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Introduction

'Infrastructural Compendia' and the Licensing of Empiricism in Mesopotamian Technical Literature

1 Introduction

Institutions are real, even in the absence of a brick-and-mortar foundation or articles of incorporation, and as it happens they are often the most visible component of the complex networks and arrays of human interaction that we speak of as 'scholarship' or even 'science'. As institutions (and the social bodies they house and propagate) have become one of the central objects of critical reflection in the last few decades, it has forced students of antiquity to think carefully about the institutional contexts of both ancient and modern scientific research. For the authors who have contributed to this volume, however, antiquity is a bigger and more splendored thing than the Graeco-Roman arena that usually defines the early history of science. For many of the participants in this volume it extends from the origins of writing in Mesopotamia and Egypt through the Graeco-Roman materials down to the great synthetic compendia that were produced in the Hellenistic, Abbasid and Byzantine periods. In speaking, therefore, of 'Mesopotamian technical literature' in reference to such a wide and multifarious time and space, I am attempting to neologize an existing term, Mesopotamia, and to do so in a mildly provocative way. One of the central hypotheses advanced in this volume is that the shape of institutional life in Mesopotamia and the type of compendia that fit naturally into institutional contexts in Mesopotamia changed relatively little over the four and half millennia for which we can follow the documentary record in the land between the two rivers. More concretely, the contributions assembled in this volume also suggest that the culture of compendia in Mesopotamia, whether the compendia in question are written in cuneiform, Talmudic Aramaic, Syriac or Arabic, remained relatively constant, and furthermore that the highly institutionalized life of Mesopotamian compendia must be contrasted with the largely non-institutional character of scientific materials in earlier phases of the Graeco-Roman world.

This hypothesis of Mesopotamian continuity, where 'Mesopotamia' is understood expansively to include the period of time between the origin of writing (ca. 3300 BCE) and the fall of the Abbasid Caliphate (1258 CE), necessarily suggests that emblematic textual phenomena such as the edition of the Babylonian Talmud and the Abbasid Translation Movement represent a specific approach to the curation of knowledge that shares essential features with the textual practices of earlier cuneiform cultures. The constant operating throughout these long millennia is the

situation of textual practices within largely institutional contexts, typically funded by the crown or other political entities and oriented to the creation of a professional class of technical specialists. This emphasis on institutional contexts and the microsociology of professional and disciplinary subcultures is to a great degree in response to what Ben Kafka has recently called the 'the technical turn in the humanities'. As Kafka himself goes on to emphasize:

> Inspired largely by science studies, humanists have started to think seriously about the technics of knowledge. ... we can probably trace this approach back to Bruno Latour's essay 'Visualization and Cognition: Drawing Things Together.' ... A bureau is, in many ways, and more every year, a small laboratory in which many elements can be connected together just because their scale and nature has been averaged out: legal texts, specifications, standards, payrolls, maps, surveys. Latour's call for an 'ethnography of inscription' has fulfilled its intellectual promise time and again, not least in Latour's own study of jurisprudence [Latour 2010]. Through subtle reconstructions of knowledge infrastructures and actor networks, the ethnographer is able to reconstruct the law's specific mode of truth production in all of its wondrous tedium.[1]

Although the technical turn should, in my view, be seen as a positive development, it poses the real danger that we find ourselves mired in minutiae that do not serve broader intellectual or research goals. Thus, rather than adhering to the current fascination with textual artifacts and their limitless materialities, in this volume we pursue a number of new synthetic research questions: How do technical compendia operate in the cuneiform and post-cuneiform Near East? How do textual authorization and replication constrain nascent empiricism? Can we postulate a distinctive 'Mesopotamian' paradigm in the early history of scientific thinking?

Although we are often bombarded with new critical or theoretical terminology, I would like to focus initially on just two ideas that have already developed a recognized place in the theoretical literature and that are also of special relevance to Mesopotamian technical literature: the *infrastructural* character of Mesopotamian compendia and the role of *citation* in the formation and elaboration of infrastructural compendia. Each of these terms will be unpacked below, but it should also be emphasized that these features of Mesopotamian compendia have been recently thematized *avant la lettre* in the work of Eva Cancik-Kirschbaum, who builds in part on Oppenheim's take on the role of the Mesopotamian lists in the technical disciplines.[2] Oppenheim himself used the term 'operational' in descriptions of his own attempts to sketch out the 'use' of lexical lists, perhaps even as a form of modest self-criticism, but with the advances in speech act theory and theoretical developments of Latour and Bourdieu, it is remarkably prescient. More recently, Cancik-Kirschbaum has emphasized that Mesopotamian lists were always situated in complex discursive situations in which the written medium of the list or

1 Kafka 2012: 110; see Latour 2013 for his most recent theoretical statement.

2 Cancik-Kirschbaum 2010, citing in particular Oppenheim 1977: 248.

compendium must be continually juxtaposed to the oral discussions and metalingual comments, viz. *die operationelle Ebene*, that regularly attached to the written artifact.[3] This overall approach to Mesopotamian scholastic materials is therefore, it must be said, quite different from the approach found in Elman's recent generalizations about the nature of scholastic thinking in Mesopotamia, in which the non-existence of *written* argumentation is taken as a sign that second-order thinking was largely non-existent in Mesopotamia.[4]

Simplistic readings of Mesopotamian textual remains have often taken the written artifact in itself as a more-or-less complete script of a discursive interaction, as if a Babylonian list of medical recipes operated along the same discursive principles as a Platonic dialogue. But of course nothing could be further from the truth. Mesopotamian lists and skeleton compendia functioned as agenda or syllabi, meant to provide the teacher with a series of possible topics in a pedagogical setting. Perhaps the best example of this is the interpretation of a list of plants, viz. drugs, that occurs in the Sumerian literary text known as *Enki and Ninhursag*, lines 199–219.

(199) He (= Enki) said to his minister Isimud: (200) "I have not determined the destiny of these plants. (201) What is this one? What is that one?"
(202) His minister Isimud had the answer for him.
(203) "My master, the 'tree' plant," he said to him, (204) he cut it off for him and Enki ate it.
(205) "My master, the 'honey' plant," he said to him, (206) he pulled it up for him and Enki ate it.
(207) "My master, the 'vegetable' plant," he said to him, (208) he cut it off for him and Enki ate it.
(209) "My master, the alfalfa grass (?)," he said to him, (210) he pulled it up for him and Enki ate it.
(211) "My master, the *atutu* plant," he said to him, (212) he cut it off for him and Enki ate it.
(213) "My master, the *aštaltal* plant," he said to him, (214) he pulled it up for him and Enki ate it.
(215) "My master, the ... plant," he said to him, (216) he cut it off for him and Enki ate it.
(217) "My master, the *amharu* plant," he said to him, (218) he pulled it up for him and Enki ate it.
(219) Enki determined the destiny of the plants, had them know it in their hearts.[5]

Although situated in a primordial time and space before the invention of writing, this passage 'authorizes' in some sense the use of lexical lists to transmit technical information, while at the same time presenting us with the simplest possible entextualization of a list of pharmaceutical plants.[6] Needless to say at this moment of quasi-baptismal reference, with Enki (the god of technical knowledge in Mesopotamia) as the interlocutor, there is no possibility of disputation. The early lexical lists

3 Cancik-Kirschbaum 2010: 25–27.

4 Elman 2014, especially pp. 19–34; one could cite various passages, but "the lack of *records* of legal discourse must be ascribed to the relative lack of importance given to this activity in ancient Mesopotamian culture" (Elman 2014, 31, emphasis added) is emblematic.

