Transliteration Guide

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# Introduction

## Version History

|  |  |  |  |
| --- | --- | --- | --- |
| Author(s) | Version | Changes | Date |
| Balogh, Griffiths | 0.1 | First draft | 2019-07 |
| Balogh, Griffiths | 1 | Expansion and revision for first release | 2019-09 |
| Balogh | 2 (1.1)[[1]](#footnote-1) | Revision | 2019-12 |
| Balogh, Griffiths | 3 | Revision and expansion | 2020-07-05 |
| Balogh, with Griffiths | 4 | Thorough revision | ####-##-## |

This is the final version of the DHARMA Transliteration Guide. Specific changes to the transliteration scheme since the last release (version 3) are few and minor, but the structure and conceptual background have been thoroughly revised. For these reasons, a list of specific changes since the last release is not included here.

but if shorthand is made fully private, that will need to be noted here

## Coverage

This Guide is essentially intended to cover the scripts relevant to the languages with which the DHARMA project is concerned, i.e., in alphabetical order (omitting the adjective “Old” relevant in several cases): Balinese, Cam, Javanese, Kannada, Khmer, Malay, Prakrit, Sanskrit, Sundanese, Tamil, Telugu. However, the recommendations we give here are certainly intended to be compatible with and extensible to other languages and scripts as and when needed for future projects.

The contents of this Guide are primarily applicable to digital editions of the text of inscriptions and manuscripts for preservation, dissemination and computer-aided research. Digital editions must follow these instructions rigorously. We do, however, hope (and, to some degree, expect) that project members will use the same transliteration method, as far as applicable, in their print publications and other work, and that the solutions recommended here gain currency beyond the scope of the DHARMA project. Section 1.6.3 gives some further pointers on what features of the transliteration system can be ignored outside diplomatic editions. We further encourage all project participants to include a reference to the current release version of the Guide (on HAL-SHS) in their publications, in order to make clear that the conventions DHARMA proposes are a published standard, and to disseminate awareness of this standard.

## Abbreviations

In addition to common abbreviations, this Guide uses:

TG for the DHARMA Transliteration Guide (the present document)

EGD for the DHARMA Encoding Guide for Documentary Editions (version 1.0)[[2]](#footnote-2)

## Brackets for linguistic notation

The concepts indicated by these brackets are introduced in §2.1.

/a/, /ɑː/ **slashes** indicate phonemic entities

[ɑː], [ɐ] **square brackets** indicate phonetic entities

<a>, <k> **angle brackets** indicate graphemic entities

|र|, |a| **vertical bars** indicate graphetic entities

## Terms and definitions

The following is a list of cursory definitions of script-related terminology, located here for quick reference. Concepts which are vital for working with this guide are underlined in the list. It is strongly recommended that you read the more detailed discussion of grapholinguistic terminology in §2 before reading the contents of this section.

* script and writing (§2.2)
  + **writing** is the graphic representation of language
  + a **script** is an inventory of graphic signs which can be used conventionally for writing
  + a **writing system** is a system of rules governing how certain aspects of a particular language can be recorded by means of a particular script
* typology of writing systems (§2.2.1)
  + a **phonographic** writing system is one which predominantly records language by representing archetypal speech sounds
  + an **alphabetic** writing system is a phonographic system which represents every archetypal speech sound by a visually independent graphic sign
  + an **aksharic** writing system is a phonographic system where the graphic signs representing archetypal speech sounds are often visually dependent on primary signs, so that only their combinations are visually independent; and where primary consonant signs by default also indicate an ‘inherent’ vowel
* in conversion between writing systems (§2.2.2),
  + **transliteration** is the use of a target writing system to represent how something is written in a source writing system, so that target graphemes correspond to source graphemes
  + **transcription** is the use of a target writing system to represent how something sounds in a source language, so that target graphemes correspond to source phonemes or phones
  + **Romanisation** is transliteration or transcription with Roman as a target writing system
* **graphemes** (§2.3) are a finite set of signs comprised of a signifier that is a graphic feature and a signified that is a minimal unit of abstract linguistic information pertinent to analytic interest
  + **graphemics** (or graphematics) is the study of graphemes
* **graphs** (§2.4.2) are an infinite set of the concrete graphic instantiations of individual graphemes, such as |A|, |A|, |अ|, |अ|
  + **graphetics** is the study of graphs
* **allographs** (§2.5.1) are graphs which instantiate the same grapheme
  + **graphetic allographs** are allographs which do not signify any linguistic information other than that contained in the grapheme, such as Devanagari |अ|, |अ| and |अ|
  + **graphotactic allographs** are allographs of which only one is permitted in a given graphemic context, such as the graphs corresponding to <r> in Devanagari |र्क| and |क्र|
  + **graphemic allographs** are allographs which potentially signify linguistic information in addition to, and at a different level than, that inherent in the grapheme, such as Devanagari |उ| | versus |ु|
* **homographs** (§2.5.2) are identical or nearly identical graphs which instantiate different graphemes
* **polygraphs** (§2.5.3) are groups of two or more graphemes that together conventionally indicate a particular phoneme
* a **character** (§2.4.1)is the minimal graphetically autonomous unit of a writing system, for example, <A>, <T>, <t·>, <ka> and <rtsnyai> are characters of the Indic writing system
* characters may be comprised of one or more graphemes (§2.4.3)
  + a (graphemically) **simplex character** is a character comprised of a single grapheme, such as such as Indic <A> and <T>
  + a (graphemically) **complex character** is a character comprised of two or more graphemes, such as Indic <t·>, <ka> and <rtsnyai>
* a **glyph** (§2.4.2) is the concrete manifestation of a character, for example, |अ|, |त्|, |क| and |र्त्स्न्यै| are glyphs of the Devanagari script
* glyphs may be comprised of one or more graphs (§2.4.3)
  + a (graphetically) **simplex glyph** is a glyph comprised of a single graph, such as such as Devanagari |अ| and Bengali |ৎ| as well as Devanagari |त|
  + a (graphetically) **complex glyph** is a glyph comprised of two or more graphs, such as Devanagari |ते| and |क्ल|
  + a **conjunct** or **ligature** in an aksharic writing system is a particular kind of complex glyph involving two or more consonant graphs
* terminology for the constituent parts of glyphs
  + a **component** (§2.4.3.1) is a discernible graph in a complex glyph, such as the graphs |t| and |e| in |ते|
  + a **marker** (§2.4.3.2) is a graph which can only manifest as a component, and never as an independent glyph, such as the |e| in |ते|
  + a (graphic) **element** (§2.4.4) is any salient part of a graph or glyph that is not itself a graph
    - a **stroke** is a graphic element which may be conceived of as a single stroke of the writing instrument
    - a **diacritical mark** (§2.4.4.1) is for our purposes nothing more than a kind of element which can be added to a graph and thereby change the grapheme associated with that graph
* terminology for graphic signs signifying various kinds of information (§2.3.4)
  + an **alphabetic sign** is one that represents speech sounds in any phonographic writing system
  + a **numeral sign** or cipher is one that denotes a number
  + a **non-alphanumeric sign** is a graphic sign that is neither alphabetic nor numeric

