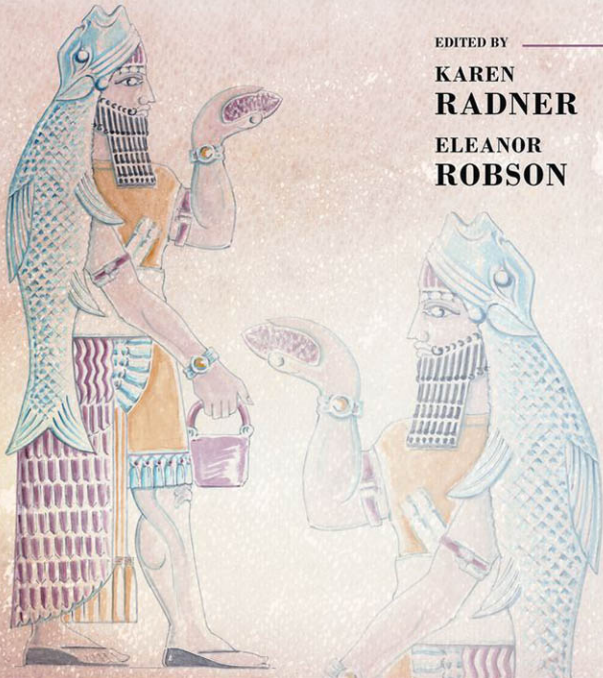


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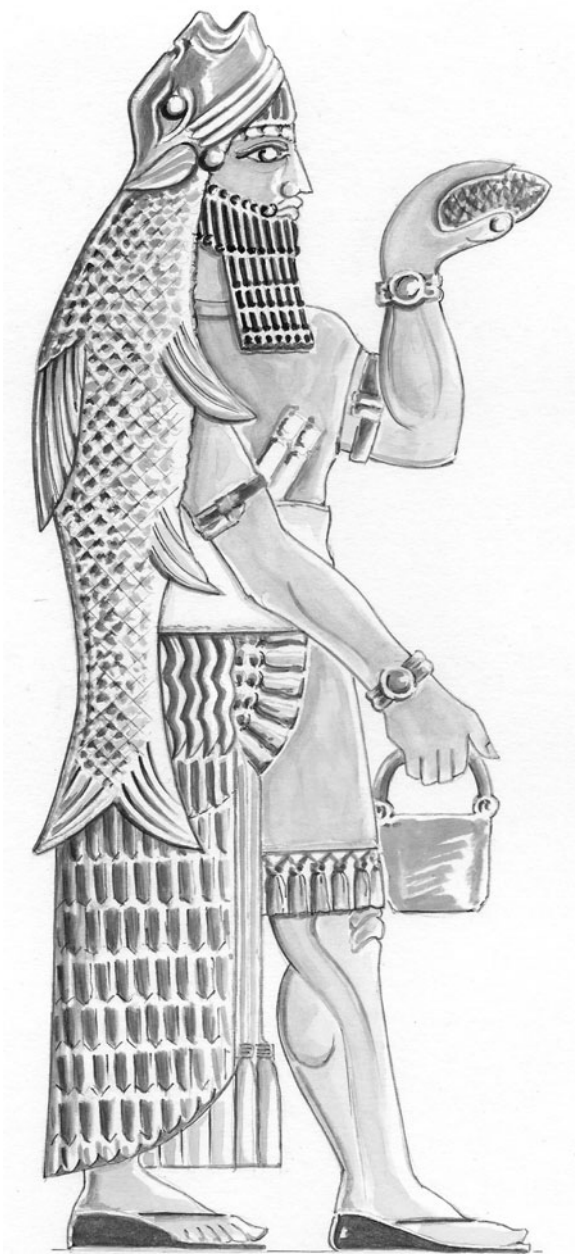
**ELEANOR
ROBSON**



≡ The Oxford Handbook of
**CUNEIFORM
CULTURE**

THE OXFORD HANDBOOK OF

**CUNEIFORM
CULTURE**



FRONTISPIECE. A fish-cloaked *apkallu*-sage, the embodiment of cuneiform scholarship, created by artist Tessa Rickards based on original monuments from ancient Kalhu and Til-Barsip.

THE OXFORD HANDBOOK OF

CUNEIFORM CULTURE

Edited by

KAREN RADNER

and

ELEANOR ROBSON

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Anne Löhnert is a lecturer at the Institute of Assyriology and Hittitology at the Ludwig-Maximilians-Universität Munich. The author of a book on lamentations in the Old Babylonian period ('*Wie die Sonne tritt heraus! Eine Klage zum Auszug Enlils mit einer Untersuchung zu Komposition und Tradition sumerischer Klagelieder in altbabylonischer Zeit*', 2010), her research so far has focused on Sumerian literature (especially cultic texts) as well as the transmission of literary works in the second and

first millennia BC. More recently her research interests have started to focus on to the administrative archives of Nuzi.

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Eleanor Robson is Reader in Ancient Middle Eastern Science in the Department of History and Philosophy of Science at the University of Cambridge. Her research focuses on the socio-political contexts of intellectual activity in ancient Mesopotamia and the online edition of cuneiform texts. She is the author of *Mathematics in Ancient Iraq: A Social History* (2008) and director of the AHRC-funded research project, *The Geography of Knowledge in Assyria and Babylonia, 700–200 BC* (<http://oracc.org/gkab>).

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John M. Steele is Associate Professor of Egyptology and Ancient Western Asian Studies at Brown University. His research focuses on the history of early astronomy, with particular reference to Babylonia. He is the author or editor of five books, including recently *A Brief Introduction to Astronomy in the Middle East* (2008), *Calendars and Years: Astronomy and Time in the Ancient Near East* (2007), and *Calendars and Years, 2: Astronomy and Time in the Ancient and Medieval World* (2011), and many articles on ancient astronomy.

Michel Tanret is Full Professor of Assyriology and Ancient Near Eastern History at Ghent University and coordinates the research cooperation between the Belgian university departments teaching ancient Near Eastern studies. His principal field of interest is the Old Babylonian period and its social and economic history. Recent books focus on scribal education (*Per aspera ad astra: l'apprentissage du cunéiforme à Sippar-Amnanum pendant la période paléobabylonienne tardive*, 2002) and on the seals of priests (*The Seal of the Sanga: On the Old Babylonian sangas of Šamaš of Sippar-Jahrurum and Sippar-Amnanum*, 2010). He is currently preparing an edition of the archive of Inana-mansum and Ur-Utu from Sippar-Amnanum.

Jonathan Taylor is Curator of Cuneiform Collections in the Department of the Middle East at the British Museum. His research interests include literacy and education in the ancient Near East, as well as the non-textual features of clay documents. Currently he is investigating attitudes towards, and uses of, the past in the ancient Near East itself.

Steve Tinney is Clark Research Associate Professor of Assyriology at the University of Pennsylvania, Philadelphia, Associate Curator-in-Charge of the Penn Museum's Babylonian Section, and Director of the Pennsylvania Sumerian Dictionary Project. He is active in a range of online projects and is the author of *The Nippur Lament: Royal Rhetoric and Divine Legitimation in the Reign of Išme-Dagan of Isin (1953–1935 BC)*, 1996. His principal research interests are Sumerian language and literature and the emergence of the scholarly tradition.

Niek Veldhuis (PhD Groningen 1997) is Associate Professor of Assyriology at the University of California at Berkeley and Director of the *Digital Corpus of Cuneiform Lexical Texts* (<http://oracc.org/dcclt>). His main research interests focus on the history of education in Mesopotamia in its relationship with intellectual history and the uses of writing. He is currently working on a history of the lexical tradition from the late fourth millennium BC to the demise of cuneiform around the beginning of the common era.

Eva Von Dassow teaches the history and languages of the ancient Near East at the University of Minnesota. She is the author of *State and Society in the Late Bronze Age: Alalah under the Mittani Empire* (2008), co-author of *Cuneiform Texts in the Metropolitan Museum of Art*, vol. 3 (2000), and editor of *The Egyptian Book of the Dead: The Book of Going Forth by Day* (1994; 2nd rev. edn 1998). Her recent research examines the conceptualization of citizenship and the constitution of publics in ancient Near Eastern polities, written records as artefacts of cultural practice and temporal process, and the nature of writing as an interface between reader and reality. Among her current projects is a study of the Hurrian *Song of Liberation*, exploring the political dimensions both of the poem's composition and of its later textualization in a bilingual Hurro-Hittite edition.

Caroline Waerzeggers is Lecturer in Ancient Near Eastern History in the History Department of University College London. Her research focuses on the social and economic history of first-millennium BC Mesopotamia, and on the archival material from Neo-Babylonian and early Achaemenid Sippar and Borsippa in particular. She is the author of *The Ezida Temple of Borsippa: Priesthood, Cult, Archives* (2010) and directs an ERC-funded research project investigating new perspectives on Second Temple Judaism from cuneiform texts.

Mark Weeden concentrates his research on the written cultures of northern Syria and Anatolia. He is a British Academy post-doctoral research fellow at the School of Oriental and African Studies, London, with a research project on the Akkadian of Alalakh. His PhD thesis was completed at the School of Oriental and African Studies, University of London, a revised version of which will be published under the title *Hittite Logograms and Hittite Scholarship* in 2011. He is jointly responsible (with D. Yoshida) for the publication of hieroglyphic-inscribed artefacts from the Japanese excavations at Kaman-Kalehöyük, Yassihöyük, and Büklükale, as well as being an epigrapher for the Turkish excavation at Ova Ören, all in central Anatolia.

F. A. M. Wiggermann (PhD Free University of Amsterdam 1986) is retired, but as epigrapher is still involved in the Dutch excavations at Tell Sabi Abyad in Syria. His present interests include the administration of the Assyrian state in the Late Bronze Age, religious iconography, and first-millennium library texts, subjects on which he has been publishing all his life.

Silvie Zamazalová studied ancient history and Egyptology at University College London, where she is now pursuing her PhD, researching geographical concepts in the Neo-Assyrian empire at the end of the 8th century BC.

Nele Ziegler has been a researcher at the Centre National de Recherche Scientifique (UMR 7192, Paris, from 1999) and a member of the team of epigraphers working on the palace archives of Mari. Her editorial work on these texts is part of her wider interest in the history of the Old Babylonian period. The author of books on Mari's female palace inhabitants (*La population féminine des palais d'après les archives royales de Mari*, 1999) and on the musicians of Mari (*Les musiciens et la musique d'après les archives de Mari*, 2007), she collaborated with Dominique Charpin on a study of the political history and chronology emerging from the Mari sources (*Mari et le Proche-Orient à l'époque amorrite: essai d'histoire politique*, 2003). Her current research focuses on the archives from the time of Samsi-Addu and on the historical geography of northern Mesopotamia (with Eva Cancik-Kirschbaum, she has recently published an edited volume, *Entre les fleuves: Untersuchungen zur historischen Geographie Obermesopotamiens im 2. Jahrtausend v. Chr.*, 2009). She teaches at the École du Louvre and at the École Pratique des Hautes Études, both in Paris.

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Chapter 2 is reproduced by generous permission of Mark E. Cohen, Robert K. Englund, and Michael Hudson. Frans van Koppen and Mikko Luukko kindly took several of the photographs in this book, with the ever invaluable assistance of the Study Room staff of the British Museum's Department of the Middle East. Tessa Rickards graciously accepted our invitation to create the drawing for the book's jacket and created a beautiful work of art that moreover succeeded in satisfying our demands for authenticity. Our heartfelt thanks go to Frans van Koppen for his meticulous work on the index. We are especially grateful to Hilary O'Shea for inviting us to take on this exciting project, and to her, Kathleen Fearn, Dorothy McCarthy, Rosemary Roberts, Jenny Wagstaffe, and the rest of the OUP team for helping us to bring it to fruition with minimum stress and maximum enjoyment.

Karen Radner and Eleanor Robson

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A NOTE ON TYPOGRAPHICAL CONVENTIONS

Readers of this book do not need to know the languages or scripts of the ancient Near East; although contributors sometimes use ancient words or texts, they always provide English translations. The languages written in cuneiform script may be rendered alphabetically in two different ways: *transliteration*, which is an alphabetic representation of cuneiform signs; and *transcription* or *normalization* (these words are synonymous), which is an alphabetic representation of the language that does not give any information about the signs used to write the original text.

In alphabetic normalization in this book, we write both Sumerian and Akkadian words just like any foreign language: in italics with no hyphens or full stops or superscripts (e.g. Akkadian *ṭupšarru* ‘scribe’ and Sumerian *sanga*-priest).

In transliterations of Akkadian, the syllabic signs are presented in lower-case italics and separated by hyphens (e.g. *ṭu-up-šar-ru*), while logograms (signs representing whole words) are written in small upper-case letters and separated by full stops (e.g. DUB.SAR, a logographic writing of *ṭupšarru*). For transliterations of Sumerian, this book uses lower-case bold face, separating signs with hyphens (e.g. **dub-sar** ‘scribe’). For both languages, determinatives are written in superscript lower-case, with no connecting punctuation (e.g. ^{li}DUB.SAR and ^{li}**dub-sar**). Sign names are transliterated in capital letters, and signs within signs joined with × (e.g. TU₆ = KA×LI = *šiptu* ‘incantation’, where KA×LI means ‘the sign KA with the sign LI written inside it’).

In transliteration, normalization, and translations, square brackets enclose restorations of missing text, while uncertain translations are marked with question marks or set in italics.

See Veldhuis and Weeden in this volume, and Robson (2009, listed in the references to the Introduction) for more on Assyriologists’ typographical conventions for representing cuneiform script.

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INTRODUCTION

KAREN RADNER AND ELEANOR ROBSON

THE term ‘cuneiform culture’ is not simply a synonym for the ancient Near East but the conceptual framework that provides cohesion to this volume. It is impossible to do justice to all of ancient Near Eastern culture chronologically, geographically, and linguistically, even in a book of this size. Instead, we examine it through the lens of cuneiform writing—the writing technology that is not only fundamental to a modern academic understanding of the region but which also bound the ancient inhabitants into a shared set of ways of understanding and managing their world. The title of this book, *The Oxford Handbook of Cuneiform Culture*, therefore reflects its emphasis on cuneiform literacy and the literate segments of society, or ‘textual communities,’ following Brian Stock’s definition of the latter as ‘microsocieties organized around the common understanding of a script’ (Stock 1990: 23).

The cuneiform writing system of the ancient Middle East was deeply influential in world culture. For over three millennia, until about two thousand years ago, it was the vehicle of communication from (at its greatest extent) Iran to the Mediterranean, Anatolia to Egypt (Figure 0.1). A complex script, written mostly on clay tablets by professional scribes, it was used to record actions, thoughts, and desires that fundamentally shaped the modern world, socially, politically, and intellectually. Unlike other ancient media, such as papyri, writing-boards, or leather rolls, cuneiform tablets survive in their hundreds of thousands, often excavated from the buildings in which they were created, used, or disposed of. Primary evidence of cuneiform culture thus comes from a wide variety of physical and social contexts in abundant quantities, which enables the close study of very particular times and places.

But although cuneiform is witness to one of the world’s oldest literate cultures, the academic discipline devoted to it, Assyriology, is still a relatively new and underdeveloped field at just over 150 years old. Cuneiform writing shaped the economies and societies which used it, just as its limitations and possibilities were inseparable from intellectual thought about the world. But modern cuneiformists have traditionally studied either socio-economic history or intellectual and cultural history, which themselves have been balkanized into modern categories such as ‘literature,’ ‘religion,’ ‘magic,’ and ‘science.’ Political history is a third strand which has hitherto rarely been integrated with

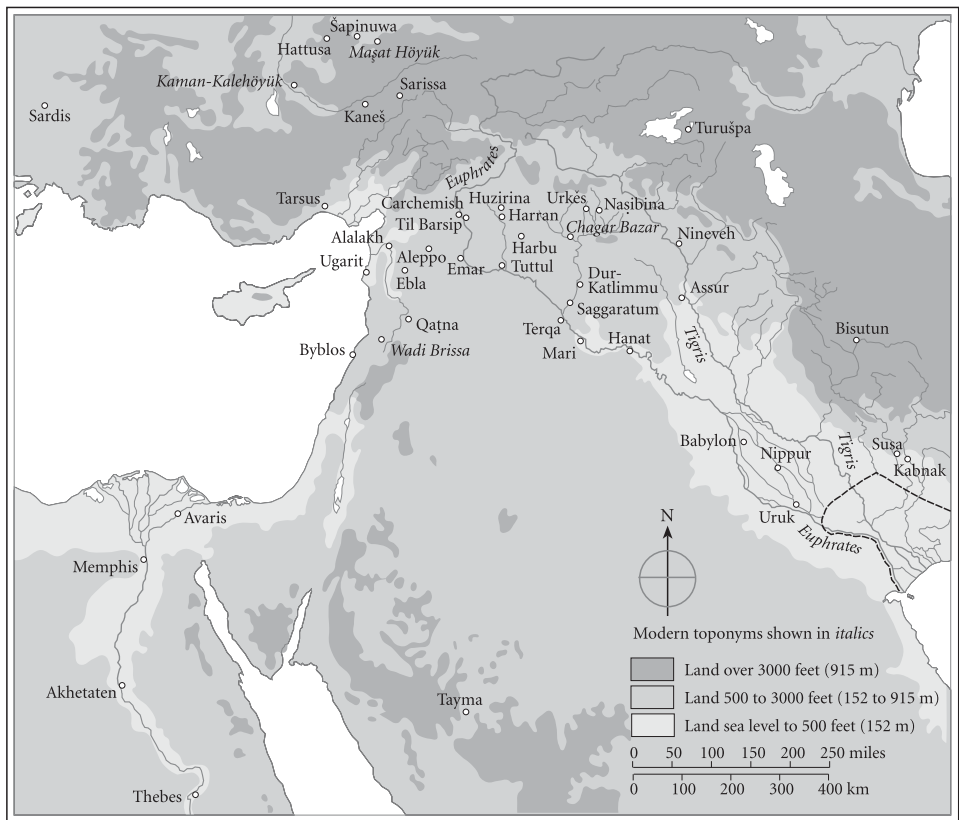


FIGURE 0.1 Map of the ancient Near East, showing the major places mentioned in this book

the study of the other two, except as an ordering and dividing principle. This division of labour has created two distinct images of the ancient Near East. Socio-economic studies produce a strangely familiar world of high finance, bureaucracy, and international law and diplomacy, while intellectual and cultural studies recreate an ancient Near East that is exotic, alien, full of sorcerers, demonic forces, and auspicious signs. Rarely are these parallel worlds superimposed on each other.