5 Translation after ETCSL.

6 Entextualization in the sense of the term put forward in Silverstein and Urban 1996, namely a real-time verbal 'reading' of the material text-artifact in a definite social setting. For a rather different approach, see the discussion of canonical verbalisations in Hyman 2006.

therefore represent an agreed upon sequence of topoi, and while individual scholars could and (as much later commentaries show) did interpret these lists in radically different ways, the mere fact that the members of a given profession or technical specialization agreed on a fixed 'curriculum' or set of topoi endowed the written manifestation of the curriculum with authority and even a distinctive type of agency.

The infrastructural character of Mesopotamian compendia is most visible, however, in the total absence of controversy or even polite disagreement within the boundaries of the written text. This feature of Mesopotamian compendia stands in contrast to many types of Graeco-Roman technical compendia, which are often explicitly framed as the point of view of a named author and include direct challenges to other practitioners.[7] This contrast, though by no means absolute, does suggest that the oral-written divide was definitive, at least in the earlier phases of the cuneiform textual record.[8] The infrastructural text was written, presumably memorised by all card-carrying members of a given profession, and could only be modified by reconfiguration or addition, never deletion or replacement.[9] The individual entries in these compendia served as points of departure for the kind of perspectival or agonistic debates that regularly appear in later Graeco-Roman treatises, but in the heavily professionalized technical disciplines in Mesopotamia perspectival interpretations and commentaries were not, as a rule, allowed into the written text.

2 The infrastructural compendium

If we adopt a straightforward definition of 'compendium' such as 'a collection of concise but detailed information about a particular subject' (OED), an infrastructural compendium might be distinguished from other types by its use of sequences of words, phrases or brief descriptions that serve as a skeleton text or agenda for oral instruction or debate within concrete historical institutions.[10] This type of compendium served as a shared common ground for all members of a given profession or other technical specialization. Properly credentialed practitioners could presumably maintain their own interpretations of certain facts or theoretical

7 See, for example, Asper 2007; Doody 2009; van der Eijk 2010 and the papers collected in König and Whitmarsh 2007.

8 For a general discussion of how anonymous, impersonal compendia fit into the Greek technical literature, see in particular the section on *Grundannahmen zu Wissenschaftstexten* in Asper 2007: 27–45.

9 This is not meant to deny the reality of extract tablets or pedagogical materials, merely to emphasize that these traditions were cumulative rather than categorical; cf. Larsen 1987.

10 Obviously I am stressing the on-going, normative character of a social practice deemed institutional rather than the scale or physical setting of such an institution.

generalizations as long as they agreed to a fixed repertoire of *infrastructural* compendia. These compendia are therefore infrastructural in the precise sense of the term as recently defined by Brian Larkin:

> Infrastructures are built networks that facilitate the flow of goods, people, or ideas and allow for their exchange over space. As physical forms they shape the nature of a network, the speed and direction of its movement, its temporalities, and its vulnerability to breakdown.[11]

And while in colloquial usage infrastructure tends to refer to what we might call banal or non-semiotic networks (electricity, water and sewage lines, for example), in just the last couple years a number of theorists have rightly seized upon the fact that there is no profound difference between the internet and a natural gas pipeline. One of the funny things about infrastructures, as opposed to other forms of technology, is that "they are present to the senses, yet they are also displaced in the focus on the matter they move around." As Larkin puts it, "We often see computers not cables, light not electricity, taps and water but not pipes and sewers."[12] And it is precisely this difference in focus that distinguishes an infrastructural compendium from other written manifestations of technical knowledge. While modern-day researchers must be largely satisfied with reconstructing the plumbing, the real life of these texts was in the *oral* commentaries, scholastic disputes and disciplinary practice that they set in motion.

Seen in this light, the complex stratification of scribal education in cuneiform that begins with the physical manipulation of the stylus, impressing wedges in the surface of a clay tablet, reaches its apogee and culmination with the inculcation of one of more disciplines, including both their written and their non-written elements. Yet it is precisely at this point that we can see the fundamental contrast between the heavily formalized process of memorizing the *loci communes* of a profession and the inevitable debate and disputation that must have surrounded the infrastructural materials. One of the few places where we occasionally find opposition and differences of opinion within the written record is in the letters and reports of scholars in the service of the royal court.[13] The key difference between the infrastructural compendia in cuneiform and what we might term post-infrastructural written compendia such as the Babylonian Talmud (hereafter the Bavli) is that the oral disputations that remained almost entirely oral throughout much of the history of cuneiform scholasticism – culminating in occasional high-stakes confrontations at court – are translated into a written medium and appended to the infrastructural

11 Larkin 2013: 328.

12 Larkin 2013: 329.

13 See in particular Robson's discussion of the *bārû* (2011), but in fact examples of contradiction occur occasionally throughout SAA 10 such as no. 23 "Refuting a Sighting of Mercury" (Parpola 1993: 18); nonetheless, it is telling that the person whose statement is being critiqued is not explicitly named. For an early discussion of orality in Neo-Assyrian scholarly circles, see Elman 1975.

text. The iconic form of the Talmudic page, consequently, provides us with a diagrammatic representation of both the infrastructural text (the Mishnah in the Bavli) and the discursive exposition that surrounded it. Crucially, however, the common feature of both the infrastructural approach of cuneiform scholasticism and the post-infrastructural features of later compendia such as the Bavli or the Zand is that they were meant to be used in an interactive setting, not in isolation.

The other side of the infrastructural coin, at least when it comes to Mesopotamian compendia, is their reliance on a wide variety of different citational practices. Thanks to Nakassis' recent restatement of the central issues in work on citation and citationality, we can now trace the crucial links between Austin's speech act theory, Derrida's critique of Searle and recent discussions of performantive speech in institutional contexts.[14] The common denominator for all of these discussions is the role that citation plays in reorganizing existing materials into new types of oral-written hybrids (written infrastructural text + orally mediated commentaries or dialogue) and then investing these oral-written hybrids with institutional authority. While there may be a few isolated moments in the history of cuneiform technical compendia in which information was communicated without passing through an oral intermediary (viz. the copying of an old tablet without even attempting to comprehend its contents), this was certainly not the norm. Instead, we must imagine that one of the primary activities of technical specialists, as they worked through a written text, was to point out the citational relationships between elements within the written text, elements in other textual compendia and conventional topoi in the oral discussion of the written text. Minuscule fragments of this complex oral-written citational hybrid were occasionally added to otherwise standard compendia in the form of written glosses and other marginalia, and to the degree that these can be identified and understood they represent crucial evidence for the multimodal oral-written reality that surrounded infrastructural compendia. But more generally the great empirical difficulty in discussions of both cuneiform and post-cuneiform Mesopotamian compendia is that we must use clues embedded in the written, text-artifactual record to reconstruct contexts of use in which the written text served as a point of orientation, even though it was not the primary medium for communicating information. The real medium of communication in the context of an infrastructural compendium is the citation, typically uttered in the oral exposition but pointing to a specific element in the written textual array of the compendium.

