by chance or fortune (*tuche*). Polos thus appears as a champion of experience, which, as the source of the discovery of the techniques, frees us from the randomness of chance.

We know little about Polos of Acragas (the modern Agrigento in Sicily), who may have been born around 440 BCE. However, if, with Aristotle (discussed in the next section), we take seriously the attribution to him of the doctrine that experience is the origin of *technē*, this may suggest that Polos was associated in some way with the very beginnings of the medical school of the Empirists. As we shall see, Acron, the semi-legendary founder of the Empirist school of medicine, also came from Acragas and was a contemporary of Polos.

Later in the *Gorgias* (500A–501B), Socrates points out that cooking, since it deals only with what is pleasant and does not know what is good or evil, is not a *technē* but mere experience (*empeiria*). In this, it differs from medicine, which, since it has investigated the nature of the patients it treats and the causes of the remedies it prescribes and is therefore capable of providing an account (*logos*) of its methods, does qualify as a *technē*. Cooking proceeds in a completely non-technical (*atechnōs*) and irrational (*alogōs*) way, relying on mere routine and experience (*tribēi kai empeiriai*) to preserve the memory of what usually happens.

We have here, *in nuce*, the key points of difference between the two later medical schools of the Rationalists or Dogmatists (*logikoi*), on the one hand, and the Empirics (*empeirikoi*) on the other. Like Plato, the former insisted on the need to start out from a rational understanding of the nature and function of the human organism and the causes of illnesses, from which they then deduced the appropriate treatments. In contrast, “relying on routine and experience to preserve the memory of what usually happened” could have served as a perfect formulation of the Empiric credo: they did indeed rely on frequentation (*tribē*) and experience (*empeiria*), and their technique (*technē*) did consist primarily in observing which phenomena occur previously, concomitantly, or subsequently to which other phenomena. As we shall see, however, if the
Empirics largely minimized the importance of reason for defining the nature of the human body and seeking the causes of illness, this was because they thought such intellectual activities were largely irrelevant. For Plato, in contrast, as for the Rationalist physicians, the defining feature of both knowledge, *(epistēmē)* and technique is that one knows, and can explain, the causes and reasons for what one is doing.

Aristotle on Experience, Technique, and Knowledge

As he often does, Aristotle picks up where Plato left off, elaborating upon and transforming Plato’s ideas. At *Posterior Analytics* (2.19, 100a3–9), Aristotle presents his famous account of the origins of technique and knowledge. From sensation derives memory, and repeated memories of the same thing amount to one experience *(empeiria)*. Experience, which is equivalent to the establishment of a universal in the soul, then gives rise to a technique *(technē)* if it concerns the world of generation or becoming, but to knowledge *(epistēmē)* if concerns what (truly) exists. Aristotle presents a very similar scheme in the opening chapter of the *Metaphysics* (A, 980a20 ff.). In humans, memory leads to experience *(empeiria)*, for many memories of the same thing “produce the power of one experience” (ibid., 981a1). Experience almost seems to be similar to knowledge *(epistēmē)* and to technique, the difference being that experience is the means through which human beings acquire technique and knowledge; the role of experience is thus purely instrumental. Aristotle then quotes Polos to the effect that experience produced technique, while lack of experience produces chance.

For Aristotle, then, technique results when, from many thoughts of experience, one universal judgment about similar things comes into being. He illustrates this process with examples taken from medicine. Instances of judgments arising from experience include “remedy x helped Callias when he was suffering from illness y,” “remedy x also helped Socrates when he was suffering from illness y,” and so on. Technique comes into play when those who have been benefited by remedy x are identified as belonging to a single class—for instance, phlegmatics, bilious people, or those suffering from bilious remittent fever. Technique thus seems consist in the power to make inferential generalizations, or at least to identify universal classes, presumably by means of reason.

Aristotle goes on to point out that we often see experienced people succeed where those who possess an account *(logos)*, but no experience, fail. This is because experience is knowledge of individuals, while technique is the knowledge of universals, but all actions and comings-into-being concern individuals. The example he cites comes once again from medical practice: rather than curing “man” as an abstract universal, what a doctor cures are individuals such as Callias and Socrates. More than experience *(empeiria)*, Aristotle continues, technique is characterized by knowing *(to eidenai)* and understanding *(to epaiein)*, and this is
why we consider technicians (tecnitai) to be wiser (sophōterous) than experienced persons. This is because technicians know the reason why the means they employ actually work, whereas persons with mere experience know only the that (to hoti), not the why (to hoti kai to dioti). Accordingly, master craftsmen are considered more honorable and wiser than manual laborers, who are analogous to inanimate things such as fire, insofar as they act as they do without knowing the reason why.

Here, in what reads very much like a development of ideas set forth in Plato’s Gorgias, we have a clear distinction between experience as pre- or subrational knowhow that arises on the basis of memory, and technique as rational knowledge that is aware of the causes involved in a given practical activity and can articulate them. This view is accompanied by a devaluation of manual labor and those who practice it. If technique is considered to be more of a certain knowledge1 (epistēmē) than mere experience,2 it is because those who possess technique are able to teach what they know, whereas those who have experience alone are unable to do so.3 In addition to this Platonico-Aristotelian devaluation of the epistemic value and status of technical, artisanal knowledge, what is important to retain here is Aristotle’s principle, mentioned almost en passant, that experience is the knowledge2 (gnōsis) of individuals, while technē deals with universals.

Aristotle’s epistemological scheme in both Metaphysics A 1 and in Posterior Analytics B 19 can be roughly schematized as follows:

sensation → memory → experience → technique/knowledge1

This scheme contains an innovation as compared to the analogous scheme we saw above in Alcmaeon: the appearance of the stage of experience. However, Aristotle is by no means clear about the nature or function of this new stage. In the passage of Posterior Analytics, he seems to envisage experience as equivalent, on the one hand, to a logos,3 a notoriously ambiguous Greek term; and on the other to a universal concept. Yet the reader remains puzzled as to exactly how, in this schema, such universals come into being. Subsequent generations of Peripatetics were to devote themselves to clarifying this point.

Alexander of Aphrodisias on Metaphysics A 1: Experience and the Formation of Universal Notions

The commentary on our passage from Aristotle’s Metaphysics offered by the great Peripatetic philosopher Alexander of Aphrodisias (late second–early third century CE) is complex. Writing half a millennium after Aristotle, Alexander tries to elucidate what the Stagirite meant by his account of the formation of universals and the role of experience in the cognitive process. One reason for the complexity of his undertaking is that Alexander seems to be integrating conceptual schemes from at