The Oxford Handbook of Cuneiform Culture draws together these hitherto disparate topics and methodologies to project a new image of the literate ancient Near East. It seeks to restore context and coherence to the study of cuneiform culture by approaching it holistically: through the social, the political, and the intellectual, by means of textual sources whose materiality is fully acknowledged. Mesopotamia's clay tablets and stone inscriptions are not just 'texts' but also material artefacts that offer much additional information about their creators, readers, users, and owners. Whenever appropriate and possible, the contributors to *The Oxford Handbook of Cuneiform Culture* explore, define, and to some extent look beyond the boundaries of the written word. We hope that the book goes some way towards nuancing the depiction of the ancient Near East in both learned and popular literature.

To this end, we have commissioned chapters from a mix of scholars from across the discipline and around the Assyriological world, female and male, old hands alongside those just beginning their careers. The contributors' remit was to transcend the political, geographical, chronological, and linguistic boundaries that have been constructed by modern research over the past century or more, and to cut across conventional temporal and spatial categories. They have each risen wonderfully and good-naturedly

Table 0.1 Timeline of Cuneiform Culture

	Political history and periodization	Key people and places
Later fourth millennium	Urbanization and literacy: Uruk period, c. 3200–3000 (Uruk IV, Uruk III)	the city of Uruk the site of Jemdet Nasr
Early third millennium	City-states: Early Dynastic period, c. 3000–2350	Sumerian city of Šuruppak (Fara) Syrian city of Ebla
Later third millennium	First territorial empires: Akkadian or Sargonic dynasty, c. 2350–2200; Third Dynasty of Ur (Ur III), c. 2100–2000	king Sargon of Akkad and his daughter Enheduana, c. 2300 Gudea, city ruler of Lagaš, c. 2150 king Šulgi of Ur and his successors, c. 2100–2000
Early second millennium	Short-lived kingdoms of the Old Babylonian period (c. 2000–1600): Isin, Larsa, Mari, Ešnunna, and Babylon	king Zimri-Lim of Mari and his courtly entourage, c. 1760 king Hammurabi of Babylon, c. 1750 the scribes and students of Nippur, c. 1740 Ipiq-Aya the scribe of Sippar Ur-Utu the chief lamenter of Sippar
Later second millennium	Age of international diplomacy: Kassite or Middle Babylonian period; Middle Assyrian empire; Amarna period, c. 1400	Hittite city of Hattusa Egyptian city of Amarna Syrian city of Ugarit the Zu-Ba'la family of diviners in Emar
Early first millennium	Age of empires: Neo-Assyrian empire, c. 900–612 Neo-Babylonian empire, c. 620–540	kings Sargon, Sennacherib, Esarhaddon and Assurbanipal of Assyria and their advisors king Nebuchadnezzar II of Babylon and his temple personnel
Later first millennium	End of native rule: Persian or Achaemenid period, c. 540–330 Seleucid or Hellenistic period, c. 330–125 Parthian or Arsacid period, c. 25 BC–AD 225	king Alexander the Great, c. 330 Berossos, historian of Babylon, c. 300 the priests and scholars of Uruk

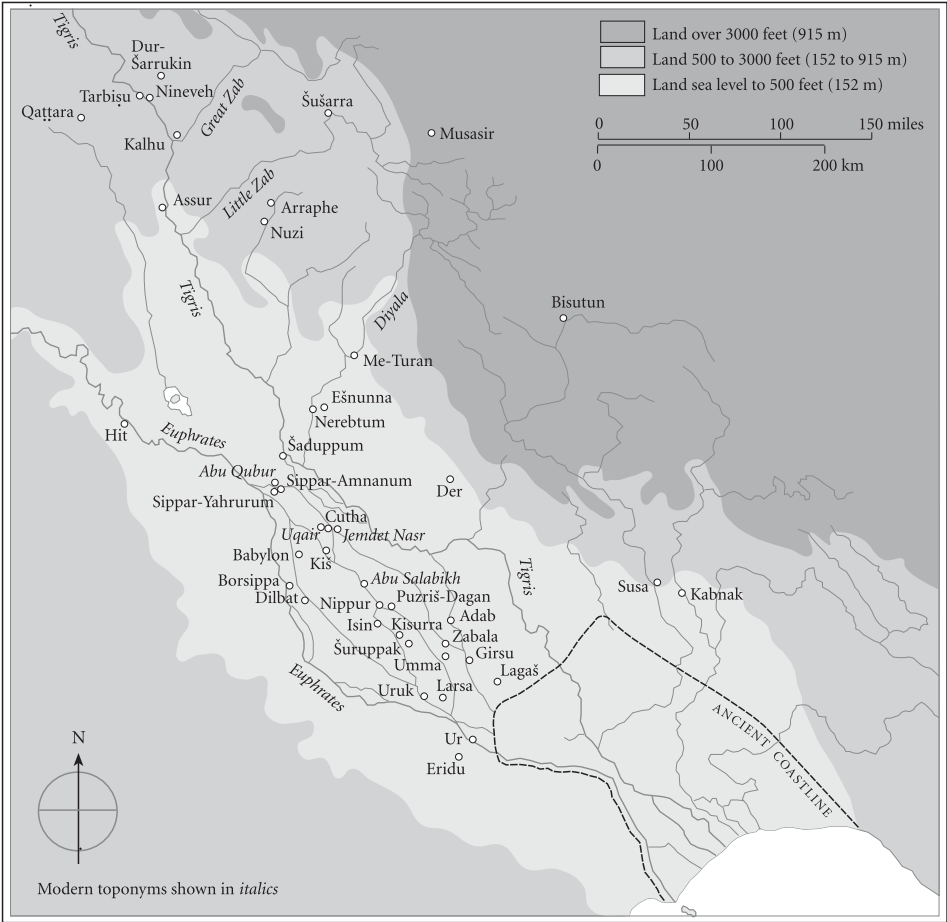


FIGURE 0.2 Map of ancient Mesopotamia, showing the major places mentioned in this book

to the challenges we set, and we are immensely grateful to all of them. They have drawn on the best scholarship of recent decades and integrated a multiplicity of fruitful approaches, highlighting open problems and helping to set agendas for subsequent research.

The resulting book is not structured by periods (see Table 0.1)¹ or places (Figures 0.1 and 0.2) but around seven themes: ‘Materiality and literacies’, ‘Individuals and communities’, ‘Experts and novices’, ‘Decisions’, ‘Interpretations’, ‘Making knowledge’, and ‘Shaping tradition’. Each of these sections encompasses a brief introduction and five chapters. While these chapters cover three thousand years of cuneiform culture from the late fourth millennium to the 2nd century BC, *The Oxford Handbook of Cuneiform Culture* seeks to be exemplary rather than exhaustive, focusing on methodologies rather than on blanket coverage. Several of the authors have used a deliber-

¹ For reasons of uniformity, all dates in this volume are given in the conventional Middle Chronology, following the regnal dates established by Brinkman (1977).

ately diachronic approach (Foster, Löhnert, Lion, Robson, Steele, Taylor, Veldhuis, and Wiggermann) or selected two or more case studies from different periods to make their point (Chambon, Cohen and Kedar, Frahm, and Von Dassow), but two periods of Mesopotamia's past have very clearly emerged as the focal point of the majority of the contributions. One is the end of the third millennium to the first half of the second millennium BC, the so-called Ur III and Old Babylonian periods. During this time, an age of territorial states, Mesopotamia's political set-up was shaped by the rivalries and alliances of a mosaic of small kingdoms that periodically coalesced into much larger units, with Ur for seventy years and later Babylon for 175 years as the political centres of states controlling Mesopotamia (Brisch, Brunke, Charpin, Démare-Lafont, Huber Vulliet, van Koppen, Tanret, Tinney, and Ziegler). The second focal point is the 'Age of Empires' from the mid-8th to the late 6th century BC (Baker, Böck, Fuchs, Jursa, Koch, Radner, Rochberg, Schwemer, Waerzeggers, and Zamazalová), when the Neo-Assyrian and later the Neo-Babylonian empires dominated the political history of the Middle East. This twin emphasis is due to the exceptionally rich textual remains which document these periods from sites across Mesopotamia, most especially Assur, Babylon, Kalhu, Mari, Nineveh, Nippur, and Sippar. Three chapters deal with the very beginning of cuneiform culture in the southern city of Uruk in the late fourth millennium BC (Englund) on the one hand, and its last guardians, active in this very same city and elsewhere in Babylonia as late as the 2nd century BC (Clancier and De Breucker) on the other. Another chapter looks at 'cuneiform abroad', analysing how the Mesopotamian writing system was adapted for use in Anatolia under Hittite rule in the mid-second millennium BC (Weeden).

The Oxford Handbook of Cuneiform Culture aims to demonstrate the importance and relevance of cuneiform culture to world history by integrating the strange with the familiar. With this in mind, we chose the image for the jacket and frontispiece. It shows a composite creature, half man, half fish, known in ancient times as an *apkallu*, 'sage'. The Akkadian term is a loanword from Sumerian *abgal*, literally 'big fish'. The cover image, which is also reproduced on the frontispiece, is based on the 9th-century BC Assyrian *apkallu* carved on the stone decoration of Ninurta's temple in Kalhu, modern Nimrud (Layard 1853: pl. 6). Its creator, Tessa Rickards, brings it to life by using the colour scheme of the wall paintings adorning the 8th-century BC Assyrian palace of Til Barsip (modern Tell Ahmar). A similar fish-creature was depicted in room XXVII of the Til Barsip palace, close to the throne room, but is preserved only in fragments (Thureau-Dangin and Dunand 1936: pl. LIIb). The Kalhu *apkallu* was certainly also painted in antiquity, perhaps in a very similar way to the artist's reconstruction. According to Mesopotamian tradition, these 'big fish' are the companions of the god of wisdom, Enki/Ea, who dwells in the depths of the sea. They regularly emerged from the sea in order to teach mankind the cornerstones of civilization, such as agriculture, kingship, justice, and writing, before the Flood ended their coexistence (see van Koppen in this volume). From the third millennium BC to the Hellenistic period (see De Breucker in this volume), the fish-creatures were seen as purveyors of wisdom and learnedness (Reiner 1961; Greenfield 1999). Scholars and priests took

their title and dressed in their image, wearing robes and hats made out of the skin of the enormous river carps that still populate the Euphrates and Tigris today. To us, these fish-creatures are icons of cuneiform culture.

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PART I

MATERIALITY AND LITERACIES

LITERACY has been a fashionable subject for academic research in recent years, especially among sociologists and historians (e.g. Street 1984; 1993; Olson and Torrance 2001; a more exhaustive list in Werner 2009: 340–341). But many of those studies are predicated on several assumptions that do not hold for the ancient Middle East: that literacy is alphabetic, environmentally if not educationally ubiquitous, and involves numeracy only at the margins. What did it mean to be literate and numerate in an environment that was not covered in writing, a world which it was possible to inhabit—especially outside the cities—without ever coming into contact with the written word, a world in which the slow, complex induction into the arts of writing entailed indoctrination into a self-conscious community of literati and numerati who wielded significant political, social, and intellectual power? Our view of ancient Mesopotamia is inevitably constructed through the eyes and words of the literate few. It is futile to pretend we can ever access what ‘the Mesopotamians’ as a whole did or said or thought: we know only of the unusual minority who had some access to, if not control over, the documentation that has survived the millennia.

However, it is becoming increasingly apparent that it was not only professional, male scribes who could read and write cuneiform: as Niek Veldhuis and Brigitte Lion show in Chapters 4 and 5, there were different levels of cuneiform literacy, and different ways to engage with it, for men and women alike. Later in the book, Michael Jursa explores the functions of cuneiform within Neo-Babylonian temple communities in Chapter 9, while in Chapter 13 Michel Tanret looks at the professional, familial, and sentimental meanings of writing for a single individual in 17th-century Sippar. Indeed most chapters

address questions of cuneiform literacy in one way or another; it would be otiose to single out more of them.

A distinguishing feature of cuneiform culture is that was essentially, fundamentally numerate (cf. Robson 2008): as Robert Englund shows in Chapter 2, the world's earliest written records are accounts of temple assets—land, labour, livestock, offerings—drawn up at the end of the fourth millennium BC, along with exercises in writing and calculating the necessary personnel and commodities. Over the course of several centuries cuneiform writing began to adapt itself for other purposes, but quantification remained one of its central functions. In Chapter 3, Grégory Chambon considers ways in which to analyse ancient uses of numbers and measures without inadvertently imposing anachronistic concepts of accuracy and standardization on them.

Cuneiform culture was peculiar by world standards in another way: for the medium it favoured and thus the sheer abundance of primary written evidence at our disposal. We may sometimes despair at the huge gaps in the historical record, the fragmentary state of our sources, and the frustratingly allusive ways in which the ancients expressed themselves, but in many ways Assyriologists have it lucky compared to historians of other ancient cultures. That abundance is the direct outcome of the fact that much of the time, cuneiform script was written on clay and other relatively imperishable media, as Jonathan Taylor explores in Chapter 1. The materiality of clay fundamentally shaped cuneiform culture, enabling tamper-proof preservation of the written word but discouraging lengthy writings or documentation that required frequent updating. By a careful study of excavation spots and tablet formats, Steve Tinney in Chapter 27 differentiates a variety of reasons for textual production in the Old Babylonian period, a variety which is not apparent when the sources are treated as disembodied text.

To compensate for the deficiencies of clay tablets, writing boards (Akkadian *lē'u*) with erasable waxed surfaces were used alongside them from at least the 21st century BC (Steinkeller 2004), plus papyrus (Akkadian *niāru*) from the mid-second millennium and parchment or leather rolls (Akkadian *giṭṭu*, *magallatu*) from the early first millennium onwards (see Philippe Clancier in Chapter 35). Practically no such artefacts survive—apart from a few now surfaceless Neo-Assyrian writing boards—although they are occasionally mentioned in tablets and sometimes depicted visually (Figure 1.8). We must never forget that cuneiform culture was only one literate culture amongst several in the ancient Near East, albeit the most longlived and prestigious.

FURTHER READING

This book is not particularly about the languages of cuneiform culture—primarily the linguistic isolate Sumerian and the Semitic Akkadian—and nor does it assume that readers are especially familiar with them. Robson and Radner's (2009) simple online introduction to the Akkadian language in cuneiform script gives references to further reading. There are also several useful recent collections that discuss Sumerian, Akkadian and cuneiform alongside other ancient literate cultures: Houston (2004) is on the births of ancient scripts while Baines,

Bennet, and Houston (2008) is about their deaths. Woodard (2008) gives detailed linguistic descriptions of the ancient languages of the Middle East, while a broader take on ancient literacy in the region is given in Sanders (2006). The standard textbooks on the history of the area—neither of which pay much attention to the topics discussed in this volume—are Kuhrt (1995) and Van de Mieroop (2007).

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CHAPTER 1

TABLETS AS ARTEFACTS, SCRIBES AS ARTISANS

JONATHAN TAYLOR

To the untrained eye, each clay tablet inscribed with cuneiform writing tends to look much like every other. To an Assyriologist, however, the physical appearance of a tablet can reveal many layers of information about the inscription and the context of its production; the physical characteristics of tablets correlate strongly with their date and function. Tablets are also susceptible to scientific analyses of the clays and their composition. Following on from studies by Glasmacher et al. (2001), Blackman (2003), Goren et al. (2004), and D'Agostino et al. (2004), a team lead by Chikako Watanabe has begun a range of analyses to investigate tablet clays, their inclusions, and their micro-fauna and -flora, with an eye to provenance and palaeo-climate.

This chapter seeks to capture some major trends in the study of tablets as artefacts, and provides examples from the collections of the British Museum. It therefore concentrates on Mesopotamian cuneiform. Where object numbers are quoted, images and further information are available in the online collections catalogue: www.britishmuseum.org/research/search_the_collection_database.aspx. The physicality of a tablet cannot be studied entirely in isolation from other features such as orthography, vocabulary, formula, palaeography, etc. The study of tablets as artefacts has a long but fitful history. Many questions have yet to be formulated, let alone answered.

THE NATURE OF CLAY

As Rice (1987) explains, the key characteristic of the clay used to form tablets is plasticity. Water is added such that it becomes possible to give clay a form that it will retain, meaning here both the general shape of the tablet and the wedges impressed into the surface to form the inscription. Clay naturally contains water that is chemically combined or occurs between the layers of clay molecules. The water added to achieve plasticity is only

mechanically combined ('physiorbed'), thus weakly bound to the surfaces of clay particles; the water forms a thin film around the clay particles, acting as a lubricant to allow the clay platelets to slide over one another. This adsorbed water is easily lost at low temperatures (drying in air, for example), causing the clay to lose its plasticity; adding further water will restore plasticity.