The emphasis that I would like to place on the institutional contexts in which infrastructural compendia come into use derives in a rather straightforward way from discussions of performative speech and its contexts of felicitous occurrence, first in linguistic anthropology and later on in Searle's attempt to rehabilitate

14 Nakassis 2013.

speech act theory with an institutional component.[15] While the anthropologists have not generally focused on institutions per se, seeking instead to develop a general account of the power of speech in different kinds of contexts, Searle has been the most important systematizer of speech act theory in the wake of Austin's famous *How to Do Things With Words*.[16] Largely one suspects in reaction to Rosaldo's withering critique of his intentional model of speech acts, Searle postulated a specifically institutional context for successful speech acts in his 1995 book *The Construction of Social Reality* and in a paper entitled "What is an institution?"[17] And while Searle's particular take on performativity and collective intentionality has not been accepted as a *communis opinio*, the basic idea shared by all of these different approaches is fairly straightforward: different types of validity or truth (denotational, scientific, legal, religious, etc.) are rooted in the acceptance of a speech act as a particular type of action by an institution of some kind. Other research traditions have sought to explain the complex relationship between speech acts, institutional contexts and the social values that they are capable of generating in rather different terms, but what they have in common is an emphasis on the highly constrained and carefully demarcated social contexts in which values like truth, effectiveness or objectivity are authorized.[18]

The best evidence for a complex web of citational relationships between written, infrastructural compendia and their oral exposition, at least throughout the length and breadth of the cuneiform written tradition, is the presence of glosses and other marginalia interspersed in an *ad hoc* way throughout otherwise standardized texts. Glosses and other *ad hoc* marginalia have often been mentioned as a particularly rich area for the identification of the oral surround within which written text-artifacts were entextualized and manipulated: Niek Veldhuis, for example, has pointed to clear evidence for this kind of metalinguistic notation in the context of Old Babylonian period acrographic lists such as Lu = *ša* or Izi and historians of cuneiform mathematics have often used marginal or irregular notations for understanding the early history of place value notation.[19] Yet these examples,

15 See Silverstein 1993 on metapragmatic function within linguistic anthropology; for Searle's efforts to rehabilitate orthodox speech act theory, see Searle 1995; 2005.

16 Austin 1962.

17 Rosaldo 1982, although Searle does not cite Rosaldo's critique; Searle 1995 and 2005 respectively.

18 Readers familiar with the Kripke's causal theory of reference (Kripke 1980; Putnam 1975), the famous Twin Earth problem (Putnam 1973; 1975) or Tomasello's work on joint attentional scenes (Tomasello 1999; Tomasello *et al.* 2005; Moll and Tomasello 2006) will certainly recognize that many of the same issues are at stake in these accounts. Of course as soon as we mention terms such as 'truth' and 'objectivity' we are caught up in broader methodological issues; for some orientation to these broader issues, see the 2012 MPIWG Preprint on historical epistemology entitled *Epistemology and History: From Bachelard and Canguilhem to Today's History of Science*.

19 Friberg 2005; Robson 2008: 77–79.

however illustrative of the subtle intermeshing of the oral, written and procedural components of scribal practices, are not oriented to the type of technical compendia that we are focusing on here. Mark Geller's contribution to this volume ("Encyclopedias and Commentaries"), however, in which he investigates two different versions of a list of *materia medica* (KADP 2 and KADP 4), represents one of the most important examples of this type of phenomenon. Alongside the compendia of *materia medica* that we find in KADP 2, the focus of Geller's paper is actually on a shorter extract tablet (KADP 4) that includes an initially bewildering range of glosses and interpolations such as the following:

8	^{ú}*za-mar* $sa_{5\ sa\text{-}a}$ *za-mar* $sig_{7}{}^{a\text{-}ru\text{-}[q]u}$	^{ú}*ak-tam tur-a-zu* du_{11}.ga
9	^{ú}*hab-ši-lu-ur-ga*	^{ú}min nim. $^{e\text{-}lam5\text{-}}$ ki ^{e}
10	^{ú}*ti-la-a-kur-ta*	^{ú}min *Gu-te*$^{!e}$

8	'immediately red, immediately green'-plant = *aktam*-plant, also called *tur'azu*	
9	*habšilurga*-plant	ditto, Elamite
10	*tillakurtu*-plant	ditto, Gutian

Here we see technical scholasticism at work, honing in on the philological and linguistic details of a single pharmacological plant (Akk. *aktam*, an extremely common ingredient in the therapeutic materials) in no less than three distinct ancient Mesopotamian languages: Akkadian, Elamite and Gutian. As Geller puts it, the numerous glosses and interpolations in KADP 4 almost seem to be "commenting on the larger tablet," but that "we are back in eighth-century Assur, before commentaries became a well-established academic genre, and that KADP 4 is a type of proto-commentary in which glosses represent keywords for hermeneutical explanations which we otherwise lack" (M. Geller in this volume). Here in the annotated extract tablet KADP 4 we see the boundary line between oral and written, which also served as the usual demarcation between object language and metalanguage in the web of citations surrounding an infrastructural text, shifting every so slightly and, in the process, giving us a rare glimpse of the type of metalinguistic commentary that always surrounded an infrastructural text.

Within such a paradigm, the key difference between the infrastructural text and its oral exposition was the medium in which each of these components was encoded: the infrastructure was encoded in writing and a would-be member of a profession gained entrance through the process of memorizing and reinscribing the infrastructural compendium. Crucially, however, there is no reason to believe that memorization and material iteration of the infrastructural compendium was the *raison d'être* of the entire process. Instead, it must be seen as a shared common ground for the institution or the social group in which it operated. The role of infrastructural texts in the astrological disciplines is made particularly clear in Mathieu Ossendrijver's contribution to the volume ("Compendia and Procedures in the Mesopotamian Astral Sciences"). Ossendrijver provides us with a detailed

overview of some of the most important compendia in the astral sciences, including EAE 14, MUL.APIN and the astronomical diaries, viz. "highly standardized compilations of astronomical, meteorological, economic and historical data for intervals of six months" and the Seleucid period goal-year compendium TU 11. In the second half of the 1st millennium BCE the astronomical sciences represented the most advanced of the technical disciplines in Mesopotamia and, as Ossendrijver notes, the astronomical diaries must be seen as the most complex example of compendia-building in the Mesopotamian world:

> Each diary is the end product of a complex data management operation in which short-term reports with different types of information, obtained from different scholars, were collected, evaluated, processed and compiled into the format based on six month intervals. (Ossendrijver in this volume)

Here Ossendrijver clearly argues for both a complex citational relationship between the astronomical diaries and their sources, but also emphasizes that blocks of material that were originally generated in one discursive environment could be recontextualized in other types of compendia. In the absence of the type of *ad hoc* marginalia that M. Geller discusses, the movement of blocks of material from one compendium to another often represents one of our best pieces of evidence for the history of Mesopotamian compendia. Ossendrijver also discusses the quotation of entries from *Enuma Anu Enlil* in the letters of Neo-Assyrian scholars and in particular the numerical tables that appear in *Enuma Anu Enlil* (EAE) 14, a compendium that Francesca Rochberg also discusses later on in the volume. Although EAE 14 was clearly an organic element of the *Enuma Anu Enlil* series ("an integral part of the subseries 'Appearances of the Moon' and not an astronomical insertion disconnected from the omens" as Ossendrijver notes), it is unusual in that it was loaned into an Aramaic-speaking technical context, where it was translated into Aramaic and subsequently found its way into the Aramaic Astronomical Book (4Q208–4Q211) at Qumran, now discussed at length in Drawnel's new edition of the primary sources.[20]

The transmission of cuneiform technical compendia such as EAE 14 into various Aramaic-speaking technical ateliers – both while cuneiform was still accessible in some form but also after its demise in the first few centuries CE – represents a piece of one of the most complex questions for the early history of Mesopotamian technical compendia: the reception of Mesopotamian materials in Aramaic. Specialists in Second Temple Judaism have increasingly focused on a wide range of technical materials that have been recovered from Qumran and the Genizah materials, and Lennart Lehmhaus situates his contribution to the volume ("*Listenwissenschaft* and the Encyclopedic Hermeneutics of Knowledge in Talmud and Midrash")

20 Drawnel 2011.

within this new research tradition.[21] But rather than limiting himself to Second Temple materials Lehmhaus investigates a wide range of list making processes and formal structures in the Babylonian Talmud (the Bavli) in the broader context of early Jewish scientific thought. Lehmhaus's discussion includes both materials that have often been interpreted as extraneous but were still incorporated into the Bavli such as the Gittin Book of Remedies (Gittin 68b–70a) as well as lists and compendia that were clearly formulated within the Rabbinic tradition itself. Mark Geller has argued that the Gittin Book of Remedies must derive from Akkadian therapeutic materials due to the astonishing number of Akkadian loanwords that can be identified in the text.[22] As Lehmhaus emphasizes, however, the Gittin Book of Remedies is carefully woven into its surrounding context in the Bavli, so we cannot see "this textual block as an alien element" (Lehmhaus in this volume). At the same time, Lehmhaus also focuses on a number of distinctively rabbinic list-making practices or compendia such as Seder Eliyahu Zuta (The Minor Order of Elijah, "a unique and multifaceted work that skillfully combines different genres, formats and styles of discourse into a dense ethical discourse" and the "midrash of lists" to be found in traditions such as Midrash Maʿasseh Torah (Midrash of the Work of Torah), as in the following example:

> Three things [behaviors] will bring a man to wealth: calculation on prayer, faithful business with other men, humbleness towards his household. Some even say: one who has knowledge. As it is said: *by knowledge the rooms are filled with all precious and pleasant riches (Prov. 24:4)*. (Chuppat Eliyahu, p. 165)

Here the formal history of citational practice that began with infrastructural compendia in Mesopotamia comes full circle as groups of orally-mediated rabbinic maxims that came into existence in the context of oral exposition re-enter the written, textual record in the form of a new compendium known as Chuppat Eliyahu.

3 Licensing empiricism: replication and authority in Mesopotamian technical literature

If the picture of institutional contexts and the citational practices that inhabit them – as outlined in the preceding section – can be taken provisionally for granted, it immediately raises questions of persistence, iterability and replication. Larkin's definition of infrastructure already speaks of its role in defining the speed

21 See, for example, Langermann 2002; Leicht 2006; Reed 2007; Popović 2007; Ben-Dov 2008; Bohak and Geller 2013; Elman 2014; Reed 2014.
22 Geller 2000 and 2004.

and direction, temporality and vulnerability of technical information as it moves through a network, but in the absence of ethnographic observations how can we reconstruct the microsocial practice that surrounded ancient technical compendia? Two recent collections of papers on Graeco-Roman technical literature have adopted an explicitly literary or rhetorical approach to their structure, largely inspired by van der Eijk's seminal paper "Towards a Rhetoric of Ancient Scientific Discourse".[23] One of the key advances made possible by this approach is the recognition that certain types or genres of technical literature arise in, or alternatively, meet the needs of a specific context of transmission. The Aristotelian *pragmateiai* – sometimes spoken of as 'lecture notes' – are one of the best known examples of this in that they were apparently generated in discussions among specialists rather than for outside consumption. Föllinger has emphasized, however, that even if "[t]he manner of representation produces the impression of being present in a dialogue, … no imitation of a dialogue takes place, as in Plato's works, or in Aristotle's dialogues, the 'exoteric' writings which he produced for a wider audience."[24] The careful distinction between dialogue and dialogic materials (and the association of these two types of text with different audiences) is certainly a welcome point of view vis-à-vis the Graeco-Roman materials. It must be emphasized, however, that Föllinger's dialogic distinctions cannot be extended in Mesopotamian infrastructural compendia and the dialogic speech that enveloped them.

Although we are perfectly willing to recognize that the profoundly monological compendia that we are looking at here operated within a bustling, non-written dialogic context, we must attempt to locate concrete traces of this dialogic context in the written texts themselves rather than simply positing it existence. One of the most promising indices of dialogic context within the written textual array of infrastructural compendia is the role of metapragmatic descriptors or rubrics in communicating the reliability or authority of a given block of textual materials. These statements of epistemological classification ('tested', 'tried', 'checked', transmitted or recommended [by a famous specialist or patient]) have largely escaped the notice of present-day historians, yet it is increasingly clear that the addition of these seemingly trivial labels to technical compendia played a central role in their replication and authorization. Though elements of this approach (with its emphasis on the contrast between object language and meta-language) can already be discerned in recent investigations of literary genres and their reception, I would like to suggest that Urban's work on the replication of native transcriptions in ethnographic contexts provides a particularly useful perspective on how these epistemological labels or efficacy statements generate textual authority.[25]

23 The two collections are Doody *et al.* 2012 and Asper 2013, while the van der Eijk paper is van der Eijk 1997.

24 Föllinger 2012: 239.

25 Urban 1996; see also the narratological approach to 'codification' in Schernus 2011.

Rooted in anthropological discussions of the theory-laden character of transcription, Urban studied two native tradents of Shokleng mythological lore as they transcribed or repeated audio recordings of this material.[26] The younger of the two (Nãnmla) transcribed the myths in written form, while the senior tradent (Wãñpõ) repeated what he heard on the recording, which Urban then transcribed. Urban found that the two copies produced by Nãnmla and Wãñpõ differed from the original in very specific ways and that the differences between the two copies were almost entirely determined by the (as)symmetrical power relationships between originator and copier:

> The difference can be summed up by saying that Wãñpõ's copies were less faithful reproductions of the originals than were Nãnmla's. Wãñpõ was an elder, more or less on a par with the originators, and he considered himself to be my [= Urban's] mentor. Nãnmla, by contrast, was a young man, who regarded the elders as bearers of the ancient traditions and who saw me as his mentor.[27]

In other words, Wãñpõ's symmetrical relationship to the originator of the text gave him license to alter the received text in much more dramatic ways than the asymmetrical relationship of the young tradent Nãnmla. If we extend this model to the addition of epistemic labels or efficacy statements in both cuneiform and post-cuneiform compendia in Mesopotamia, we can be fairly confident that only those at the top of an institutional hierarchy would have been able to apply these qualifications to an existing compilation or subsection.

Later on in the same paper, however, Urban posits a more complex dynamic between originators and their replicators in the following pair of propositions:

> The more the discourse is overtly coded as a unique instance, produced by its originator, and limited to a present context and circumstances, the less likely will the copier be to respond to it.
>
> The more discourse is overtly coded as nonpersonal, that is, not as something generated by the originator but as transmitted by him or her, and the less it is linked to a present context and circumstances, the more likely will the copier be to replicate it: hence, the more shareable it is.[28]

Stated somewhat differently, the transmissibility of a text and concrete moments of documented empirical validation seem to be largely incompatible. If a cuneiform text were to include, however anachronisitically, a double blind clinical trial, it would still paradoxically make the transmission of the text more difficult in a traditional society. We can even see some evidence of this incompatibility between

26 Urban 1996: 24–27; on the theory-laden character of transcription, see Ochs 1979 and Duranti 1997: 122–161.

27 Urban 1996: 34.

28 Urban 1996: 40.

transmissibility and empiricism in the specific linguistic and historical form that epistemic labels exhibit in Mesopotamian compendia.[29] The ubiquitous qualification of 'tested' remedies with the Akkadian adjective *latku*, for example, in cuneiform compendia carefully avoids referring to any specific instance of testing through the use of a non-descript, adjectival form. Epistemic labels like *latku* occupy a very special linguistic niche: they link the technical materials to one or more occasions on which the remedy or recipe was tested, tried, or successfully put to use, but these occasions are always stated impersonally ('it is a tested remedy' rather than 'I tested it just now and it worked') or located in the far-distant or mythological past ('eye remedy used by Hammurapi'). Thus the authoritative weight of these rubrics does not necessarily lie in their minimalist semantics or historical probity, but rather in the decision of institutional authorities to append the rubric to a given body of material.