Up to a point, the more water in the clay, the greater its plasticity. Finer particles give clay greater plasticity than coarser, in part because the higher number of clay platelets provides a larger surface area. Finer clays have a higher capillary volume than coarse clays, so need more water to develop plasticity.

On drying, the water films around the clay platelets evaporate and the surface tension of the remaining water draws the platelets together. This reduces plasticity and shrinks the volume of the tablet, causing physical stresses. When this 'shrinkage water', or 'film water', is lost, the clay is termed 'leather hard'. 'Pore water' (the remaining physiorbed water) is lost more slowly because it moves through small pores. Finer clays contain more pore water because they have a larger total pore structure; although their individual pores are smaller than those in coarser clays, there are many more of them. The loss of pore water does not cause further shrinkage, since it does not surround the clay platelets and is simply replaced by air. Finer clays may crack and warp, as water is resupplied from the interior more slowly than it is lost at the surface.

Not all parts of a tablet will dry and shrink equally. An area that contains more water (such as one repeatedly smoothed during forming) will shrink more. Particle orientation also influences differential shrinkage, as shrinkage is greatest perpendicular to the orientation of clay platelets. This is due to differing volumes of water films versus clay particles in each linear dimension and variable densities of particle packing. Stroking will cause particles to align perpendicularly to the forming pressure. Where the orientation of clay platelets changes sharply—at corners, seams, and angles—differential shrinkage can occur, causing cracking and warping. Resistance to shrinkage is a factor of 'green strength', that of dry but unfired clay. Finer clays have a higher green strength than coarser clays.

Clay will shrink less if grains are spherical (abraded through transportation in a river, for example), uniform, and closely packed; this makes for a weak body, however. An abundance of platy, flat inclusions such as micas or chlorites leads to lamination (where the clay splits into layers). A good clay thus has a range of inclusion sizes. Adding tempers such as chaff can slow drying and reduce shrinkage. Finally, warmer air can absorb more moisture than cooler air, thus decreasing drying time.

Thickett and Odlyha's (1999) results suggest that tablet clay is almost entirely a silt, magnesium alumino-silicate (probably palygorskite), which by a modern potter's standards would be considered poor quality clay. Scribes would process the clay to remove large stones and vegetation that could hinder the inscription. An unpublished report records how tablet clay from Old Babylonian Tell ed-Der was levigated to a stage where inclusions were < 0.01 mm, but unsoaked fragments up to 3 mm remained. A range of inclusions can be seen even in the library tablets from 7th-century Nineveh. Most common is the presence of small stones, particularly abundant in tablets from

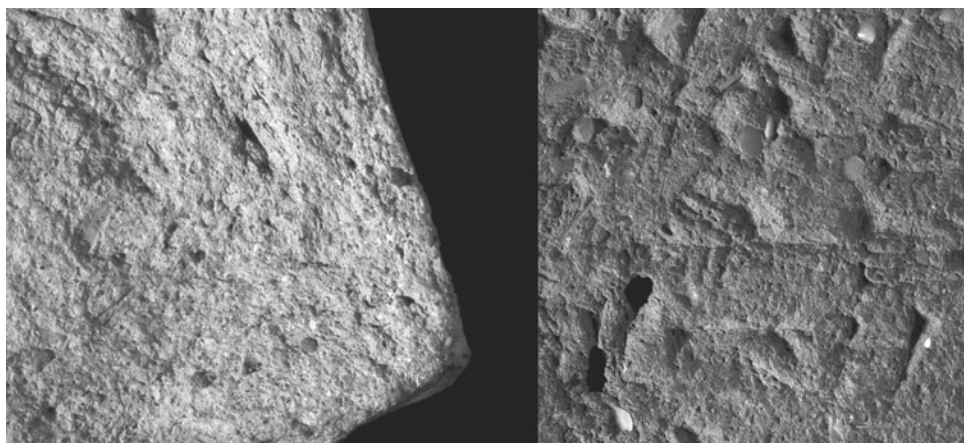


FIGURE 1.1 Clay tablets containing different inclusions: (*left*) stones in the matrix of a tablet from Nuzi (BM 26211); (*right*) shells in the matrix of a tablet from Canaan found at Tell el-Amarna (British Museum, ME 29833). (© Trustees of the British Museum)

Nuzi, for example (see Figure 1.1). Some Neo-Babylonian administrative texts seem to have stone fragments deliberately added. Snail shells also occur sporadically in the record, and in significant numbers in the Amarna letters from the Canaanite ruler Šub-Andu (see Figure 1.1). Neo-Babylonian school tablets can be full of stones and shells, indicating insufficient levigation. Inclusions are also potentially useful sources of information on the local environment. Some categories of text vehicle reveal the presence of chaff. This is found particularly in bricks, but also in Neo-Assyrian prisms (see below), where it helped to provide strength for these large objects. Visual survey makes it clear that scribes used varying qualities of clay for different tablets, according to place, genre, and other factors. This is only to be expected; it is parallel to the different qualities of paper in use today. Scribes would have been expert clay-handlers who knew where to find the right clay and how to work with it to achieve the desired results.

MAKING A TABLET

Old Babylonian Susa yielded 10–12 cm long cylinders of prepared clay (Gasche and de Meyer 2006: 369), handy sources of tablet clay; analysis revealed that the cylinders and local tablets were made of similar clay (Gasche 1973: 54 n. 8). Beyer (1983: 50) refers to lumps of clay found at Mari that could have had the same purpose. British Museum objects 1847–6–23,14 and 1847–6–23,15 (which arrived in a shipment containing sculptures from Neo-Assyrian Nimrud) could be interpreted similarly, as suggested to me by Christopher Walker.

Processed clay would be kneaded to fully mix wet and dry portions and to remove air pockets. The majority of tablets give the impression that they are carefully made and inscribed. This is surprisingly difficult, and scribes must have learned how to do it properly during their training. We can expect techniques to have varied. Very little work has been done on the basic questions of how tablets were made, and how this changed from one region to the next, over time or according to the intended function of the object inscribed.

Most tablets fit in the palm of the hand, but much larger or smaller tablets were sometimes produced; the smallest can be less than 2 cm square and only a few millimetres thick, while the largest can be 30–40 cm square and 4–8 cm thick. Generally speaking, tablets fall into a limited number of groups, with the shape of each group reflecting the nature of the text, date and place of production. Tablet size usually depends on the quantity of text to be inscribed, but often a particular type of text will be of more or less standard length, and thus tablets of more or less standard size. This is not to deny the great skill of scribes who were experienced in estimating space. There is evidence from several contexts of tablets being produced at the standard size, despite their inscription being rather shorter than normal. Standardized tablet formats and predictable document lengths offer the potential for prefabricating a stock of blank tablets. Few blanks are known, but the existence of many more may safely be inferred. Zettler (1977: 37) records sealed, uninscribed tablets from Old Akkadian Tello, parallels to which include the unsealed Old Akkadian tablet BM 86353, as well as Ur III (BM 23688, sealed; further Zettler 1987: 209), Old Babylonian Nippur (Hilprecht 1903: 524–525), Mari (Charpin 2002: Fig. 6), Sippar (Al-Rawi and Dalley 2000: nos. 3, 49, 50), and several Neo-Babylonian examples (BM 62892). Such blanks open the possibility that someone other than the scribe could make the tablets, but that has yet to be documented. Standardized tablet formats were not universally implemented. The Late Babylonian tablets assembled by Zadok (2005), for example, illustrate the variety that can exist even within one group.

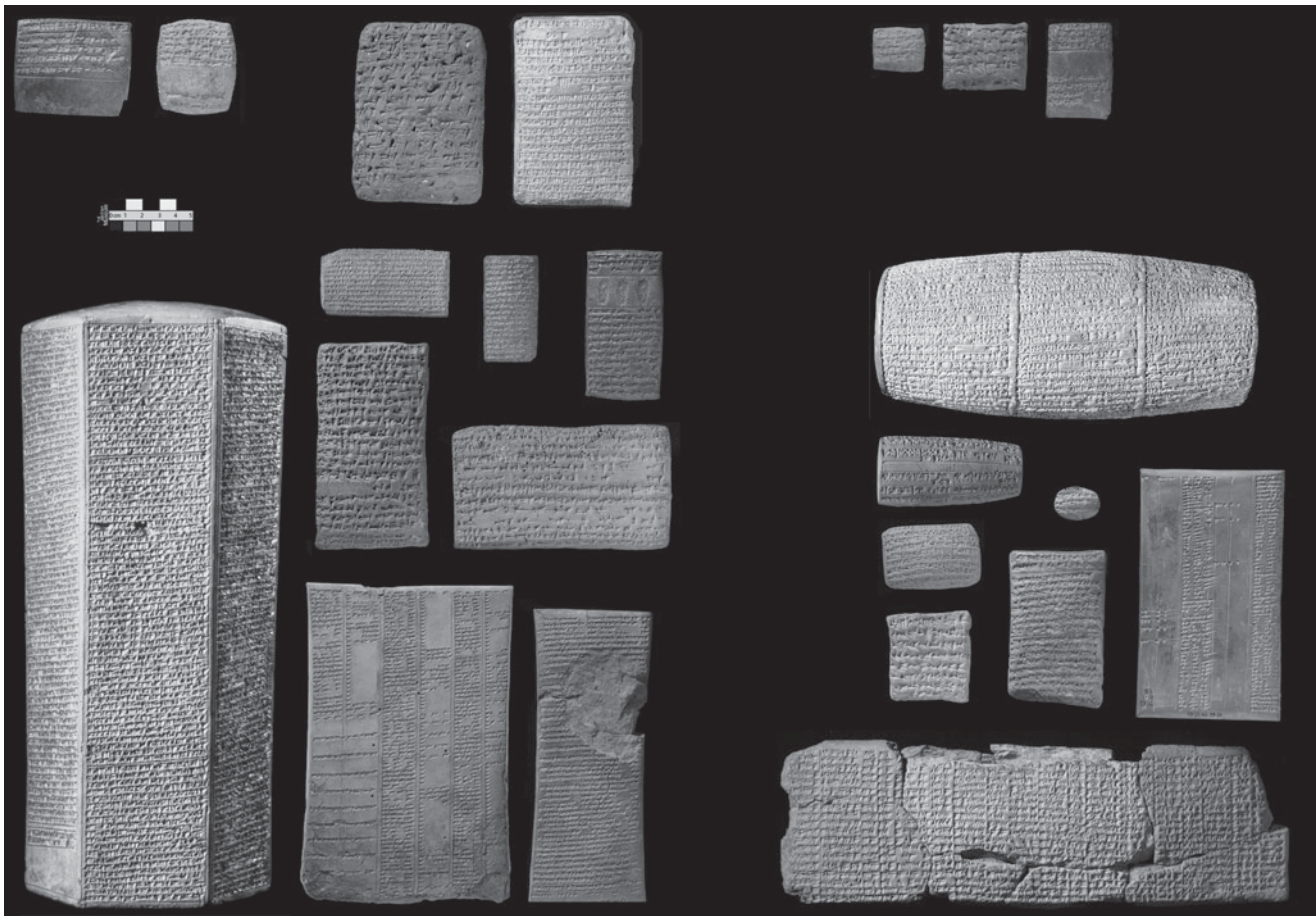
Some shapes are highly distinctive and are easily recognizable. Most tablets are basically rectangular and require more detailed analysis. Unfortunately, it can often be difficult to communicate clearly in words the kinds of feature that are instantly recognized by the experienced eye. The images in Figure 1.2 offer a pictorial overview of some of the common types of tablet from each period of Mesopotamian history. A comprehensive account of the size, shape, format, and features of cuneiform tablets does not yet

FIGURE 1.2A A sample of the variety of shapes and sizes of clay documents. (*Top*) Archaic: administrative (BM 128826); Early Dynastic: administrative (BM 15829, BM 29996, BM 102081); Old Akkadian: administrative (BM 86281, BM 86289, BM 86332); Ur III: administrative (BM 24964), cone (BM 19528). (*Middle*) Ur III: administrative (BM 19525, BM 104650, BM 13059, BM 19176, BM 26972, BM 26950, BM 110116). (*Bottom*) Old Babylonian: administrative (BM 16825), letter (BM 23145), administrative (BM 87373), scholarly (UET 6/3 64, on loan to the British Museum); Old Assyrian: administrative (BM 120548). (© Trustees of the British Museum)

(a)



(b)



exist, but the following are useful overviews of the material from particular periods: Postgate (1986) for Middle Assyrian, Radner (1995) for Neo-Assyrian, and Jursa (2005) for Neo-Babylonian. Eidem (2002) offers a more focused look at some Old Babylonian letters.

Visual inspection can reveal aspects of manufacture. A caveat here is that well-made tablets will appear to be solid lumps of clay, without air pockets or layers. This does not necessarily mean that layers are absent, as amply illustrated by envelopes where the folds are visible at some points but not others. In some cases, fingerprints can be seen on the surfaces of the internal folds within tablets (K 10678).

The most basic technique used to manufacture tablets sees a simple lump of clay hand-moulded into a rough shape, perhaps because the scribe lacked the training or the requisite time and facilities. This technique seems to result in rather crude-looking tablets with uneven profiles, such as some school tablets (UET 6/3 64) or late Babylonian horoscopes (BM 38104). Some smaller tablets could also be made by this method, but would have required effort to finish to a sufficiently high standard. Other tablets, particularly ones too large to fit in the hand, show signs of kneading or rolling against a hard surface. Very often folds of clay are visible. Sumerian school texts refer to the existence of a wooden ‘tablet-maker’, (Sumerian ^{giš}**dub-dim**₂, Akkadian *dubdimmu*). The word is closely related to one referring to a type of pole (see Sallaberger 1996: 16 n. 68), so perhaps this is a rolling pin.

A more complicated construction whereby an outer sheet was wrapped around a core is visible in many tablets of various sizes, across the range of periods, sites, and genres. From this we may reasonably hypothesize that a complex folding construction was standard practice in Mesopotamia. Biggs (1974: 22–23) observed that typical Abu Salabikh tablets already consist of a 1.4 cm layer of very fine clay wrapped around an irregular core, in apparent contrast to Fara tablets.

The question arises as to how the core itself is formed. It seems unlikely that old tablets would be sheathed in a layer of fresh clay to form new tablets, since the layers would not bond well, few iterations could occur before the tablet became too large, and where the outer layer is broken away so that the surface of the inner core is visible, that surface seems always to be uninscribed. BM 26783 (see Figure 1.3) reveals a more plausible process: a strip of clay was folded almost in half, with a flap holding the folds together; the outer layer was then folded over this core, perpendicular to it. This is perhaps to give the tablet extra strength.

FIGURE 1.2B A sample of the variety of shapes and sizes of clay documents (cont.). (*Top*) Nuzi: administrative (BM 17616, BM 26280); Amarna letters (British Museum, ME 29883, ME 29785); Middle Babylonian: administrative (BM 17689, BM 17673, BM 17626). (*Left*) Neo-Assyrian: prism (BM 91032), scholarly (British Museum, K 750), letter (British Museum, K 469), administrative (British Museum, K 309a), scholarly (British Museum, K 159, K 195, K 4375, K 2811). (*Right*) Neo-/Late Babylonian: barrel (BM 91142, BM 91105), administrative (BM 29589), scholarly (BM 92693), administrative (BM 30912, BM 30690), scholarly (BM 38104, BM 34580). (© Trustees of the British Museum)



FIGURE 1.3 The folds in a tablet (BM 26783), showing the method of manufacture. (© Trustees of the British Museum)

In the light of the above information, we might tentatively translate anew the only published account from Mesopotamian sources of how to make tablets, an Old Babylonian bilingual school exercise (Civil 1998; ETCSL 5.1.a):

[Qu]ick, come here, take the clay,
 knead it, flatten it,
 [calc]ulate (the amount needed), fold it (over itself),
 reinforce the core, form (the tablet),
 [...] plan it, [...]
 hurry, [...]
 lift up the flap-clay, trim it off!

The inner core of BM 110193 has a thin crust of clay produced by dampening with water; this was perhaps intended to act as a bonding layer. Sometimes the core is made of a different clay from the outer skin (clearly shown in BM 51224). In general, however, most tablets seem to be made from one clay. A further refinement to the layering techniques is that of applying slips—pastes of diluted clay—to improve the visual appeal of the finished tablet. Use of slips is particularly evident in Middle Assyrian and scholarly Neo-Babylonian tablets.

WRITING A TABLET

When writing on moist clay, it is almost inevitable that the scribe will leave fingerprints. While a properly finished tablet does not show many fingerprints, some partial prints do remain, often on the corners. It has been suggested that systematic study of these prints could help reconstruct archives or possibly how a tablet was held (D'Agostino et al. 2004: 113–114).

Tablets were written with a specialist writing instrument, now called a stylus. Its ancient name, 'tablet reed', betrays the origins of the tool. Over time other materials were added to the stylus-making repertoire: wood, ivory, bone, and metal. In the early days of writing, a combination of impressing and incising was used, leaving wedge-shaped marks and curved lines. The curved lines are gradually replaced by impressed wedges, and the script assumes a more abstract appearance. Speed and ease of writing and the greater visibility of wedges with larger heads (thus, impressed) may be among the reasons for this transition. The commonly offered suggestion that accidental smudging of text by scribes as they wrote from right to left played a role is disproved by the lack of such smudging on the tablets, and indeed on numerous later tablets where columns were written from right to left.