Three of the four contributions in this section (Steinert, Bhayro, and Raggetti) provide us with a broad survey of this type of phenomenon from the Old Babylonian period (ca. 1800 BCE) and first-millennium BCE cuneiform compendia through Syriac and Arabic materials that largely came into existence during the Abbasid period (ca. 750–1258 CE). Steinert's contribution ("'Tested' Remedies in Mesopotamian Medical Texts: A Label for Efficacy Based on Empirical Observation?") is particularly important in that it locates specific historical instances in which *materia medica* were tested, apparently for safety rather than efficacy, and these tests were then reported in epistolary form. Steinert offers a compelling example from a letter sent to Old Babylonian Mari early in the 2nd millennium BCE.

> Regarding the plants (employed) against 'the burning of *ṣētu*-fever' of the physician (*asû*) from Mardamân and of the staff physician, about which my lord has written to me: I have sent their plants, which were gathered on a mountain, under seal with my signature to my Lord, and (I have sent) these physicians with La-gamal-abum, together with their plants.
>
> My lord has already tried the herb for (curing) 'the burning of *ṣētu*-fever' of the staff physician, but I myself have (also) tried the herb for 'the burning of *ṣētu*-fever' of the Mardamân physician and it worked well (*šammam ša ḫimiṭ ṣētim … altukšuma damiq*). (Steinert in this volume)

This kind of historically concrete and personal description of actual drug use, which goes on to say that it was also tested on a human guinea pig, never appears in cuneiform compendia, but it does suggest that in actual practice, physicians were testing remedies for safety and perhaps effectiveness. As Steinert emphasizes, the language of 'testing' does not seem to appear in any of the surviving second-millennium BCE compendia and even in first-millennium BCE therapeutic compendia only a small section or a limited number of individual recipes are designated as *latku* 'tested'. Crucially, however, even in the context of those recipes that are

29 For an overview of the question of empiricism in Mesopotamian thinking, see the papers collected in Selz 2011.

described as *latku* 'tested' no concrete information about specific events of testing or use are ever presented. This shows us that very different constraints operate on the compendia, blocking the inclusion of personal or historical information, and if Urban is correct in his postulation of an antithesis between concrete, personal specificity and the transmissibility of a text, then this is as we would expect: concrete instances of testing are excluded from the compendia in order to make them more easily transmissible.

The only apparent exception to the ban on referring to historical events in the compendia is the occasional mention of a famous ruler such as Hammurapi or Enlil-bani. Steinert also directs our attention to the most elaborate (and quite unusual) efficacy statement in the therapeutic corpus: the lengthy summary statement found in AMT 105,1:

> Tested and checked salves and bandages *which are proven through experience*, from the mouth of the old sages from before the Flood, which Enlil-muballiṭ, a sage of Nippur, has left (behind for posterity) in Šuruppak, in the second year of Enlil-bāni, king of Isin. A non-expert shall show it to an expert, (but) an expert shall not show it to a non-expert. Taboo of Marduk. (Steinert in this volume)

Unlike other efficacy phrases, this "summary appendix" comes at the end of the text, immediately before the colophon and includes additional elements such as a secrecy clause and a statement of the antediluvian origin of the recipes in question. As Steinert points out, elaborate statements such as this represent "a late scholarly innovation and reflect a stage in the development of efficacy phrases tied to the formation of compendia and the establishment of authoritative textual series. At this stage, efficacy phrases are combined with other elements such as declarations of origin and secrecy formulae, as a conscious device to emphasize the importance and authority of the contents" (Steinert this volume). As we see here more complex efficacy phrases like *napšalātu takṣīrānu latkūtum barûti ša ana qāti šūṣû* "tested and checked salves and bandages which are proven through experience" often act as a center of gravity that attracts other types of authentication or authorization such as secrecy formula or statements of mythological origin.

As we turn to the use of efficacy phrases and other epistemic rubrics in more familiar Semitic languages, the secondary literature provides us with a somewhat clearer picture of the phenomenon. Efficacy phrases have been discussed in the context of medieval English recipes but also closer to home in a number of recent discussions of 'tested and tried remedies' in Aramaic, Syriac and Arabic.[30] As Rudolf points out in a forthcoming paper, bipartite 'tested and proven' formulae appear in a number of different groups of magical texts in late antiquity, including

30 For efficacy phrases in Middle English recipes, see Jones 1998: 203–206; for similar materials in Aramaic and Arabic, see Schäfer 1990: 88; Schäfer and Shaked 1994: 135, 139, 146–147; Ullmann 1970: 311–313; Bohak 2008: 282.

materials from the Cairo Genizah and the Demotic and Greek Magical Papyri.[31] Rudolf then goes on to suggest that the primary goal of these labels was to act as a form of propaganda or advertising for the sale of individual recipes. This is undoubtedly correct for many of the late antique texts, but the presence of these efficacy statements in institutionally-maintained compendia suggests that they must have operated in a substantially different way in more institutional contexts. Bhayro's contribution to this volume ("Theory and Practice in the Syriac *Book of Medicines*: The Empirical Basis for the Persistence of Near Eastern Medical Lore"), which builds on a number of important discussions of the Syriac Book of Medicines in recent years, offers a particularly important example of the use of efficacy phrases in Syriac compendia, a usage that is remarkably similar to what we find in cuneiform therapeutic materials.[32] But more importantly, Bhayro also situates the Syriac Book of Medicines at a point of intersection between the lengthy written tradition in Mesopotamia and a newly invasive written tradition in the form of Galenic medicine.

Although the Syriac Book of Medicines contains both materials extracted from Syriac translations of Galen as well as recipes that derive from native Mesopotamian, presumably cuneiform compendia, the Galenic materials are particularly intriguing because they are "not a translation, but in fact an abridgement of earlier Syriac translations," removing the first person discussions in which Galen as author speaks.[33] Thus we see in a post-cuneiform compendium written in Syriac precisely the same processes at work that we saw earlier in the cuneiform compendia, even when the sources are Graeco-Roman in origin: the removal of specific individual or historical indices in order to produce a depersonalized text (see also my own contribution to the volume) in combination with the addition of efficacy phrases or epistemic labels. These two processes (depersonalization and the use of anonymous efficacy phrases) seem therefore to be characteristic of both cuneiform and post-cuneiform compendia in Mesopotamia. Moreover, if we compare these Mesopotamian compendia in cuneiform and Syriac with the processes at work in Galen's own compilations of recipes from a wide variety of sources, the processes at work could not be more different. The removal of 'Galen's own voice' from the Syriac Book of Medicines stands in stark contrast to what we see in Galen's own compilations of recipes (*De compositione medicamentorum per genera / localium* = *Composition of Medicines according to Types* and *Composition of Medicines according to Places*), in which Galen often preserves the first-person turns of phrase that he finds in his sources. Totelin has recently emphasized that Galen often incorporated first-person turns of phrase that he found in sources like Asclepiades in order to bolster the empirical force (*peira*) of his compendia, but this represents a radically

31 Rudolf forthcoming 5.

32 For Bhayro's earlier work in this area, see Bhayro 2005 and 2013.

33 See Bhayro 2013 for an overview.

different and very non-Mesopotamian approach to textual authority.[34] Put somewhat differently, Graeco-Roman compendia such as Galen's recipe collections marshaled their authority by combining first-person descriptions of empirical practice (either as a revoicing of first-person empirical observation in the textual source or added by Galen as part of his own elaboration) with elaborate methodological arguments against other schools and practitioners, while the authority of Mesopotamian compilations was based on an anonymous, institutional authority, expressed in the form of metadiscursive labels and efficacy phrases.