The shape of styli has been the subject of prolonged debate, with suggestions ranging from square to triangular (Driver 1976: 18–31). Marzahn (2003) offers evidence for some styli being cut from a round reed, rather than Saggs's (1981) triangular sedge. It is worth noting that the triangular shape of the impressions does not necessarily imply a triangular stylus-end; pressing a square-ended stylus into the clay at an angle produces wedge-shaped impressions. Incidental holes made by styli tend to be round. The bone styli found at Tell ed-Der (Gasche 1989: 102 pl. 45; cf. Boehmer 1972: 196–197) are roughly square in section, with bevelled ends; they are too short (max. 5.5 cm) to have made the longer rulings found on many tablets. Might they be training styli? The angle between the head and tail of a wedge can vary from 90 to 45 degrees. Clay's (1906: 20) observation that this angle correlates very strongly with that of the corner-wedge suggests that the latter was made by simple impression, without a flick of the wrist. The other end of the stylus, or perhaps another stylus altogether (as in Early Dynastic texts, where there are both large and small number marks as well as wedges), was round-ended. This was used to write numbers as late as the Ur III period. Styli had limited lifetimes and were apt to split at the end, leaving double impressions with each stroke in the clay (BM 13038). Much about styli and other scribal equipment remains unclear.

It is commonly the general shape of a cuneiform sign that is key to its identity, rather than the exact number and placement of its component wedges. Some wedges are key to giving the sign its general shape, while others are less important and may vary without changing the meaning. In some late scripts, however, groups of very similar-looking signs are used, and minor changes in the number or placement of wedges can signal the difference between one sign and another. The specifics of sign composition could

potentially be used to identify scribal schools, if not individuals. It is further possible that the order in which wedges are written could be key to how signs are formed. This is very difficult to discover, however, as deeper wedges give the appearance of having been written before shallower ones (Livingstone et al. 2004). The solution to this problem may lie in the displacement of clay distorting previously written wedges.

The whole wedge can itself be impressed at a variety of angles. For most of cuneiform, the wedges are arranged in an arc that is comfortable for a right-handed person. In earlier periods and in monumental scripts that imitate archaic forms, wedges can be found in other alignments. The entire script can lean to the left, as in Late Babylonian tablets, or even to the right, as in Old Assyrian tablets.

Cuneiform signs are usually written in such a way that they connect with their horizontal and vertical neighbours, giving the script a feeling of coherence. Signs are spaced out to fill the line. When there is insufficient space to complete a line, the text flows onto the right edge and sometimes even the opposite side of the tablet. Another solution is to run on into the next physical line, inset and occasionally in a smaller font.

Cuneiform characters came to be read at 90 degrees to their pictorial origins, but the timing and reasons for this change are much disputed. Marzahn (2003) hypothesizes variable writing and reading direction in archaic Uruk. It is also worth stressing that the way in which tablets are stored or labels hang does not necessarily demonstrate reading orientation, since we are ignorant of scribal practice—were such inscriptions read from a position face on or sideways, and would a scribe pull a tablet straight out or pivot it down on a corner? The flow of writing may be a factor in any change, given the original right-facing nature of the script and the possible implications of that for wedge order.

Cuneiform script could be written parallel to the short edge of the tablet (portrait orientation) or to the long edge (landscape). But almost all tablets turn along the horizontal axis rather than the vertical (as do modern books). This must be related to the fact that tablets are individual sheets of writing material, held in the hand, with deep edges, so that text can flow uninterrupted around the object. Where there are several columns, they run from left to right on the obverse, right to left on the reverse; the columns on the reverse of some Old Babylonian and Neo-Babylonian exercise tablets run from left to right. Indeed, exceptions to the rules about turning direction are seen most often in the work of younger students who have yet to perfect the turning habit. The Graeco-Babyloniaca tablets (see below) frequently turn around the vertical axis. Other exceptions can be found occasionally in administrative documentation, too: Lion and Stein (2001: no. 38) from Nuzi and several Neo-Babylonian and Late Babylonian administrative and legal texts. These can probably be explained as oversights. Other examples are clearly deliberate: the Vassal Treaties of Esarhaddon, magnificent state documents, turn like a book and the columns on the reverse run from left to right (Wiseman 1958: 14). The same phenomena are observable in the monumental East India House Inscription of Nebuchadnezzar (BM 129397) and its duplicate (Wallenfels 2008). Other categories of exception include: a royal inscription from Lagaš where each column is read on both obverse and reverse, before moving to the next pair of columns; rectangular Middle Babylonian school tablets where the obverse is read in portrait, while the reverse is read

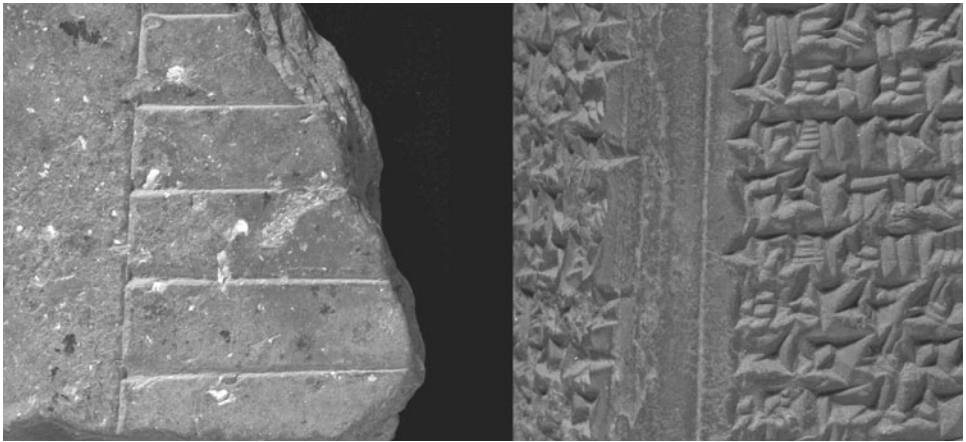


FIGURE 1.4 Rulings made on clay tablets by a stylus (*left*: BM 12451), and by string (*right*: British Museum, Sm 1026). (© Trustees of the British Museum)

in landscape; Neo-Babylonian barrel cylinders with hymns to Nabu, where the two columns are oriented upside down to each other (BM 42768, BM 95480); some Late Babylonian scholarly tablets; plus individual specimens such as Neo-Babylonian administrative tablet BM 49643.

Tablets and other text vehicles are routinely ruled in a variety of ways: to provide guidelines, indicate text lines (earlier forming text ‘cases’, where signs were clustered into sense units) and columns or mark divisions within a text. The rulings are made with a stylus, and often the head of what is effectively a very long wedge is visible. Rulings and their relation to the text can be revealing. Sometimes rulings are made with string instead of a stylus (see Figure 1.4); this is most common in borders of Neo-Assyrian prisms (see below), where it provided a neater look to these long lines.

Right from the earliest days, tablets could be impressed with seals, which were used as a form of identity or authority marker. They could certify the receipt of goods or the assumption of an obligation, or act like a signature. There was enormous variety not only in the designs of seals, but also in the sealing practices—who sealed, when, where, and how many times. Sealings are thus extremely informative. From the Old Babylonian period onwards, finger-nail impressions could serve as a seal substitute. Usually three nail-marks are made in a group, as many as five in Neo-Assyrian texts or seven in Middle Babylonian, or as few as one in Seleucid texts (see Figure 1.5). In Neo-Babylonian texts artificial nail-marks can be found; by the Hellenistic period they disappear from use. The arrangement of nail impressions varies widely. Hems were also sometimes impressed in lieu of seals (see Figure 1.5). Other textile impressions are accidentally made. Hems (and nails) have wider symbolic usage. Rarely pearls (ND 2346) or shells (K 313) were used as seal substitutes (Herbordt 1992: 41–42).

Some first-millennium scholarly tablets are marked with what are traditionally called ‘firing holes’ (see Figure 1.6), usually round but occasionally square, triangular, or even



FIGURE 1.5 Nail impressions on a Neo-Babylonian tablet (*left*: BM 85239), and a hem impression on an Old Babylonian tablet (*right*: BM 81023). (© Trustees of the British Museum)

almond-shaped. The name is based on the idea that they were made to prevent the tablet exploding during the baking process. Only rarely in antiquity were tablets baked. A handful of Neo-Babylonian colophons and documents attest the practice. The vast majority of tablets in more recent history were baked; from the mid-19th century onwards it has been common practice for dealers, excavators, and museums to bake tablets to protect them from damage. An alternative theory holds that the ‘firing’ holes were originally employed to prevent alteration of the text by filling blank spaces on the tablet (Jeyes 2000: 371). There are many cases of tablets where holes are made in some but not all spaces, or where holes are found in places where no additional writing could have been placed. While their function remains elusive, their placement is not entirely random.

Steinkeller (2004: 68) formulates two arguments about Ur III administrative texts that have profound implications across cuneiform: firstly that such texts were written some time after, and in a setting different from, the transaction they describe; and secondly that such texts present a special, bureaucratically meaningful version of events, rather than an accurate account of what actually happened. It is clear that scribes did not always write a tablet from beginning to end in a single moment. We should imagine a situation where tablets were kept damp until considered finished. This was not always successfully achieved. The final column of BM 23687 was written after the clay had started to harden. In BM 19176 the upper lines on the reverse were written not only after the obverse but also after the last lines of the reverse. Other parallels exist; Gebhard Selz (pers. comm.) refers to a tablet that lacks a total, suggesting several stages in the writing process. Krebern timer et al. (2005: 48) document the use of a vertical wedge of deletion, written with a different stylus from the original text, and refer to the later addition of lines. Clay (1906: 16) uses check-marks to deduce that lists were written by first copying the names of people from a prior list, then noting which were dead or runaways, then the amounts and marks to show when these have been paid out.

In the round Ur III field survey tablets the yields are sometimes written in after the clay had started to dry (Maekawa 1982: 101). In other cases the yields are not written in at all; another solution must have been found. Assurbanipal’s Library contains examples of a colophon being written after the clay had started to dry (K 251), and in a couple of occasions even written in ink after the tablet had fully dried (K 10100, DT 273). Wax-filled

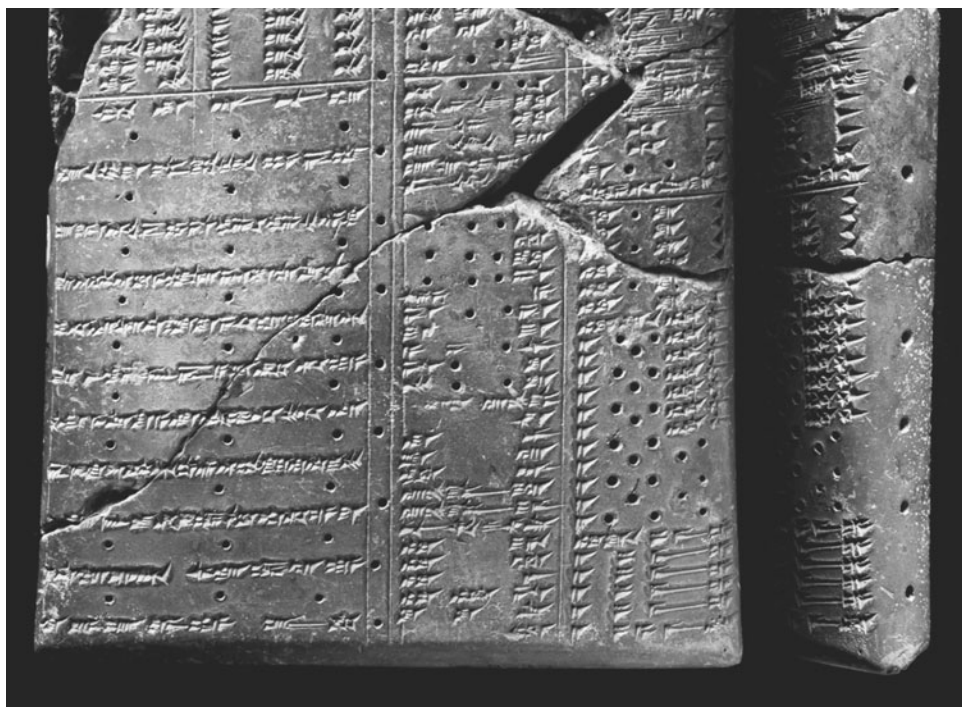


FIGURE 1.6 'Firing holes' in a Neo-Assyrian scholarly tablet (British Museum, K 39). (© Trustees of the British Museum)

writing boards (see below) were more amenable to delayed inscription, so would be sealed to prevent alteration of the text (MacGinnis 2002: 222–223).

Given the proficiency with which the few surviving inked cuneiform inscriptions are written (see above, plus further examples from Assur and Hattusa), we are entitled to speculate as to what other use was made of ink for cuneiform. We know of other uses from Old Babylonian period Mari (Charpin 1984). Some tablets are cancelled with red ink (paralleled by physical crossing out attested in late Old Babylonian Sippar and Larsa, e.g. BM 80161), indicating that the transaction has been completed but a record of it was still required. In other cases marks were struck through individual lines in a list of workers, eliminating them from the team. This use of paint on tablets is now further attested at Tell Bi'a on the Syrian Euphrates (Durand and Marti 2004: 132). The Egyptian scribes at Amarna wrote on tablets in ink, sometimes archival notes on letters, sometimes red or black dots on school tablets, interpreted by Izre'el (1997: 46–47) as marking metre boundaries. A rare reference in a scribal colophon to omens written on parchment (see further Garelli 1978) opens up the possibilities of much wider use of ink for writing cuneiform in the late periods.

Some first-millennium texts contain Aramaic notes (inked on or incised with a reed pen, occasionally both) added to cuneiform texts, or consist solely of incised Aramaic

letters. The Aramaic notes are often written upside down in relation to the cuneiform text. It would be curious had they been so written by the cuneiform scribe (who would plausibly have been able to write Aramaic), but also curious had an Aramaic scribe chosen to incise rather than ink the inscription. Incised Aramaic perhaps consciously mimics the impressed character of the traditional cuneiform script. Interestingly, several tablets contain similarly incised characters of an as yet unidentified script, proposed but rejected as a form of Indian script (Falk 1993: 117–119). During the late period, cuneiform began to give way to Aramaic and Greek documents written on parchment (see further Clancier 2005). A remarkable group of tablets known as the Graeco-Babyloniaca (see most recently Westenholz 2007) show Greek-speakers learning cuneiform. These tablets contain traditional school texts on the obverse, with transliteration into Greek letters on the reverse.

Several categories of notation were used beyond the basic inscriptions and scribal colophons. Administrative lists can be marked with rectangular, semi-circular, or circular check-marks. In Early Dynastic texts the cross-shaped cuneiform signs KUR₂ or PAP could be used to show unexecuted transactions (G. Selz, pers. comm.). In some school texts and occasionally in administrative lists a line count can be found; this takes the form of a '10' mark in the margins at every tenth line. School texts can also contain the cross-shaped signs BAD or NU to indicate an error made by a learner pupil. School texts can use a special gloss-marker (Krecher 1971: 433). In Neo-Babylonian barrels this or a vertical wedge can be used to mark off text that runs over into the next column. Old Assyrian texts make occasional use of a vertical wedge as word divider; this often seems to be an indicator of non-professional scribes (Larsen 2002: xl–xli). Lambert (1978: 76) records a kind of acrostic written around the edges of cylinders containing hymns to Nabu.

A much neglected aspect of scribal practice is that of making drawings on tablets. Among the earliest uses of drawings are the designs used instead of seal impressions in archaic Ur (1930–12–13, 410). The most spectacular drawings, however, can be found on the reverse of school tablets from Abu Salabikh (Biggs 1974); the function of these elaborate designs remains unclear. Plans of fields and buildings (Heisel 1993: 7–75), and mathematical diagrams (Robson 2008: 60–67) appear during the late third millennium, and continue into the first millennium. They tend to be relatively simple line drawings with labels. From the Old Babylonian period we find diagrams illustrating viscera, incantations (BM 92669, BM 92670; cf. the sage on the Late Babylonian medical text BM 40183), and drawings of a teacher. There are also maps (Millard 1987) of cities or the world (BM 92687). Neo- and Late Babylonian administrative texts can sometimes carry scored lines (Baker 2003: 245), archaic signs (BM 29342), or drawings such as birds (BM 22357), fish (BM 46874), geometric shapes (BM 29363), or other designs (BM 83400) on their reverse, or less commonly the left edge.

Drawn not with the regular stylus but with a combination of pointed tool and fingernails, such drawings appear to constitute archival marks, some referring to the content of the accompanying text (Zawadzki and Jursa 2001; Janković 2004: 193–194). Similar types of drawing are found on tablets from the Old and Middle Babylonian periods; in the former case, the drawings often refer to the deities who are creditors of silver loans.

First-millennium tablets also yield illustrations of divine standards (BM 33055) or parts of the liver (K 2090) or the skies (Sm 162).

Other examples demonstrate the considerable success with which it is possible to draw on clay: the lion attacking a boar from Babylon (Jakob-Rost et al. 1992: no. 51), composite creature from Kabnak (modern Haft Tepe) in Elam (Negahban 1994: Fig. 14), or the hand-modelled copy of the royal seal on BM 77612 (Da Riva and Frahm 1999/2000: 166–169), which displays incredible mastery of the clay. These drawings are made without excessive build-up of clay. The same can be said for the incised characters of archaic script. Equipment and technique were clearly important. Furthermore, this observation contradicts the widespread assumption that curved lines fall out of use on account of the build-up of clay in front of the stylus.

While erasures are far from rare, the general impression is that scribes took sufficient care with inscriptions that relatively little use was made of erasure; this is perhaps connected to the feature that invisible erasure seems to be very difficult. Rare markings seem to indicate text due for erasure (Reisner 1896: xiv–xv; Schroeder 1920: no. 1).

A special type of erasure is that of ‘excision of acquittance’, identified by Joachim Marzahn in texts from Early Dynastic Lagaš (pers. comm.). Individual transactions within a document are deliberately erased for one of a variety of reasons, including to mark amounts paid back or items not yet delivered. A similar interpretation has been offered for tablets which have the upper left corner missing, perhaps broken off to indicate the completion of a particular stage in the administrative process (a phenomenon clearly attested at archaic Uruk; G. Selz, pers. comm.).

Palimpsests are rare. They are found occasionally in school contexts and have been claimed in the case of some letters from Old Babylonian Šušarra (modern Shemshara, Larsen 1987: 220 n. 51); in this specific circumstance we can imagine that it was easier for the messenger from a foreign city to re-use an old tablet than make one anew. The most common type of Old Babylonian school tablet has erasure and re-inscription built into its function from the start. On the left side a model text is written, to be copied in one or more columns on the right. The copy is later erased and another copy made over it. When the right side of the tablet becomes too thin it can be cut away or refortified with additional layers of clay. Otherwise the addition of clay to tablets is rare, and usually of unclear purpose.

ENVELOPING

Administrative texts and letters were sometimes covered with an envelope made from a thin strip of clay (see Figure 1.7). In the latter case it might have kept the contents confidential and allowed an identifying seal to be impressed on the outside. Old Assyrian letters can include a second ‘page’, in the same envelope (BM 113573). Envelopes on administrative tablets protected the text from alteration or damage; physical protection was often enhanced by placing the tablet upside down and back to front, so any damage



FIGURE 1.7 Fragment of a clay envelope, showing the folds within (*left*: BM 13059a), and a tablet inside its envelope (*right*: BM 22903). (© Trustees of the British Museum)

to the text of the envelope did not also lead to damage to the same part of the text on the tablet (Charpin 2000: 72). Administrative envelopes bore a copy (not always identical), summary, or excerpt of the text they enclose, plus seal impressions or other markers of identity. Practice varied widely; for example, in the early Ur III period the envelope would be sealed on obverse and reverse before inscription, but later in the Ur III period would be inscribed before being sealed all over (Fischer 1997). Uninscribed envelopes are rare (BM 78747, BM 86451).

A common enveloping technique for Ur III tablets lays the tablet towards the end of a strip of clay and folds the sides over the tablet, with the two flaps tapering together in the centre (BM 13022a, BM 13059a; see Figure 1.7). Next the remaining clay was folded over the two flaps. It seems likely that water was used to stick the folds together. Often the internal surfaces of envelopes are marked extensively with fingerprints (BM 110219).

The question arises as to how the envelope did not simply become part of the enclosed tablet mass. Anecdotally, answers have ranged from a hypothesized layer of dust or an ephemeral layer of textile separating the two (perhaps evidenced by BM 22903a, BM 54225a) to the idea that an envelope met the tablet only at the corners. Observation reveals that the inside edges of the envelopes usually bear a positive impression of the whole inscription, including all edges, to such an extent that the text can now easily be read from the inner envelope surfaces. Experimentation suggests that tablet and envelope could have been kept apart by the simple expedient of allowing the tablet to air-dry a little before adding the envelope (already Clay 1906: 9). Alternative practices may have been followed, of course.

Enveloping declines in popularity from the Old Babylonian period, while the practice of producing duplicate tablets increases in popularity. The old technology does not altogether disappear, however, and envelopes are still found around Neo-Assyrian and some Neo-Babylonian letters and administrative texts. An echo of enveloping is hypothesized

in Late Babylonian contexts, where an inner roll of papyrus is sealed with clay then a duplicate outer roll wrapped around it (Invernizzi 2003).

RE-USE AND RECYCLING

Clay tablets can easily be re-used: as construction material; as amulets; erased and re-inscribed (common only on a type of Old Babylonian practice tablet); recycled, either by remoulding the clay into new tablets (UET 6/3 621) or by re-levigating into sediment.

It has been observed that documents often survive only from about the last 30 years of an archive's life, and it has been hypothesized that archives only survive at all when suddenly and violently disturbed (see Civil 1987; Millard 2005). Functioning archives are thought to have been gradually 'eaten' from behind, as old tablets are disposed of, perhaps in order to make new tablets.

It is widely assumed that tablet recycling was standard practice in all contexts, but the archaeological evidence for this is currently limited. In which contexts and to what extent did recycling take place? Was it systematic or ad hoc and opportunistic? We might hypothesize that archive clearance occurred sporadically, when the accumulation of documentation became problematic. It is clear that brick-built bin structures or pots functioned as clay stores; these could be semi-permanent in public archives and 'schools', but apparently not in private contexts. These structures do not necessarily imply recycling, however. Raw tablet clay is readily available in limitless quantities, at no cost, requires minimal preparation, and probably is not used in as great quantities as has often been assumed. Tanret (2004) gives an idea of the numbers of tablets produced per day by a scribe operating in a private context (approximately one every few days per customer). We should probably think along roughly similar lines for scribes in institutional contexts. Writing tablets probably consumed only a small proportion of a scribe's day. In addition to carrying out the activities described in, and implied by, the surviving texts, as well as the many more which have not been recovered, he would also have performed numerous activities that were never recorded in clay. Recycling involves unnecessary effort. Students no doubt produced tablets at a much faster rate than administrators, and their products expired almost instantly after completion (and while still more or less damp; see Gesche 2001: 57 for evidence from Neo-Babylonian school tablets). Tablet quality therefore was not of prime concern there. Even in school contexts, students had large quantities of clay on hand, and a large number of tablets have been found in temporary storage or as building hard-core; House F at Nippur is a good example, with as many as 1000 school tablets surviving (Robson 2001: 44). Once a tablet had outlived its usefulness it was just a small lump of surplus clay, in a building and a city made of clay. There is plentiful evidence for tablets having been discarded, in lots or individually, even in contexts where evidence can be found for recycling.

Van Driel (1998: 27 n. 30) records having seen Neo-Babylonian tablets from Sippar where the inner clay contained visible wedges, but unfortunately does not mention

which tablets; the Sippar material is also a little unusual compared to that from other sites. At Old Babylonian Mari the excavators found a tablet that appeared to have been recycled immediately after having been written; only traces of a personal name survive (Villard 1984: no. 627). Another tablet, this time roughly wrapped in clay, has also been interpreted as being recycled (Charpin 2002: 39 Fig. 6). It is not clear exactly what stage in the process this would represent, or how the tablet came to take this form and remain in it; and moulding new clay around old tablets is an otherwise undocumented practice as yet. Middle Babylonian Haft Tepe yielded a similar object from a context containing many school tablets (Negahban 1994: 40 Fig. 8), and in this case we are probably not dealing with such a process, since the amount of new clay is excessive.

Zettler (1992: 68) highlights what seems to be a huge administrative recycling bin in the Ur III levels of Inana's temple at Nippur, containing clay and thirty-four broken sealings, tags, and the remains of about a dozen crumpled or broken tablets, including at least two school exercises. Both the tablets and the sealings argue for the deposit being made within a short period, within a few years either side of 2038 BC. The very low number of objects (in a bin with a volume of 6.25 m³) and their shared, very recent dating stand in contradiction to the models that see the gradual attrition or sudden clearing of archives from behind. The short life of these tablets also contradicts the longer lives of other single transaction documents, which in many cases are kept even after being entered into summary documents, and typically survive in huge numbers, dating back decades before the end of archives. This and the presence of stone weights in the bin suggest rather that a small pile of waste objects was thrown into the bin as it was covered over and replaced by a pot of much smaller capacity; the surrounding courtyard also contained waste stone and other materials, as well as tablets.

Scheil (1902: 33–34) describes finding a bin with school tablets being recycled, but little else can be said about this. In early Old Babylonian area SM at Ur, a group of mangled tablets was found (Woolley and Mallowan 1976: 80 n. 1); there was no sign of a clay container, however. Many of these tablets are described as 'perfect'. The remaining tablets included several school tablets, perhaps explaining the recycling. Just outside the building further tablets were found dumped intact. Two installations of asphalt-covered bricks in a scribal family's house in Late Babylonian Uruk have been interpreted as clay-working facilities (Hoh 1979: 28–29, Fig. 10b, pl. 69); quantities of roughly formed fine clay lumps were found there. A brick bench and brick boxes in the Neo-Assyrian archive room of the Northwest Palace in Nimrud, meanwhile, have been interpreted as a filing system (Walker 2008: 258–259). The classic example of recycling is that from the house of a lamentation priest in Old Babylonian Sippar-Amnanum (see Tanret in this volume), where scribal training had been taking place. Subsequent renovations buried the clay bin. From this point on the owner would have had to dispose of his expired documentation another way; it is simplest to assume that he would just have thrown it away, and that this method of disposal would have been common.

At Old Babylonian Susa further evidence of tablet recycling was found (Gasche and de Meyer 2006), different again in nature from those previously discussed. In one building

were found several deposits of clay mixed with fragments of broken school tablets (some water-damaged) ranging from very basic stylus practice to advanced exercises. This is not a snapshot of one moment in the education of a single scribe. In the street outside was another deposit with clay, much smaller tablet fragments and a few sealings. The building is not domestic, but appears to be a clay-working installation, designed to serve the large adjacent administrative building, and perhaps also the pottery adjacent on the other side. While tablet recycling does seem to have been taking place, it appears to be restricted to school tablets (possibly also sealings), and the overall number of tablets is tiny given the total 400 litres of clay found there. The mixing of tablets and fresh clay raises two obvious questions: why the need for fresh clay and why mix refined tablet clay with unrefined clay? The answer to the first has been that the supply of old clay was insufficient—apparently woefully inadequate. Unless the volume of documentation was increasing rapidly, it would seem that archives were not being slowly recycled from behind; vast quantities of new clay were entering the system. Gasche and de Meyer's (2006) answer to the second builds on the observation that some tablets from Tell ed-Der and Susa, particularly letters, have fine clay layers wrapped around lower quality cores (Gasche and de Meyer 2006: 368); a similar manufacturing technique has been observed in tablets from Mari (Faivre 1995: 58). The suggestion is that such clay would need to be processed so that it could be used for new tablets or their outer layers. Were this so, it would necessarily mean that those original tablets could not have been through the recycling process themselves, and that future tablets would be made either from pure clay alone or with the introduction of much new, unrefined clay. Perhaps it is simply the case that the volume of tablet clay being recycled was too small to make it worth the effort of separating it out.

OTHER TEXT VEHICLES

For depictions of scribes we rely on Neo-Assyrian evidence, largely from the relief sculptures of palaces. While objects are depicted accurately, Assyrian composition is formalized and does not yield photo-realistic images. Scribes are shown operating in pairs; one holds a wooden writing board with wax-filled panels, the other holds a pen and writes on a roll of parchment or papyrus. The second scribe is thought to be writing a parallel account in Aramaic—the everyday language of the time—presumably for a different purpose. An alternative hypothesis is that he is a kind of war artist, taking notes on the exotic landscapes to inform the later carving of reliefs celebrating Assyrian victory in that campaign (see Reade 1981: 162). The cuneiform scribe regularly carries a writing board rather than a tablet. From a practical point of view, it would be easier for a scribe on campaign to operate with a writing board than to have to source and process clay in a strange environment, make a proper tablet, and inscribe long lists before the tablet dries. In the Til Barsip paintings and a few reliefs (e.g. BM 118882; see Figure 1.8), however, the cuneiform scribe holds a tablet; he also holds a stylus as long as those of scribes writing on boards.



FIGURE 1.8 Two Neo-Assyrian scribes, one holding a clay tablet and the other a leather scroll: detail of a stone relief from Tiglath-pileser III's palace at Kalhu, modern Nimrud, Iraq (BM 118882). (© Trustees of the British Museum)

Apart from tablets of various shapes and sizes, many other objects can be made from clay and inscribed. These range from objects such as roughly life-size clay architectural fittings in the shape of fists (known as 'hands of Ištar'; BM 90976) and vessels carrying royal inscriptions (BM 140889) or labelling the owner or contents (1880-06-17,1932) to teaching models of vital organs, most often livers (BM 92668), but also lungs (Rm 620) or spleen. Most common, however, are royal inscriptions: bricks or building deposits (Ellis 1968). From the Old Akkadian period onwards, some bricks were inscribed with a stamp; handwritten bricks can contain a high proportion of errors. This is the only use to which printing was put in Mesopotamia; presumably it was not deemed appropriate for other inscriptions to be stamped in this way, even when the text was similar to that of the bricks. It is not without interest that the Assyrians had invented what amounts to movable type for this one purpose. Building deposits can take the form of cones, nails,

prisms, barrels, or cylinders, each displaying a number of sub-types, correlating closely with period and provenance. Prisms and cylinders are further found carrying other types of text, particularly school texts and literature. Unlike the average tablet, building deposits in antiquity were intended to be baked.

As early as the Ur III period scribes could write on wooden or ivory boards (in single, double, or multiple leaves) filled with a mixture of wax and orpiment (or another material; Stol 1998: 347–348; see further MacGinnis 2002). The additive gave the wax plasticity and also a yellowy colour akin to the slips found on some tablets. These boards bore a variety of texts and were used for both temporary and longer-term purposes. Their manufacture was a complicated process and required carpenters (proven by texts from late period Uruk). Tantalizing expressions mention the transfer of data between boards and clay tablets; their precise interaction is unknown (Symington 1991: 116–118).

From the Ur III period clay cones and nails are found, ranging from around 6–12 cm long. Despite close physical resemblance and function, cones and nails are subject to different practices and follow separate developmental paths. During the early Old Babylonian period the heads of nails increase dramatically in size, and start to bear a copy of the inscription. Cones and nails are normally solid. Some bear tell-tale traces of having been twisted from a wheel; the coiled end has not been smoothed (BM 139975). Others have a partial-depth central piercing from the base (BM 102586, BM 138346); they are irregularly cone-shaped. This type appears to have been turned slowly on a spike wheel. Some have been tempered to provide extra strength.

Some cones and nails have a bulge part way down the length of their tail. This may be the inspiration of the barrel cylinders that take over from cones; cylinders are just more symmetrical around the bulge. The symmetry is not perfect. Some barrels are thicker at one end, when viewed from the outside. Internally they are thicker at that end, this being the base upon which the object was turned on the wheel and perhaps on which it was intended to be stood. Barrels vary enormously, in terms of size (from less than 10 cm long to more than 20), structure (solid or hollow; both types can sometimes be pierced longitudinally), and in quality of material used (from very fine clay to heavily tempered clay). Hollow barrels were wheel-thrown using coils; these can have much thicker ends (BM 54506), like hollow prisms. Solid barrels have a surface layer of finer clay over a rough but strong core (BM 51255).

From the Early Dynastic period onwards a wide range of cylinders and prisms was produced, from exceptional pieces such as Gudea's famous cylinders (about 60 cm tall, 30 cm diameter) through more common Old Akkadian–Old Babylonian school texts (much smaller objects ranging from cylinders to prisms of 4, 6, 7, or more sides, holding up to three columns of text per face, and likewise being solid or pierced vertically), to the Middle- and Neo-Assyrian prisms (Borger 1996; these can be 40–50 cm tall) that were the functional equivalents of Neo-Babylonian barrel cylinders.

Neo-Assyrian hollow prisms were made by a complex technique (see Figure 1.9). First came a thick base with a concave upper. On top of this came the body; the internal skin, giving the object its basic form, was made by stacking coils on top of each other and smoothing into a cylindrical vessel. The writing surface was formed by adding a layer of

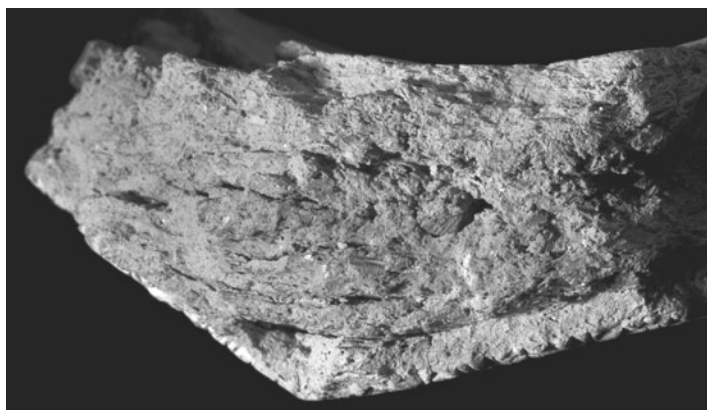


FIGURE 1.9 Fragment of a Neo-Assyrian prism, showing the layers of its construction (BM 128076). (© Trustees of the British Museum)

fine clay. It was this layer that gave the prism its squared sides; a similar phenomenon is found in tablets, where it is the outer layer that gives the tablet its more precise form. The top simply arches into a small central cavity. The mechanism by which the scribe was able to keep the writing surface moist for long enough to inscribe the text remains unclear; perhaps simply a damp cloth was used.

CONCLUSION

Each of the above sections can be nuanced and greatly expanded—and further sections added on topics such as scribal training or manipulation of script, for example—but I have tried to offer a glimpse into the study of clay tablets as objects with their own story. Some of the features result from the considered expression of highly trained artisans, others are incidental; all have something to tell us about the scribal world. The ready availability of high-quality images of the objects, and a holistic approach integrating study of inscriptions with that of the vehicles of their textual expression open the way to a deeper understanding of cuneiform culture.

FURTHER READING

Rice (1987) is a very useful reference work, explaining clay as a raw material and techniques of working with it. Driver (1976) presents an incisive account of the physicality of writing and its implications. Charpin (2008) gives a lively and well-informed account of cuneiform and clay tablets, ranging from fine details to overarching themes. Edzard (1980) is a detailed and technical introduction to cuneiform writing.

Brosius (2003) is a collection of papers addressing the use of tablets, with an obvious emphasis on archives. Ellis (1968) gives an overview of foundation deposits—an important category of text vehicles other than tablets—and how they were used. Eidem (2002) uses Old Babylonian as a case study to demonstrate the value of studying tablets as artefacts. A good example of a publication of texts that pays attention to the physical features of tablets and what can be learnt from them is Podany (2002), especially chapters 1 and 6.