In Raggetti's contribution ("The 'Science of Properties' and its Transmission") we see one of the logical endpoints of this distinctively non-Graeco-Roman form of compilation: those who put together the Abbasid period compilations that Raggetti focuses on were concerned with the 'science of properties'. These compendia made use of a complex vocabulary for describing underlying causal relations and empirical validity, including a contrast between materials described as either *Manāfiʿ* or *Ḫawāṣṣ* as well as a type of material known as *Muǧarrabāt*. With respect to the first pair of terms, Raggetti explains that

> the difference between *Manāfiʿ* and *Ḫawāṣṣ* lies in the transparency of the underlying causal relations. Within a comparative approach, one may infer that the relation between cause and effect in the *Manafi'* is clear and can be deduced with a common sense approach. In the latter, the two different aspects meld, resulting in a peculiar and ineffable process of causation. (Raggetti in this volume)

The label *Muǧarrabāt* was used in connection with medical phenomena, namely as a label for "records of physicians' case histories, treatments, medical experiences, and remedies which are at least 'described' as real cases" (Raggetti in this volume). As Raggetti notes, the figure of Abu 'Ala ibn Zuhr is of particular interest in this regard, since he was author of two major compendia (*Kitāb al-Muǧarrabāt* 'Book of Tested Remedies' and a *Kitāb al-Ḫawāṣṣ* 'Book of Occult Properties') that might be thought to fit into the Mesopotamian type of compendia under discussion here. Raggetti has recently pointed out in another venue that ibn Zuhr was, however, Andalusian and made use of an explicit set of citational abbreviations in order to carefully track his sources.[35] Thus even where we can identify similarities between Mesopotamian and non-Mesopotamian compendia in the Abbasid period, it appears that the profound anonymity of technical compendia remained an abiding feature of the materials that were produced in the vicinity of the Abbasid court, while more explicit forms of citation came into existence in other regions of the Arabic-speaking world.

34 For a discussion of first person usage in Galen, see Totelin 2012: 309, citing Fabricius 1972: 31 and 174–179.

35 Raggetti 2014.

One of the other logical endpoints of this type of post-cuneiform tradition is actually to be found in Slavic folklore, where historiolae and other narrative elements drawn from Mesopotamian technical literature were recontextualized as ritual or 'magical' therapeutic remedies. Florentina Geller's contribution ("Between Demonology and Hagiology: The Slavonic Rendering of Semitic Magical *Historiola* of the Child-Stealing Witch") offers a rare insight into the Slavonic materials used against the Child-Stealing Witch, viz. the Sisinius prayers, but of course better known to Assyriologists as the Lamaštu demon. Geller first summarizes this far-flung tradition, extending from the Mesopotamian Lamaštu demon and the Liliths mentioned in Aramaic magic bowls and Syriac incantations to Greek and Slavonic versions of much the same story. The goal of all these materials is to prevent the death of recently born infants due to demonic attacks of one kind or another. The primary ritual mechanism at work in these materials is the recitation or inscription on an amulet or talisman of 'protective names' such as Sanui, Sansanui and Semniglaph in the Aramaic materials. As the historiola moves from one culture to the next, certain distinctive elements disappear: the name of the cuneiform demon Lamaštu is replaced by a generic term for female demon, namely Lilith, in the Aramaic magic bowls, and as Geller then points out, the "Slavonic magic texts do not remember Lilith" at all (F. Geller in this volume). Only the narrative framework and the three protective names remain. In the seventeenth-century apocryphal prayer or incantation entitled "Prayer to St. Sisin, Isidore, Simeon," which Geller translates for the first time in her contribution the three protective names have morphed into Sisin, Isidore (< Sideros) and Simeon and in fact the narrative focuses exclusively on Sisin. In some sense, therefore, the materials collected in Raggetti's contribution and in F. Geller's contribution ramify in equal and opposite directions: the Arabic materials preserving the co-textual structure of the cuneiform technical materials in the form of infrastructural compendia, while the Slavonic materials in Geller's contribution maintain the pragmatic context in which cuneiform technical materials would have been used in a decidedly post-cuneiform cultural context.

4 The two paradigms: towards a new textual criticism for Mesopotamian technical compendia

Central to the papers collected in this volume is the thesis that the type of scientific authority associated with the individual thinker or researcher in the Graeco-Roman world cannot be generalized to all of ancient science. More generally, as Rochberg puts it in her contribution to the volume ("The Babylonians and the Rational: Reasoning in Cuneiform Scribal Scholarship"):

> ... subsequent attempts to correct the misapprehension that the Greeks invented science and rationality, and to prove that rational reasoning, and with it science, does not have to be

> categorically excluded from the ancient Near East has largely taken the form of showing that the contents, form, or methods of the cuneiform scholarly and technical writings satisfy criteria for rationality established in ancient Greek philosophy. (Rochberg in this volume)

Rochberg identifies Dodds's *The Greeks and the Irrational* as one of the hegemonic texts buttressing this "misapprehension" and one might even extrapolate from Rochberg's formulation that Dodds plays much the same role in the ideological substrata of classical scholarship that the idea of mytho-poetic thought advanced by the Frankforts in *The Intellectual Adventure of Ancient Man* plays in cuneiform studies.[36] As part of her excavation of these intellectual histories, Rochberg first notes that "Dodds' prime example of the Hellenistic trend toward the irrational was astrology," but then goes on to exemplify Dodds's vociferous rejection of occult properties and immanent forces:

> Besides astrology, the second century BC saw the development of another irrational doctrine which deeply influenced the thought of later antiquity and the whole Middle Ages – the theory of occult properties or forces immanent in certain animals, plants and precious stones. Though its beginnings are probably much older, this was first systematically set forth by one Bolus of Mendes, called "the Democritean," who appears to have written about 200 BC. His system was closely linked with magical medicine and with alchemy; it was also soon combined with astrology, to which it formed a convenient supplement.[37]

This is precisely the 'science of properties' material that Raggetti refers to in her contribution to this volume and the Democritean texts that Dodds is citing have recently been re-edited and recontextualized as part of the history of ancient science in the work of Matteo Martelli.[38]

The crux of Rochberg's argument is that the linkage between astrology and the science of properties, the linkage that Dodds found so disagreeable, is in fact one of the key forms of rationalization in Mesopotamian scientific thought. Much of early Graeco-Roman medicine, for example, fixates on a four-fold system of humors and their links to the pharmaceutical properties of *materia medica*, a specific way of rationalizing pharmacology that is emblematic of Graeco-Roman science. In Mesopotamia, however, we find a very different paradigm in which correlations between native taxonomies of *materia medica* and astronomical/calendrical phenomena play the central role. Thanks largely to Steele's suggestion that the animal names in *Dreckapotheke* mentioned in the late *Kalendertexte* correspond to zodiacal signs (a plant coded as 'sheep-blood' corresponding to Aries, for example), these materials have emerged as a new hotbed of research into this distinctively Mesopotamian form of rationalization, or as Rochberg says:

36 Frankfort and Frankfort 1946.

37 Dodds 1956: 246.

38 See in particular Martelli's *The Four Books of Pseudo-Democritus* (2014).

> The *Kalendertexte* epitomize a method that relates traditional scholarly knowledge concerning stones, plants, and animals of the Babylonian pharmacopeia with astronomical number schemata, the zodiac and the ideal calendar. The number schemes seem to function as techniques for creating multiple correspondences. The particulars of these various parts of the world were interconnected, to be drawn together in a variety of correlations and correspondences, one essential component of which was correlation by analogy. (Rochberg in this volume)

If the dominant form of rationalization in late Mesopotamian culture involves correlations operating *between* disciplines, as they are usually conceived (and in a culture that was generally hesitant to put metadiscursive or theoretical statements into writing), how can we operationalize Rochberg's hypothesis that a distinct form of rationalization was operating in Mesopotamian circles?

One of the main contentions of this volume is that the redactional processes surrounding technical compendia provide some of the best evidence for this specifically Mesopotamian form of rationalization. This approach grows out of both Eva Cancik-Kirschbaum's work on the diagrammatic structure of textual artifacts and also out of recent discussions with Lucia Raggetti and Matteo Martelli about the nature of technical compendia in antiquity.[39] The refigurations of Arabic technical materials discussed in Raggetti's contribution to this volume are particularly apt: even at the end of our temporal framework (yet still operating within a distinctively Mesopotamian mode) these compendia were frequently reorganized precisely in order to highlight certain types of elements within a given entry (name of material, source, or pharmaceutical effects). By reorganizing the entries in a compendium according to their medicinal properties, the possible correlations with medical texts are made more accessible; if reordered on the basis of the animal from which a particular material derives, links to the zoological literature are made available.[40] Although a distinctive textual criticism for ancient technical and scientific compendia is still only in its infancy, it is clear that it must come to grips with both the modularity of groups of entries as they move between compendia as well as the redactional processes that were applied to individual entries. The final two papers in the volume (Wee's discussion of embedded variants in the Diagnostic Handbook and my own contribution) speak directly to this issue.

Building on his forthcoming work on the commentaries to the Diagnostic Handbook (Sum. sa.gig, Akk. *sakikkû*), Wee offers us a fascinating insight into the redactional processes surrounding individual entries in the diagnostic tradition ("Phenomena in Writing: Creating and Interpreting Variants of the Diagnostic Series Sa-gig"). As Wee points out, the Diagnostic Handbook has emerged as the favorite exemplum for discussion of the redaction of compendia in a specifically Mesopotamian context. This is largely because its most famous redactor, Esagil-

39 For the diagrammatic structure of textual artifacts, see Cancik-Kirschbaum and Mahr 2005; Cancik-Kirschbaum 2010; 2012; Johnson 2013a.

40 See Eisenstein 1991 for an overview and von Staden 2013 for a recent survey.

kīn-apli, who served as one of the leading scholars under Adad-apla-iddina (1068–1047 BCE) actually appended a rather detailed description of his editorial activities to a catalogue listing the tablets in the *sakikkû* series, which Livingstone has recently retranslated as follows:

> That which since the distant past had not received a new edition (*ša ul-tu ul-la* sur.ᵍgibil *la*ᵍ *ṣa-ab-tu*$_4$) and the twisted strands of which had had no forerunners: in the reign of Adad-apla-iddina, king of Babylon, to work it anew Esagil-kīn-apli, descendant of Asalluḫi-mansum, sage of Hammurabi the king, mainstay of Sîn, Lisi, and Nanaya, burgher of Borsippa, steward of Ezida, priest of Izuzu (Nabû the capable one), who holds the Tablet of Fates of the gods, who reconciles conflicting things, purification and ablution priest of Ninzilzil (Nanaya), the Lady of Solicitude, close sister of his (Esagil-kīn-apli's) beloved one, the scholar of Sumer and Akkad (i.e. Esagil- kīn-apli himself), with the ingenuity that Ea and Asalluḫi had bestowed upon him, personally carried out evaluation and established editions of *sakikku*, from head to foot, and established it for knowledge (sur.gibil dab.meš-*ma ana* níg.zu DU-*in*)! Pay attention! Be careful!
>
> Do not neglect your learning! He who does not stand by knowledge must not recite sa.gig, nor may he call out *alamdimmû*. The (series) sa.gig is the composition for sickness and depression. The series *alamdimmû* is the series for the human form and likeness, which Ea and Asalluḫi decreed. Both series comprise one composition. Let the exorcist who makes the decisions and watches over people's lives and who knows *sakikku* and *alamdimmû* in their entirety investigate and examine. Let him deliberate and put his diagnosis at the disposal of the king.[41]

As Wee makes quite clear, the key opposition in this passage is between still unedited or not yet compiled materials (sur.gibil *la ṣa-ab-tu*$_4$) and the new compilation (sur.gibil dab.meš) that Esagil-kīn-apli has produced.[42] This lengthy statement must be seen as the logical or formal endpoint of the historical practice of appending efficacy phrases and other metapragmatic qualifications to written compendia, so in some sense the process that began with the testing of pharmaceutic recipes as described in Steinert's contribution reaches it fullest form in Esagil-kīn-apli's statement of editorial intention. And it is really only here in this statement that we find a literary form that is roughly comparable to the elaborate prefaces that were regularly attached to Graeco-Roman technical treatises.[43]

The compendia that Esagil-kīn-apli put together at the end of the 2nd millennium were, in formal terms at least, not very original: they built on a well-established model for medical compendia and made use of a standard terminology for late medical compendia. In his *editio princeps* Finkel already pointed out that SUR.GIB-IL corresponds to Akk. *za-ra-a*,[44] which as Wee argues is probably to be read as *ṣa-ra-a* and can probably be linked to the same idiom for editorial work in the

41 Translation Livingstone 2013: 273.

42 For the textile metaphor for editorial work in operation in this passage, see Rutz 2011, but the same metaphor is already attested in the Early Dynastic scholastic materials (see Johnson 2013b).

43 See Föllinger 2012 and van der Eijk 2013 for recent discussions of the Aristotelian *pragmateiai*.

44 Finkel 1988: 150.

catalogue of therapeutic materials known from Assur and at least one copy of the plant list URU.AN.NA, where it is written out syllabically *ša ul-tu ul-la ṣa-ra-a la ṣab-tu*.[45] As Wee emphasizes, this idiom makes use of a textile metaphor:

> Whatever the Akkadian may be, Stol was correct to observe that the logogram SUR is associated with "spinning," "twining" and "weaving." The metaphor "tangled like threads," which immediately follows, certainly supports this view. According to the same logic, a text from Assur (VAT 10493+10543) describes an older version of the Physiognomic Series Alamdimmû as "the old (series) ..., which Esagil-kīn-apli has not unraveled (DU_8)," again portraying his editorial method as the process of unraveling textual threads from older compositions before combining the material in new ways to create a fresh edition. (Wee in this volume)

Thanks to a new edition of the therapeutic catalogue from Assur, which is being put together by the BabMed team in Berlin, it is now clear that both the diagnostic and the therapeutic materials were each organized into a distinct bipartite compendium in which the first major section was devoted to a head-to-foot enumeration of illnesses (corresponding to the Diagnostic Handbook), while the second half described general characteristics of the patient's body on the basis of external signs or externally caused medical situations (corresponding to the physiognomic materials in *alamdimmû*). Veldhuis points out that this same bipartite structure is also found *grosso modo* in the Old Babylonian list of human body parts (Ugumu):

> After the section on toes, where the "head to toe" arrangement comes to an end, the text continues with words that refer to ages ("my youth," etc.) or to the body as a whole ("my stature," "my shadow," "my skeleton"). This section is badly preserved in the Nippur material, but is now attested in several unprovenanced exemplars.[46]

Thus we can see that much the same compendial structure is found in the standard anatomical list from the Old Babylonian period (ca. 1800–1600 BCE) as well as diagnostic and therapeutic compendia that are first attested at the end of the 2nd millennium BCE. Presumably the Old Babylonian anatomical list served as the model for these later technical compendia and all three branches of ancient Babylonian medicine (anatomy, diagnostics and therapeutics) were organized along similar lines.

At the heart of Wee's contribution, however, is a fascinating study of how divergent elements within an established compendia could be edited into a new

45 Wee describes several possible etymologies and cognates in his contribution (p. 254 and n. 27). If *ṣa-ra-a* (= Sum. SUR), the term for 'compendium' in Esagil-kīn-apli's statement can be related to a geminate form such as Akk. *ṣarāru* or especially its byform *šarāru*, it may be related to the Syriac term *šarīr* 'valid, certain, trustworth (of textual materials)' that Bhayro discusses in his contribution. See also the Akk. D-stem *šurruru* 'to prompt', which corresponds to Sumerian {saĝ–gíd} and should not be confused with {sag.ki–gíd} = Akk. *nekelmû* 'to be angry at'. See in particular Dialogue 3, line 180: {tukum-bi saĝ ba-e-gíd-da-bi inim in-ne-ni-gi_4} "if they prompt, you will answer them" (cf. Karahashi 2000: 137, ex. 3).