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CHAPTER 2

ACCOUNTING IN PROTO-CUNEIFORM

ROBERT K. ENGLUND

HISTORIANS of ancient Babylonia are confronted with a myriad of hurdles in their work. First and foremost is the fact that they deal with a long-dead civilization, so that in the absence of informants they must interpret the material remains from Near Eastern excavations as best they can, often with very limited tools.

More daunting is the task for those who want to make sense of the social system that produced the documents from the Late Uruk period. Associates of the Berlin research project *Archaische Texte aus Uruk* (Englund and Nissen 2001: 9–10; Englund 2004: 23 n. 1), to whom I owe most of my understanding of the earliest written records in Mesopotamia, are often forced to oversimplify archaeological and epigraphic data from Uruk and the other late fourth-millennium BC settlements of the Near East, and in a sense to falsify into apparent meaningfulness what remains a disturbingly unclear picture. We may apply to our data the models developed in the social, above all the ethnographic, sciences, yet we should remember that with the onset of urbanization in the mid-fourth millennium BC we are dealing with an historical, developed society in Babylonia; there is a danger of ascribing to this historically distinct period the same ahistorical nature that characterizes most general histories of Mesopotamia (Bernbeck 1999; Englund 2004: 24 n. 2).

Control of the movement of goods and services is a critical element in the economic dimension of social power (Mann 1986). As is clear from a review of the emergence of proto-cuneiform in the latter half of the fourth millennium BC, it was an ever present component of urbanization in the ancient Near East. Michael Hudson (2004) has offered a concise description of most of the salient elements of early accounting in Babylonia, elements that most Assyriologists have considered in working on their specific periods of specialization, and to a lesser degree in terms of general developments in Mesopotamia. Among these are the development of writing itself; a system of calendrical metrology; and systems of quantification and bookkeeping that led to the formation of equivalence values based on the commodity silver.

Considering the importance of precious metals in most early civilizations, it might seem surprising to learn that we have no clear evidence in the archaic texts of the use of weights, nor any evidence that silver was in any way used in early households in a manner comparable to later, third-millennium usage. We indeed are hard pressed to cite evidence for the utilization of equivalence values in the Late Uruk period, with the possible exception of ration days.

An attempt is made in the following pages to give a general impression of the little we know about the accounting methods in the archaic period, with occasionally formalistic information culled from early texts, starting with a review of the development of writing; discussing in short fashion the importance of archaic numerical and metrological systems as elements of social control; illuminating the use of writing with some examples drawn from grain administration archives; touching on the matter of labour management; and closing with a tentative discussion of the implications the labour accounts have for our understanding of archaic ideology of class.

ACCOUNT-KEEPING AND THE EMERGENCE OF WRITING

More so than other writing systems, cuneiform has been described as a script based on a long history of preliterate accounting devices. Most who have studied the matter have considered early writing to be a collateral development from the exploitation of an increasingly complex method of fixing quantitative data.

Urbanization in southern Babylonia during the Middle and Late Uruk periods resulted in the growth of the settlement of southern Mesopotamian Uruk into an expanse of 200 hectares, with a population estimated to have approached 40,000 or more. Very large numbers of this population evidently were available for the construction and maintenance of the massive public district known as Eanna, with its monumental architecture surely the clearest testimony to the extraordinary new surplus economy supporting Uruk.

Hand in hand with these urban developments (Figure 2.1) are found in the archaeological record a series of accounting devices known popularly as 'tokens' since the publications of Denise Schmandt-Besserat (1992; 1996). While the archaeologist has been faulted for over-interpreting both the systematization and the iconic differentiation of these small clay objects (Englund 2004: 26 n. 4), there can be little doubt that at least a subset consisting of many of her simple geometrical artefacts represents the precursors of writing in Mesopotamia, and therefore that cuneiform began with numerical signs.

This assertion is based on two phenomena (Figure 2.2). First, the simple tokens were gathered in discrete assemblages and encased in clay balls in the periods immediately before the emergence of proto-cuneiform c. 3300 BC, and these balls were then sealed with impressions from cylinder seals—the hallmark of 3000 years of Babylonian

	Period	Writing Phase	Historical Developments
3400	Late Uruk	Clay bullae and numerical tablets	Beginning of large-scale settlement of Babylonia
3300		Archaic texts from Uruk: writing Phase Uruk IV, writing Phase Uruk III	
3200			First urban centres
3100			Age of early civilization
3000	Jemdet Nasr		
2900	Early Dynastic I	Archaic texts from Ur	Formation of large irrigation networks
2800			
2700	Early Dynastic II		
2600		Texts from Fara	
2500	Early Dynastic III	Rival city-states	
2400			

FIGURE 2.1 Overview of the chronology and historical developments of the earliest literate periods in Babylonia.

administrative history. Second, the plastic tokens were themselves impressed on the outer surfaces of some balls, leaving marks which, both physically and also in their context, conform exactly to the impressed numerical signs of the early so-called numerical tablets and the curvilinear tradition of Babylonian accounts down to the Ur III period at the end of the third millennium. We have little doubt that a statistical analysis of the overwhelming numbers of tokens still encased within clay envelopes would lead even further, to the establishment of the preliterate use of numerical sign systems with the same abstraction of unit bundling as has been shown for proto-cuneiform numerical notations. We should anticipate that we will find the two most important numerical systems in these tokens, one used to count discrete objects and one used to quantify capacity measures (Englund 2006).

It is of historical interest that the so-called Uruk expansion continued down through the use of bullae and sealed numerical tablets. Further, as Reinhard Dittmann (1986: 332–366) demonstrated, this contact continued into the earliest phase of ‘ideographic’ inscriptions of the Late Uruk period, those that I have called the numero-ideographic tablets (Englund 1998: 51–56). These texts from the Susa level 17Ax ‘contact’ (Damerow and Englund 1989: 15 n. 37; Englund 2004: 27 n. 6) correspond nicely with texts found in the area of the Red Temple at Uruk, characterized by their inclusion of seal impressions, numerical notations, and one or at most two apparent ideograms representing the basic agricultural commodities butter oil, textiles, and small cattle.

At this point there is an abrupt conclusion of interregional Uruk influence, with a continuation of development of writing in Uruk alone (Englund 2004: 28 n. 7). The

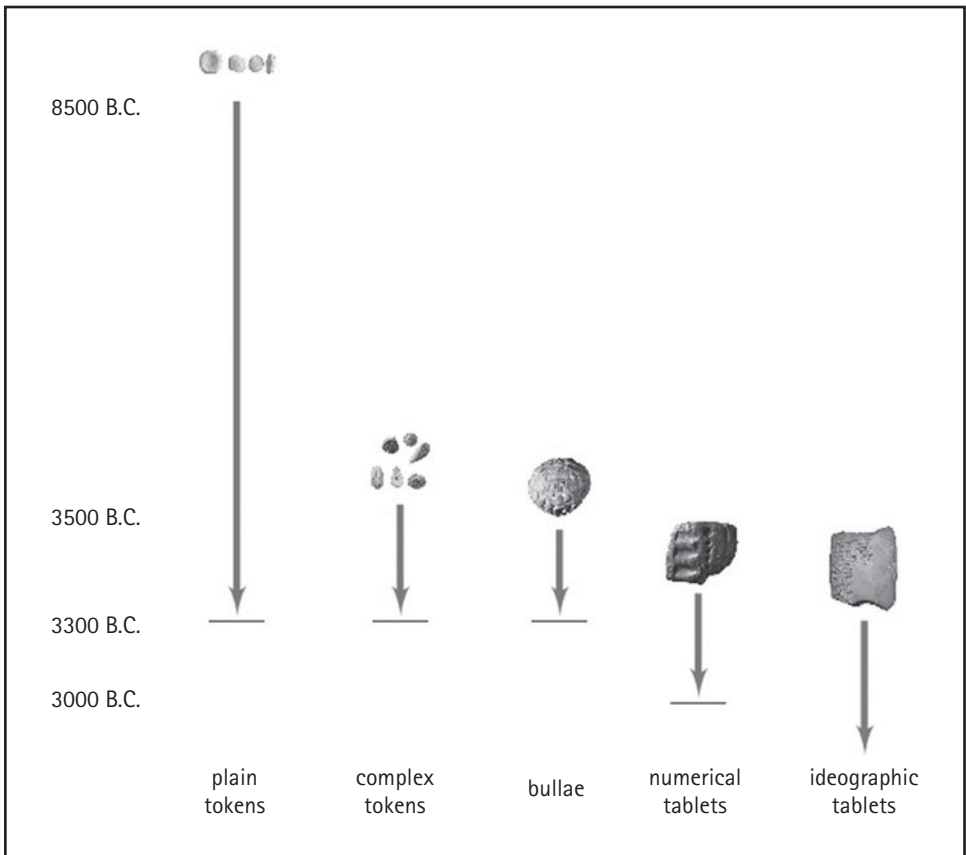


FIGURE 2.2 Denise Schmandt-Besserat's schema of the history of writing. (Based on Schmandt-Besserat 1992; 1996)

archives from Uruk consist above all of administrative documents, accompanied by a group of texts generally known as lexical lists, although there is good reason to assert that we have among these lists the earliest known example of literature (Englund and Nissen 1993: 25–29). It should be remembered that the numbers generally cited in this connection, 85% administrative and 15% lexical texts, represent averages; less than 1% of the earliest, the Uruk IV tablets, are of the lexical genre, while close to 20% of the following Uruk III tablets belong to this type of document. Whereas Uruk IV documents known to us derive without apparent exception from Uruk, those of the Uruk III (also called Jemdet Nasr) period come from a number of Babylonian sites, including Jemdet Nasr, Kiš, Uqair, Larsa, from transtigridian Tell Asmar, and, as post-Kuwait excavations streaming through London have shown, from Umma and from Adab. We should include here too the c. 1500 tablets and fragments of the so-called proto-Elamite phase in Susiana and regions to the east.

THE CATEGORIES OF ADMINISTRATIVE DOCUMENTS

We can divide proto-cuneiform administrative documentation into the two major bookkeeping types known from later periods in Babylonia, namely into primary and secondary documents (Figure 2.3). The easiest way to recognize the former type, consisting of receipts, bills, and simple transfers, etc., is by the physical size and the spatial format of the tablets. As a rule these are quite small, perhaps up to c. 8×8 cm, and might be divided into at most several cases. At present we can anticipate only that these sorts of simple documents contain no more than the most basic elements of a transaction or inventory record, as a rule including designations of quantified objects and of one or more actors involved in a relationship of some sort with those objects, often together with an indication of the administrative positions of these actors, as well as their geographical affiliations. In less frequent cases these simple texts would appear to include predicate information in the form of transaction qualifications: for instance, the signs BA or GI, which qualify, evidently for purposes of accounting clarity, the nature of the movement or storage of goods, including parcels of agricultural land.

The more interesting but rarer secondary documents can be twice or three times as large. They contain relatively large numbers of entries, and their surfaces are often divided into a complex format. As has been stated in numerous publications, this tablet format may be presumed to fulfil the syntactical functions of the more developed language representation found in later texts, particularly those of the Fara period and thereafter.

While we should be circumspect in our judgement of the syntactical force of the archaic ideographic record, there can be little doubt that the highly formalized system of numerical notations, with its roots in the token assemblages found in clay envelopes in Persia, Babylonia, and Syria, followed a wholly conventionalized internal syntax, and represented concrete facts in the archaic record that have played an imposing role in our partial decipherment of proto-cuneiform, and of proto-Elamite.

NUMERICAL AND METROLOGICAL SYSTEMS

Peter Damerow of the Max Planck Institute for the History of Science in Berlin, and Jöran Friberg of the Chalmers Technical Institute in Göteborg, must be credited with having early on discovered the importance of the numerical signs in the archaic record and making progress in this decipherment. It should be obvious that accounts deal with numbers and measures; however, the treatment by Assyriologists of numerical notations in cuneiform texts has been one of the worst blemishes in a field otherwise marked by close attention to detail. Friberg was so vexed by the copies and interpretations of the

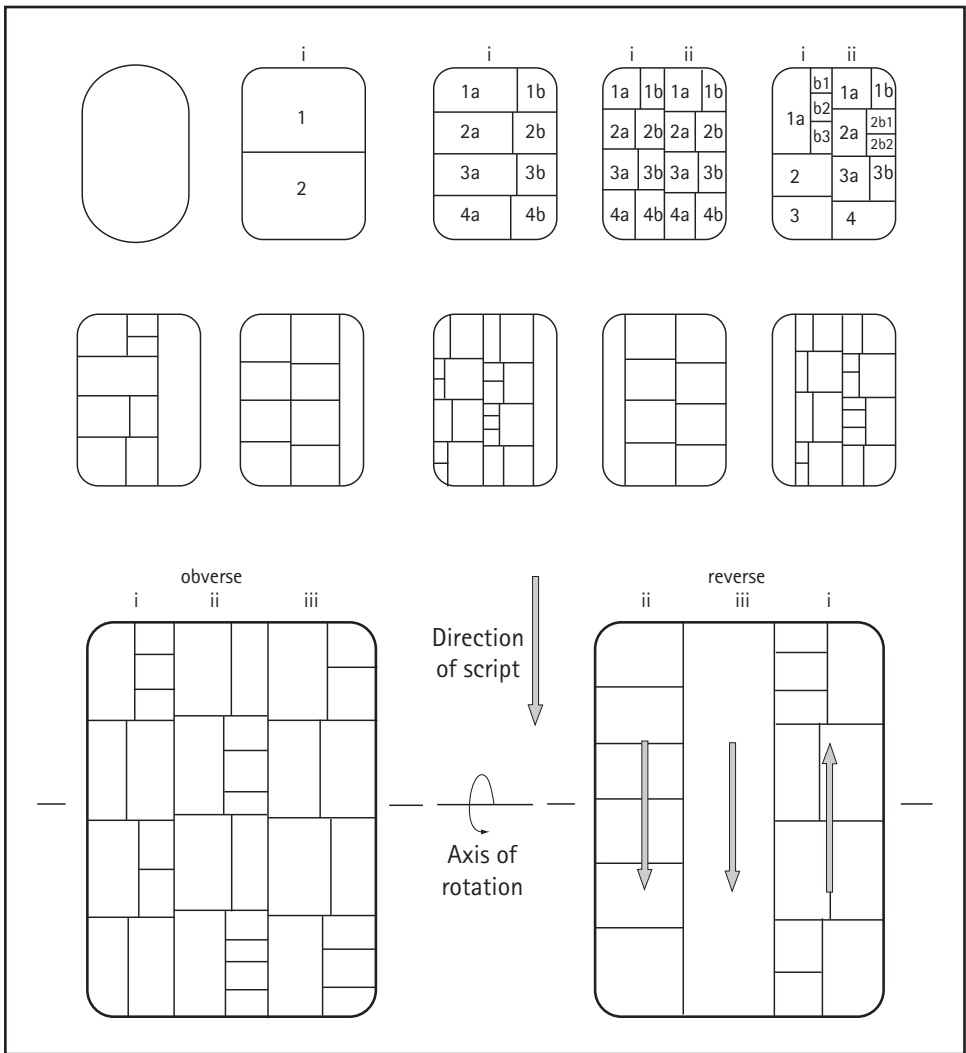


FIGURE 2.3 Formats of the proto-cuneiform texts: the two upper rows represent primary documents, the lower row a secondary document. (Drawing by Robert K. Englund)

important Jemdet Nasr texts by Stephen Langdon (1928) that, in the preparation of his groundbreaking re-edition of a number of these, together with archaic texts from other European collections (Friberg 1978–79), he made and exploited photocopies of the physical tablets in Oxford to aid in his work.

Langdon's *Pictographic Inscriptions from Jemdet Nasr* (1928) must be the worst example of cuneiform text editions on record. But a tradition of cavalierly dispensing with numerical notations in editions of administrative documents continues today in transliterated publications of primary sources with decimally interpreted sexagesimal

notations, despite the standardization proposals of the associates of the *Cuneiform Digital Library Initiative* (<http://oracc.org/doc/builder/numbers>) that a system of transliteration reflecting in a strict fashion the physical realities of the cuneiform inscriptions be adhered to. This should be a basic convention in text-analytical treatments of Babylonian literature.

In considering proto-cuneiform accounts, the first signs that command one's attention must be the numerical signs. These were impressed deep in the clay surface with the butt ends of two round styli of different diameters. As a rule, impressions of the larger stylus represent larger numbers or measures, those of the smaller styli numbers and measures from the lower scale of the numerical systems they represented. In most cases these numerical notations come first, followed by some designation of the objects they qualify, then by representations of persons or offices. Although within discrete notations the signs were, with some few exceptions, entirely unambiguous and therefore might, again with some few exceptions, have been inscribed in free order (Englund 2004: 31 n. 13), numerical notations conformed to a rigid syntactical sequence, from signs representing the largest to those representing the smallest order of quantity or measure.

The rigidity of these notational sequences can be explained partly by the fact that many of the signs were ambiguous across system borders. Dependent on the object quantified by numerical notations, the sign N₁₄ (a simple small circular impression) can represent ten clay pots of butter oil, a measure of grain corresponding to about 150 litres of barley, or a field of about 6 hectares. The real power of a clear understanding of the array of archaic numerical systems was first exploited by Friberg (1978–79), who published an analysis of the Uruk III period texts from Jemdet Nasr and other sites, in part made accessible to him by the Ashmolean Museum. Friberg's correction of an age-old misinterpretation of the structure of the archaic capacity system led to the partial decipherment of large numbers of accounts. Based in part on his work, Damerow and I were in the 1980s and 1990s able to abstract the systems shown in Figures 2.4a–b from a data set including the large numbers of texts from the German Uruk excavations (Damerow and Englund 1987).