46 Veldhuis 2014: 159, see also Couto-Ferreira 2009: 343–363.

compendial redaction through the use of embedded variants. Wee starts out by bringing together the complex redactional stages of a given entry in the Diagnostic Handbook, showing how late second-millennium fragments can be lined up with both standard entries in the Diagnostic Handbook as well as late commentaries on the same entry. This is particularly clear in his discussion of the phrase "the *kiṣṣatu* of the *ṣētu*-heat," which is attested in a late second-millennium Hattusha fragment as well as in the Diagnostic Handbook as a form of muscle pain associated with the *ṣētu* fever, but is subsequently reinterpreted in an Achaemenid period commentary as a variant form of the ubiquitous phrase "burning of the *ṣētu*-heat" (Akk. *ḫimiṭ ṣēti*). This sequence provides us with some idea of the kind of redactional moments that could have lead to embedded variants such as the following:

Type	Location	Variation
Logographic-syllabic	DPS 19/20:95′	*mi-qit pi* : KA 'Fall : of the mouth (syllabic) : of the mouth (logographic)'
Semantic (verbs)	DPS 20:85′	^{d}*šu-lak* ŠUB-*su* : DAB-*su* 'Šulak befalls him : seizes him'
Semantic (nouns)	DPS 23:7	IGI.MEŠ-*šú* : UZU.MEŠ-šú GE_6.MEŠ 'his face : his flesh is black'
Semantic oppositions	TDP 4:1	KÚM-*im* : SED 'he becomes hot : cold'
Time designations	DPS I, 8	ana ITI.3.KAM : ana U_4.3.KAM 'for 3 months : 3 days'

These are only some few of the simplest examples from the extensive set of embedded variants that Wee collects in his contribution. Crucially, this type of textual collocation indicates that the redactor was often faced with variations in his compendial sources and chose to include *both* variants at a given point in the compendium rather than deciding in favor of one or the other. Wee also demonstrates that these variants often served as key points of departure in the commentaries, and this presents us with a crucial building block for future work on the textual criticism of compendial entries and the infrastructural texts in which they appear.

My own contribution ("Depersonalized Case Histories in the Babylonian Therapeutic Compendia") brings the volume to a close and attempts to reconstruct the processes through which new entries, particularly those that might represent a kind of case history, were added to the therapeutic compendia. That Hippocratic case histories such as those collected in *Epidemics* are the first solid examples of the case history as a medical genre has become an axiomatic point in comparisons between Mesopotamian and Graeco-Roman medicine, yet I suggest that there are clear instances in the Babylonian therapeutic compendia in which a specific case and its circumstances have been 'depersonalized' and only then entered into a

therapeutic compendia. My paper therefore suggests that there are in fact case histories embedded in Babylonian therapeutic materials, but that a set of conventions surrounding the codification of specific phenomena in Mesopotamian compendia of all types prevented any explicit reference to the names of individuals. This follows largely from practices that are now fairly well understood in the context of Mesopotamian law. Charpin, for example, has shown that new statutes within the well-known legal compendia such as the Codex Hammurapi were codified and added to these compendia through the issuing of a royal rescript in reaction to a particular legal case. These rescripts reformulate the details of the individual legal case in a depersonalized way and we must assume that much the same took place when the leading physicians or scholars decided to add a new case history to an existing compendium. This process of depersonalization fits very nicely into the model for the transmission of information proposed by Urban in that the depersonalization of a case history would have made it easier to transmit and thus, at least within a Mesopotamian context, much more authoritative.

The legal analogy that is central to my contribution is also relevant, however, to broader histories of early scientific epistemology, particularly once we recognize that certain second-order concepts such as 'nature' or 'the laws of nature' are almost impossible to identify in the cuneiform textual record.[47] The origin of ideas comparable to 'the laws of nature' in the cuneiform tradition has recently been thematized in a number of papers such as M. Geller's discussion of the role of technical astronomy and secularization or Rochberg's overview of the social processes surrounding the codification of astronomical knowledge.[48] In a forthcoming paper entitled "Where Were the Laws of Nature Before There Was Nature?" Rochberg attacks one of the central problems of Mesopotamian epistemology: how did legal models impact technical compendia prior to the invention of the legal *metaphors* that underlie scientific investigation from Classical Antiquity up through our own day? But as Rochberg points out, the legal metaphor that seems to be operating in Mesopotamia differs from the legal metaphors in later cultures in that the object of the metaphor in Mesopotamia was the semiotic activity of the gods (as mediated by objects in the physical world) rather than the material objects themselves (as an autonomous realm of nature).

> Juridical or legal terminology in cuneiform texts has no reference to "nature," that is to say, no reference to a domain of physical phenomena qua phenomena, but only to phenomena qua signs of divine will and intent. The divine-human relation, whether effected by means of divinatory techniques to obtain knowledge directly or indirectly from the gods, or by means of ritual acts of entreaty to gain a response from a divinity, is what was described juridically, not the phenomena themselves (i.e., not nature itself). However, insofar as phenomena were taken as signs of divine communication, legal terms were extended to them as well, as in

47 See, however, the discussion of Akk. *šiknu* as 'nature' in Stol 1992: 48

48 Geller 2011 and Rochberg 2011 respectively.

> Esarhaddon's use of the word *kittu* "truth" to denote the regular paths of the stars, and in the formulation of omen statements as "laws". (Rochberg forthcoming)

In the processes of codification through which new therapeutic case histories are depersonalized, however, we see something quite different. The model in question is a juridical procedure used by the crown to codify a new statute within the legal codes and this procedure is then carried out at a lower level in the social hierarchy. Rather than the king – invested with the authority of the gods – creating a new legal statute through the issuing of an edict (a procedure that is portrayed and justified as a lower-order emulation of the juridical behavior of the gods as, for example, in divination), in the lower-order realm of therapeutic medicine, we must imagine the leading specialists within a given technical discipline – invested with authority from the crown rather than the gods – deciding to include a specific, yet depersonalized case history within an established compendium of therapeutic practice.[49]

This idea, that authority was devolved from a higher stratum in the hierarchy to a lower stratum, was the organizing principle for Mesopotamian technical knowledge at all levels and was centrally concerned with the sources of authority rather than the empirical investigation of material realities. Stated somewhat differently, in the older phases of Mesopotamian technical and scientific practice, authority was vested in institutions rather than highly personified authors and the leadership of these institutions was put in place by higher-order institutions: the gods put the king at the head of human society, and the king in turn chooses the individuals who will head up specific professions. In light of the carefully formulated notions of institutional hierarchy at work here, the mirroring of social practice that took place at each interface (gods interfacing with human king, the king interfacing with the elites of each profession) is less metaphorical than a matter of the position of a social group within the hierarchy: lower-order institutional practices are modeled on higher-order ones, human practices on the practices of the gods. Even if, as M. Geller has suggested, the rise of mathematically predictive techniques in the Achemenid period begins to bleach these loaded terms of much of their ideological ballast, with the rise of new institutional authorities, whether in Syriac monasteries or the Abbasid court, we see the same configuration of heavily institutionalized authority and anonymous compendia, a configuration that we should probably see as a distinctively Mesopotamian model for the dissemination of knowledge, a model largely at odds with the centrifugal form of authority and authorship that dominates in the Graeco-Roman compendia.

49 Here we see the devolution of authority as it moves across social and institutional strata, a concept that is usually summarized in the languages of Mesopotamia using the Sumerian terms {me} or {garza} = Akk. *parṣu* 'cultic office', see generally Farber 1990.

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