THE STANDARDIZATION OF TIME IN GRAIN ADMINISTRATION ARCHIVES

These numerical representations afforded those working on the problem sufficient evidence to make a number of advances in the decipherment of proto-cuneiform, including the observation that already in the archaic period household administrators had imposed on the natural cycle of time an artificial year consisting of twelve months, each month of thirty days (Englund 1988). This realization and the subsequent discovery of the widespread use of time calculations in apparent rationing texts led to a fruitful exchange between Friberg and myself that identified a number of different grain

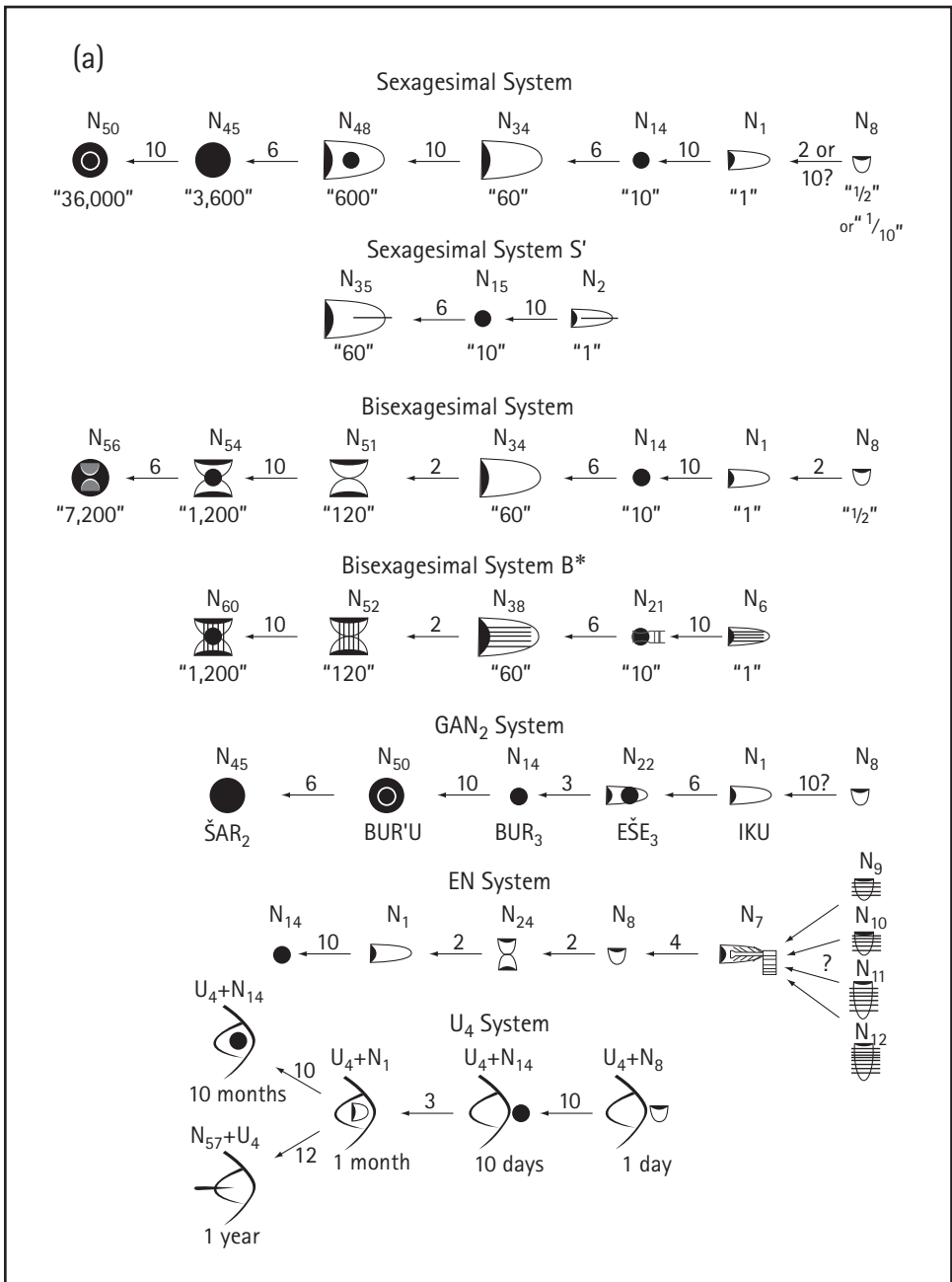


FIGURE 2.4 Proto-cuneiform numerical sign systems. Several systems of numerical signs served to qualify discrete objects (a), while others qualified measures of grains, (semi-)liquids, and time (a and b). (Drawing by Robert K. Englund)

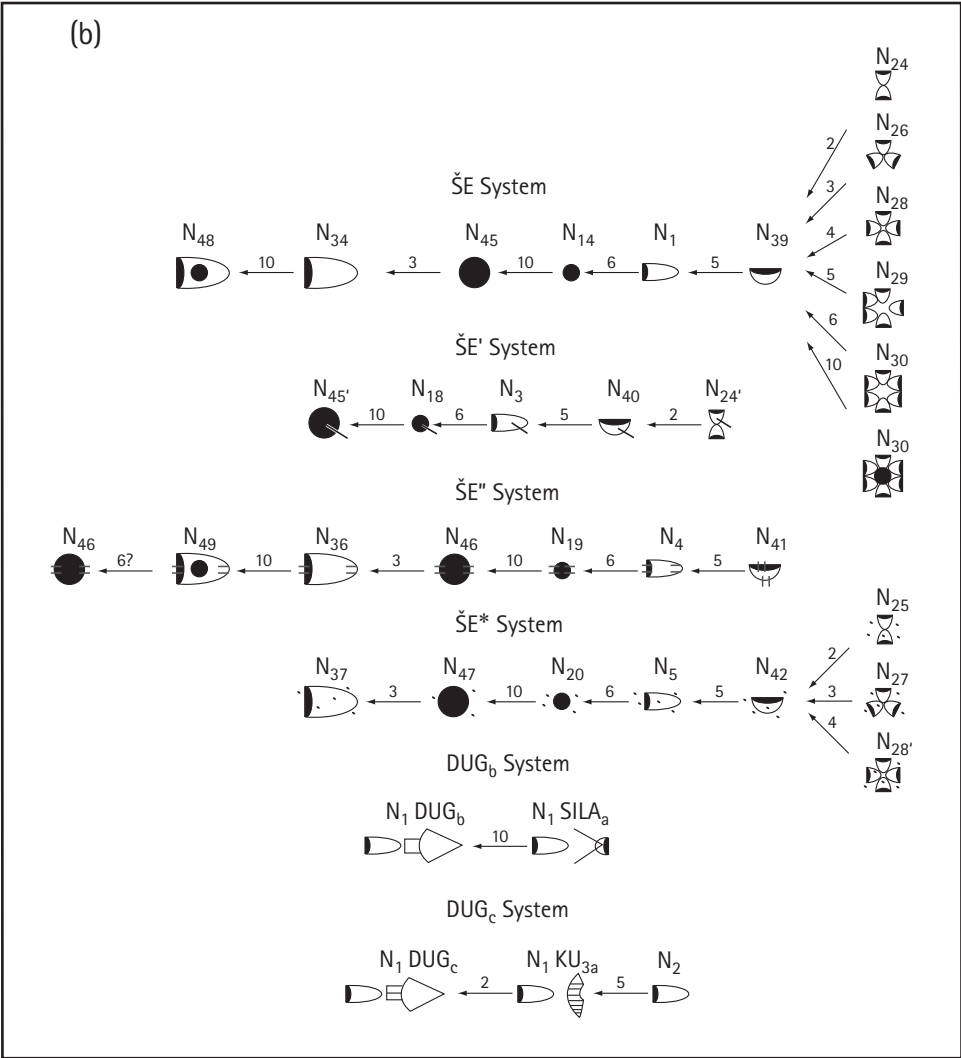


FIGURE 2.4. cont.

measure sizes employed in this rationing system, and to the plausible interpretation, first advanced by Friberg, that texts such as MSVO 1: 89 and 90, recording the daily disbursement of an amount of grain corresponding to the measure N_{24} (c. $2\frac{1}{2}$ litres) or N_{39} (c. 5 litres) over a span of three years, might document a system of long-term temple offerings (Englund 1988: 138). It is hard to understand why an account should reckon through several years the daily disbursement of a small amount of grain if this were not meant as regular alimentation for a cult figure or for a person dedicated to serve the donor in the cult.

The strengths and limitations of numerical analyses of archaic texts can be demonstrated using a group of documents from the Uruk III period recording the dispensation of agricultural products, above all dry and liquid grain products.

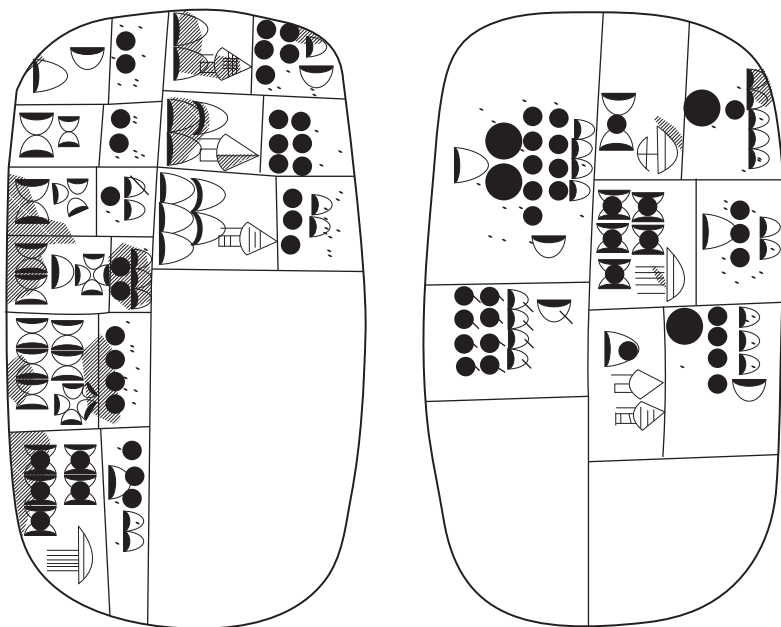
The key to understanding the important grain texts is in fact an artificial account, one of a number of school exercises known from the archaic period. Examples from later periods have received little attention. The text MSVO 4: 66 (Figure 2.5), possibly from Larsa, is something of a Rosetta stone in the decipherment of proto-cuneiform. In terms of both text format and sign meaning, this text resolved nearly all questions concerning a complex accounting mechanism. The individual entries of the text consist of notations that represent on the one hand discrete numbers of grain products—if dry products in the bisexagesimal, if liquid products in the sexagesimal system—and on the other hand notations that represent measures of grain equivalent to the amount necessary to produce the individually recorded products.

Once the information from MSVO 4: 66 could be marshalled, numbers of other complex accounts from the Uruk III period became clear to us, at least in their bookkeeping form. For instance, the Jemdet Nasr text MSVO 1: 93 (Figure 2.6 with reconstructions), shares much of its form and content with MSVO 4: 66 (Englund 2001). The obverse face of the tablet records in successive cases numbers of grain products together with notations that represent the amount of grain required for their production. As seems obvious based both on sign identifications and on production technology implicit in the types of cereals used, the first column lists dry goods—probably rough-ground flour and types of breads—while the first half of the second column lists liquid goods, certainly a type of beer represented by pictograms of ceramic vessels (Nissen, Damerow and Englund 1993: in particular 43–46). Following a double dividing-line, and therefore an accounting format device employed to indicate information derived from different primary sources, the scribe registers varying numbers of animals, animal products (butter oil, textiles, processed fish), and strings of dried fruit. Both sections are qualified, finally, with a set of ideograms representing the type of transaction recorded ('ration', GU₇), the originating place or office of the account (NI+RU, possibly representing the small settlement Jemdet Nasr itself), and the period of time covered in the account (Englund 2001: 18–21).

THE RATION SYSTEM

The basic format of those entries recording dry goods is straightforward. In the first of two sub-cases of each entry, discrete objects were counted, using what we have, due to its continuation past the bundling phases of the more common sexagesimal system into units representing 120, 1200, and, probably, 7200 units (Figure 2.4), designated the bisexagesimal system (no adequate explanation of the origin of *either* system's numerical structure has been offered; cf. Englund 2004: 37 n. 21). The second sub-case records a notation corresponding to the amount of grain requisite for the production of the units recorded.

(a)



(b)

obv. i 1	$60 \times \frac{1}{5} N_1$	$= 12 \times N_5 = 2 \times N_{20}$
2	$120 \times \frac{1}{10} N_1$	$= 12 \times N_5 = 2 \times N_{20}$
3	$120 \times \frac{1}{15} N_1$	$= 8 \times N_5 = 1 \times N_{20} \quad 2 \times N_5$
4	$300 \times \frac{1}{20} N_1$	$= 15 \times N_5 = 2 \times N_{20} \quad 3 \times N_5$
5	$600 \times \frac{1}{25} N_1$	$= 24 \times N_5 = 4 \times N_{20}$
rev. i 1	1200	$1 \times N_{47} \quad 1 \times N_{20} \quad 5 \times N_5$
obv. i 6	$6000 \times \frac{1}{30} N_1 \text{ (GAR + } 6N_{57})$	$= 200 \times N_5 = 1 \times N_{37} \quad 3 \times N_{20} \quad 2 \times N_5$
= rev. i 2		
obv. ii 1	$120 \times \sim \frac{1}{4} N_1 \text{ (DUG}_a + U_{2a})$	$\approx 30 \times N_5 = 5 \times N_{20} \quad 1 \times N_5 \quad 1 \times N_{42}$
2	$180 \times \frac{1}{5} N_1 \text{ (DUG + AŠ}_a)$	$= 36 \times N_5 = 6 \times N_{20}$
3	$300 \times \frac{1}{15} N_1 \text{ (KAŠ}_a)$	$= 20 \times N_5 = 3 \times N_{20} \quad 2 \times N_5$
rev. i 3	600	$1 \times N_{47} \quad 4 \times N_{20} \quad 3 \times N_5 \quad 1 \times N_{42}$
		$1 \times N_{47} \quad 1 \times N_{20} \quad 5 \times N_5$
	$1 \times N_{37}$	$3 \times N_{20} \quad 2 \times N_5$
		$1 \times N_{47} \quad 4 \times N_{20} \quad 3 \times N_5 \quad 1 \times N_{42}$
Grand total of flour used:	$1 \times N_{37} \quad 2 \times N_{47} \quad 9 \times N_{20} \quad 4 \times N_5 \quad 1 \times N_{42}$	
Grand total of malt used:	$1N_{47} \quad 4N_{20} \quad 3N_5 \quad 1N_{42a} \text{ (rev. i 3)} \times \frac{3}{5} \approx 8 \times N_{18} \quad 4 \times N_3 \quad 1 \times N_{40}$	

FIGURE 2.5 (a) The administrative exercise tablet MSVO 4: 66. This text formed the basis for Friberg's identification of the structure of the archaic metrological system, used to count grain measures, in particular the relationship of 1:6 between the two signs N_{14} and N_1 , earlier believed to be 1:10. (b) The calculations implicit in the text MSVO 4: 66 (see figure 2.4 for sign designations). (Drawing by Robert K. Englund)

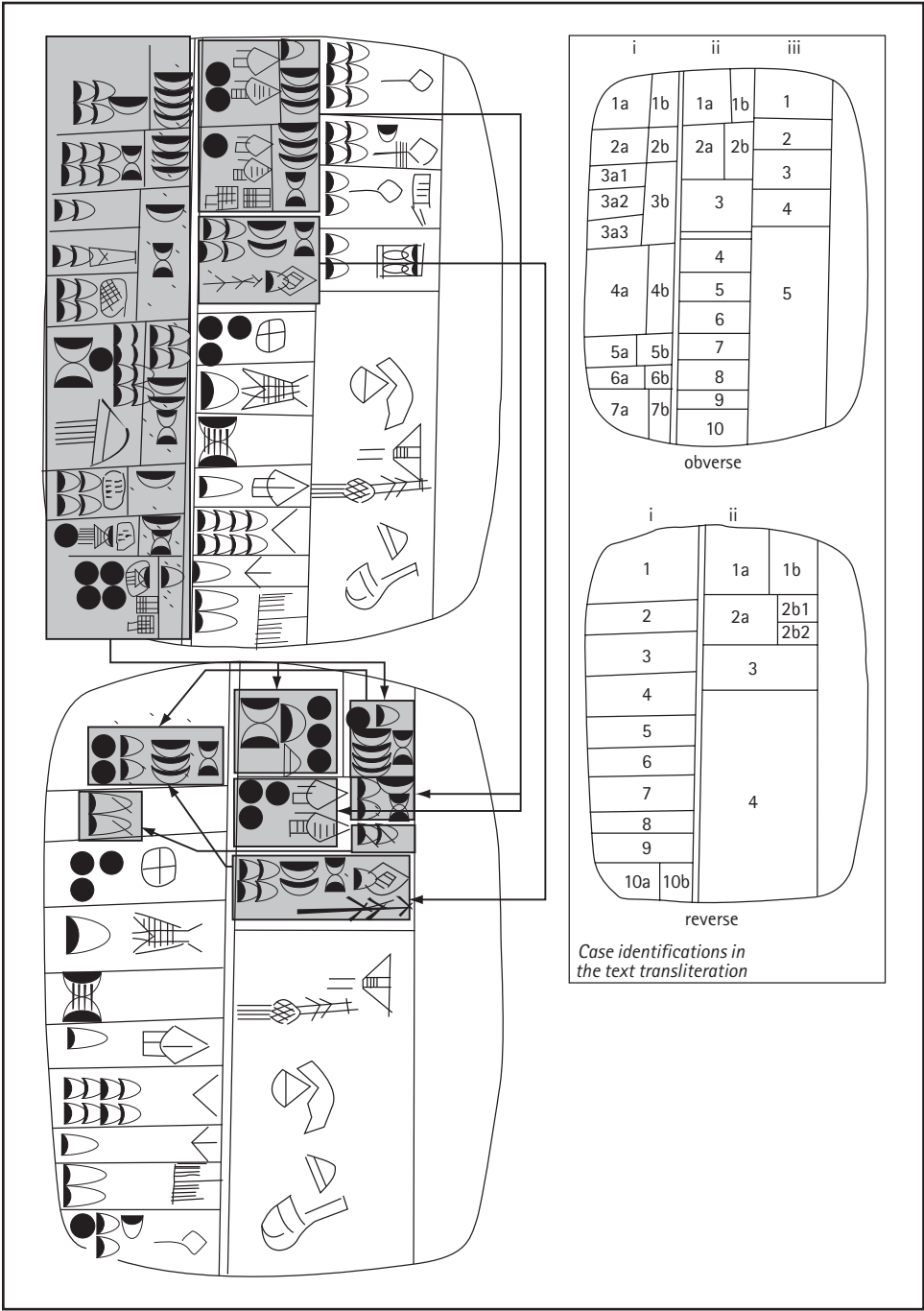


FIGURE 2.6 The account MSVO 1: 93 from Jemdet Nasr. It demonstrates many of the equivalencies, and the bookkeeping format of the exercise MSVO 4: 66, but includes ideographic notations representing agents, actions, and time spans connected with the account. (Drawing by Robert K. Englund)

The system used in this case corresponds in its numerical structure to the common grain capacity sign system, but is qualified by the addition of an arbitrary number of impressed dots that seem to graphically represent the ground barley used in the grain products.

GRAIN EQUIVALENCIES

As is usually the case with proto-cuneiform accounts, eventual subtotals and totals are inscribed on the reverse face. Here too, the categories of goods are treated differently, with a full tally of products in a first sub-case of the right column. The second sub-case was used here to tally all grain products with grain equivalencies. These equivalencies evidently represent the final value of these goods and are thus alone included in the grand total of the left column (Figure 2.7).

This formation and use of grain product equivalencies as exemplified by the texts MSVO 1: 93, and MSVO 4: 66, must be considered an important step in the direction of general value equivalencies best attested in the Ur III period for silver, but then still generally applicable for other commodities such as grain or fish, including finally also labour time. It is not possible to determine whether, as would seem intuitively likely, these equivalencies simply describe the amount of grain expended in producing different types of bread, beer, and other cereal products. But even if this is the case and the accounts presume no value equivalencies for products that might, for instance, require in their processing more labour or different ingredients than would be represented by a one-to-one relationship between the capacity of the finished product and the amount of barley corresponding to the product's grain capacity, still the *seeds* of value equivalencies among disparate goods may have been sown in these accounting procedures. The concept of value equivalency was a secure element in Babylonian accounting by at least the time of the sales contracts of the Early Dynastic IIIa (Fara) period, c. 2600 BC (cf. Englund 2004: 38 n. 22).

While there are no evident notations in the archaic texts which exhibit the level of labour time and production norm complexity of the Ur III period, still at least two components of archaic accounts are instructive about the accounting procedures at the dawn of literacy. In the first place there appears to have been a close connection between the graphic system employed to record calendrical units and that used to quantify measures of grain. In both cases the unit 'month' played a central role. Only those calendrical notations representing one or more months employed the standard forms of the sexagesimal system, with the sexagesimal unit representing the discrete unit 'one.' Notations for days and years alike employed derivative numerical signs (N_8 and N_{57} , respectively). At the same time the capacity system centres on this same unit sign N_1 , yet with diverging relationships between this and other signs in the system.

In particular the signs representing lower values in the system are arranged in a sequence that successively divides the basic unit into 'fifth' (N_{42}), and further on down to the sign N_{30a} , which represents a measure of grain 1/30th the size of the basic unit.























































(a)	(b)	
 N_{14} (=6x N_1)  ZATU659+1 N_{14} ?  $3N_1$  NINDA ₂ +1 N_8 ?  $2N_1$  NINDA ₂ +2 N_1 ?  NINDA ₂ +1 N_1 ?  N_1  NINDA ₂ +ZATU659+1 N_1 ?  ZATU659+1 N_1 ?  N_{39b} (=1/5 N_1)  GARGunū _a  N_{39a} (=1/5 N_1)  ZATU625  N_{24} (=1/2 N_{39})  GAR  U_4 ?	 SIG _{2a2}  N_{26} (=1/3 N_{39})  DU _{8c} ?  U_4  GAR  GAR+3-6 N_{57}  N_{28} (=1/4 N_{39})  GARGunū _a  ZATU726 _c  ZATU726 _d  GUG _{2a}  ZATU727  GAR  ZATU726 _c  ZATU726 _d  ZATU727  N_{29a} (=1/5 N_{39})  SILA _{3b} +GUG _{2a}  SIG _{2a2} ?  N_{29b} (=1/5 N_{39} ?)  GAR	 N_{30a} (=1/6 N_{39})  GAR  GAR+3-6 N_{57}  LAGAB _a +ŠA  ŠAGunū  ŠA  ŠA+Hlgunū _a  1/8 N_{39} (sign not attested)  LAGAB _a +ŠA  GUG _{2a}  N_{30c} (=1/10 N_{39})  DU _{8c}  DU _{8c} gunū  LAGAB _a +ŠA  1/20 N_{39} (sign not attested)  ŠA ?

FIGURE 2.7 Equivalencies in grain accounts. The table lists, in order from largest to smallest attested values, the grain equivalencies of products found in the proto-cuneiform record, together with their respective ideographic correspondences (ideographic correspondence of the same numerical signs is not included). (Drawing by Robert K. Englund)

It cannot be a coincidence that this sign so regularly corresponds in the archaic accounts to the ideogram GAR. This latter sign is the pictographic representation of the bevelled-rim bowl, a clay bowl with a capacity equal to a standardized daily ration in Mesopotamia. It therefore seems reasonable to assume that the numerical sign N_1 represents one month-ration for one labourer in the archaic period.

In the second place we find in the archaic accounts good evidence for the quantification of household-dependent labour entirely compatible with later tradition. The Jemdet Nasr accounts MSVO 1: 212–214 belong together in a relationship of secondary and

primary documents and represent an accounting transfer without any gaps (cf. Englund 2004: 40 n. 23).

It should be noted that the ideographic qualifications of those persons recorded by name in the individual entries of MSVO 1, 212–214—namely, with the sign combinations SAL+KUR and SAG+MA, and with ERIN₂—are designations of dependent labourers, probably slaves taken as plunder in violent actions against Babylonian neighbours. The twenty-seven individuals so qualified do not constitute a large number of slaves, but other accounts are suggestive of larger groups, for instance W 9827 with a minimum of 211 such individuals (Englund 1994: pl. 118; 2010: 78–79).

ACCOUNTING FOR LABOUR

The method of bookkeeping employed by archaic scribes to record groups of labourers is not particularly complex. We have approximately fifty recognizable accounts of this sort with numbers qualified by sign combinations that represent ‘labourer’ and including sign combinations evidently representing personal names. These persons are also qualified according to gender and age. For instance, the text W 23999,1 (Cavigneaux 1991: 74) in Figure 2.8 distinguishes subgroups of five female and three male humans, these subgroups in each case further divided according to age, whereby presumable infants are qualified with sign combinations that might be translated as ‘womb-suckling’. It is noteworthy that precisely the same accounting format is employed in the records of animals. Here, too, pigs are separated according to age and, in the case of small and large cattle, animals are divided according to sex. The gender qualifications for the young of these animals are represented by SAL and KUR, the same signs that generally describe men and women. Furthermore, as A. Vaiman (1991: 121–133) has shown, Uruk accounts record young animals and young ‘slaves’ with the same derived numerical sign N₈ (Figure 2.9), which generally qualifies a half (in some limited applications one-tenth) of some unit counted in the sexagesimal and bisexagesimal systems. This may derive from an apportioning of rations to children of productive age of approximately half that of adults, as was administrative labour practice in later periods.

Labour and slavery

We cannot be certain that the taxonomic differentiation in archaic Babylonia between higher-status humans on the one hand, and lower-status humans and animals on the other, is a meaningful one. Still, it might be of interest to compare Babylonian with archaic Persian data. The sadly neglected field of proto-Elamite studies has demonstrated the use of the same numero-metrological systems as those known in archaic Babylonia, with the addition of a purely decimal system. As far as we can tell, the sexagesimal system qualifies discrete goods in the same field of application as that of Babylonia, except that some objects were qualified specifically with the decimal system. This

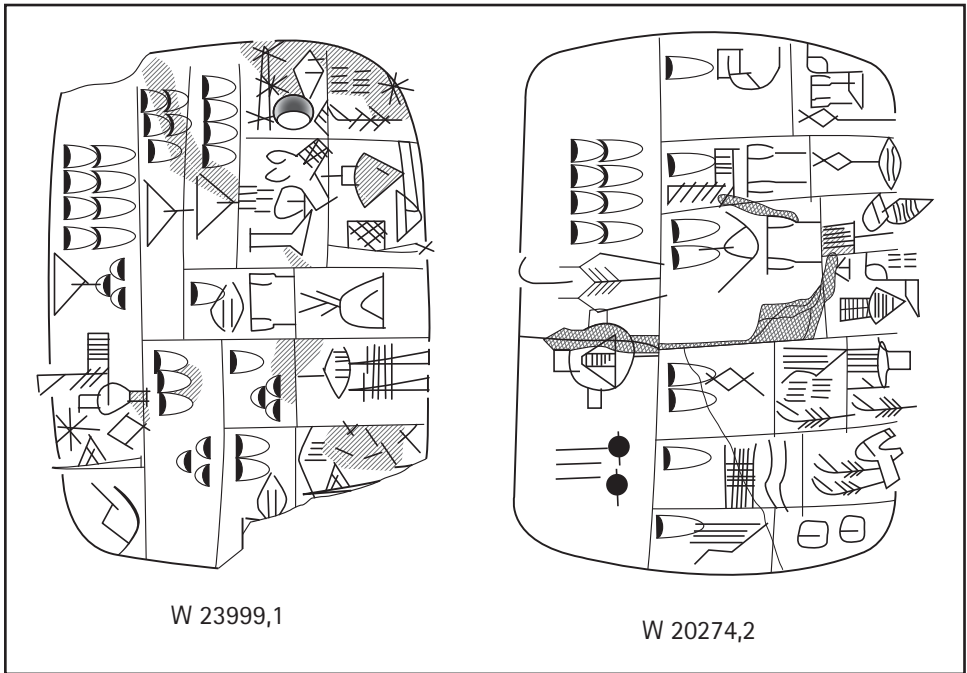
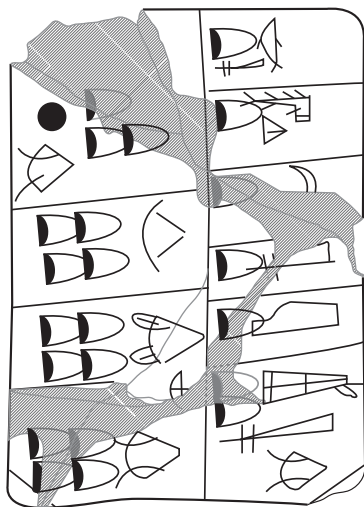
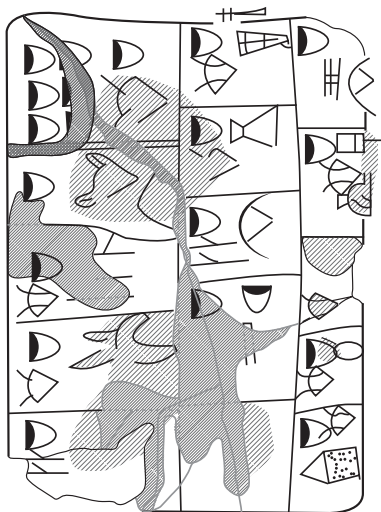


FIGURE 2.8 Accounts of domestic 'herds' of slaves (W 23999,1 and W 20774,2). Formal accounting practices suggest that these two accounts from Uruk in the Uruk III period record the make-up of two eight-member 'herds' of human labourers. (Drawing by Robert K. Englund)

decimal system, employing signs borrowed from the bisexagesimal system, qualifies what apparently are domestic animals, but also what we believe are lower-status humans. It appears that high-status humans—foremen and high officials—were, as all humans in Babylonia, qualified sexagesimally. If, as we suspect, these unusual numerical systems were introduced into Persia during the period of the Uruk expansion, then we can speculate that the inclusion of high-status humans in the Babylonian sexagesimal system represents a vestige of a two-tiered taxonomy of living beings practised in Babylonia, including domestic labourers with domestic animals. The concept of *homo sapiens sapiens*, seen relatively in different populations even today, must have been a much more fluid concept in prehistoric times.

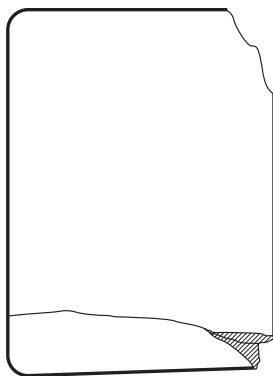
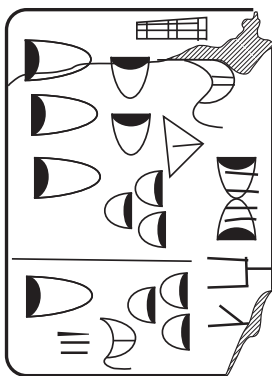
Can we call the proposed taxonomy of the Late Uruk 'slave' = 'animal' an ideological perspective? It may be that we are looking at the enslavement and exploitation of foreign populations, reflecting a deep element of the earliest native Babylonian population. But it may also reflect a developing class-consciousness. Guillermo Algaze (2001: 211–213, 215–228, 415–418), arguing that this primitive categorization represents 'a new paradigm of the nature of social relationships in human societies', has stated that the identification of humans with domestic animals is even a *necessary stage* in the formation of early states. Certainly, when we speak of 'work force', 'farm hands', or 'factory hands',

(a)



W 9656,ex

(b)



W 9655,t

FIGURE 2.9 Numerical qualification of young animals and humans. Texts of the Uruk IV period record numbers of cattle (a) and humans (b), in both cases including the numerical sign N_8 designating young animals. (Drawing by Robert K. Englund)

we abstract labourers little less than Babylonian scribes, who recorded pigs and labourers in similar fashion, both serving the community of man. Our archaic accountants may have forgotten how close they were to membership in the same fraternity.¹

FURTHER READING

Nissen, Damerow, and Englund (1993) is a well-illustrated introduction to the early development of cuneiform, with a special focus on Late Uruk documents (c. 3500–3000 BC) while Englund (1998) offers a concise survey of these texts and their historical context. For the roughly contemporary, so-called Proto-Elamite texts from Iran, see Damerow and Englund (1989).

Specific aspects of accounting conventions and practices, and their social context, are analysed by Englund (1988, labour management; 2001, grain accounting; and 2010, slavery). For a study of proto-cuneiform texts that stresses the revolutionary impact of the ‘invention of writing’ see Glassner (2003; but cf. Englund 2005). Nissen (1993) is an attempt to reconstruct Mesopotamian society on the basis of archaeological and textual remains from the mid-fourth to the mid-third millennium BC, while Visicato (2000) traces the role of professional scribes during the same period.

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¹ This chapter is a lightly edited and updated version of Englund (2004). We are grateful to the series editor, Michael Hudson, and the publisher, Mark Cohen, for permission to reproduce it here.

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CHAPTER 3

NUMERACY AND METROLOGY

GRÉGORY CHAMBON

SINCE the first decipherments of cuneiform in the 19th century AD, scholars have been interested in the reconstruction of ancient Near Eastern numerical and metrological systems. The aim above all has been to approach ancient political and economical reality by quantifying and estimating, among other things, the dimensions of urban centres, the amounts of rations delivered to palaces, or war booty. It is usually assumed today that numerical and metrological data directly reflect the concrete world, which scribes tried to describe, quantify, and organize. And indeed, the reconstruction of the arithmetical relationships between the units of measure—capacity, length, area, weight—led to an important synthesis, which still represents a key reference work in ancient Near Eastern research (Powell 1987–90).

On the other hand, historians of mathematics, since the great decipherments of the 1930s and '40s (Neugebauer 1935–7; Thureau-Dangin 1938; Neugebauer and Sachs 1945) have focused their attention on the evidence for metrology and mathematics in scribal schooling. But for many decades they focused almost exclusively on the internal analysis of mathematics, barely exploring the social and intellectual activities which enabled its development, transformation, and diffusion (for this problem, see Robson 2007a).

These two different ways of approaching the numerical and metrological systems, together with a widespread assumption that information that looks 'mathematical' is not overly productive for historians, led to the academic fields of ancient Near Eastern studies and the history of mathematics pursuing very different topics and methods from each other for much of the 20th century (Høyrup 1996).

A new interdisciplinary picture has developed over the last few decades, from the perspective of the social and cultural history of Mesopotamia. Concerning numeracy, the social and intellectual activities of professional scribes are now investigated in order to give equal weight to numeracy and literacy (Robson 2008). Concerning metrology, important philological analyses of the use of different weight standards in pre-monetary societies (e.g. Parise 1989; Zaccagnini 1986) have led to new trends in careful