## Working with Unicode

All text documents in the project, transliterated or otherwise, must conform to Unicode. Today, Unicode is the universal default code table for characters, so this requires no special effort. Never use a custom or legacy character encoding, as it will turn into gobbledygook whenever someone attempts to display it in a different font. For disambiguation, we often specify Unicode codepoints in the format U+####, where #### stands for a four-digit hexadecimal code.

### Fonts and supported characters

It is up to you to choose your preferred font for working in a word processor or XML editor, so long as it is Unicode-compliant. Some of the widely current fonts lack support for many of the special characters employed in our transliteration scheme, while others nominally support these characters, but render them awkwardly. When choosing a font, it is advisable to test it for some of the rarer characters relevant to the language you work with (r̥̄, m̐ and ḫ are good candidates).

Some publishers require using a specific font, which may or may not support all the special characters you require. If persuasion does not work, feel free to make any necessary compromises and substitute more widely supported characters for the problematic ones, i.e. to use public transliteration shorthand (§3.6.6.2).

Of the fonts shipped with current versions of Windows and Mac OS, Times New Roman, Tahoma, Arial and Calibri are fair choices, but we preferentially recommend one of the following free fonts:

* Gentium by SIL, <https://software.sil.org/gentium/> (in which the body text of this Guide is typeset)
* Noto Serif and Noto Sans by Google, <https://www.google.com/get/noto/>

### Entering Unicode characters

You probably already have a favourite keyboard layout to access the special characters you need in your work, but some of the characters used in DHARMA transliteration may not be covered. Detailed technical instructions on designing, installing and using keyboard layouts or assigning shortcut keys are beyond the scope of this guide, so we can only offer the following tips.

* for out-of-the-box solutions,
  + on a Mac, try the layouts Easy Unicode or ABC Extended (formerly US Extended)
  + on Windows, there is no suitable keyboard shipped with the system, but you may be able to use and/or adapt John Smith’s keyboard layout and Word macros, available at <http://bombay.indology.info/software/fonts/induni/index.html>
* to create your own keyboard for Windows, use the Microsoft Keyboard Layout Creator, <https://www.microsoft.com/en-us/download/details.aspx?id=102134>

If you can access most of the characters you need via your keyboard, but there are a few that you need occasionally and cannot access, one of the following solutions may help:

* assign a shortcut key or sequence to the inaccessible characters in your editing software
* insert them from a table of available characters
  + in MS Office, use Insert Symbol
  + on Mac OS (systemwide), use the Character Table
* copy and paste the inaccessible characters from this guide (or from a file you keep at your fingertips, listing each of those characters) each time you need one of them
* use Unicode codes to enter special characters
  + in MS Office you can type the code, then press ALT + x to convert the code into the corresponding character
    - you can enter the code with or without the prefix U+, but using it will make certain the software recognises where the code begins, so the last characters you typed before the code will not interfere with what you want to produce
  + on Mac OS (systemwide), you need to enable Unicode Hex Input in Language Preferences
    - once you have done this, whenever you switch to this keyboard layout, you can press and hold Option while you type the character code (without the prefix U+) then release Option
* if all else fails, use private transliteration shorthand (§3.6.6.1)

### Precomposed characters

Unicode caters for Roman letters with diacritical marks in two separate ways. On the one hand, many diacritical characters — such as ü, ā or ṭ — are available in precomposed form, which means that the letter-plus-diacritic is a single Unicode character.[[3]](#footnote-3) On the other hand, diacritical marks — such as ◌̈, ◌̄ or ◌̣ — themselves are available as special combining characters which, when entered after a suitable base character, will be combined with it to render as the base character with the diacritical mark. For example, the character ā may be produced either by entering a (U+0061 Latin Small Letter A) followed by ◌̄ (U+0304 Combining Macron), or by entering ā (U+0101 Latin Small Letter A With Macron). Processing software is generally able to treat the two as equivalent (so, for instance, searching for one will find the other as well), but this cannot be guaranteed in all situations. For this reason we urge you to **always use precomposed characters** whenever they are available, and resort to combining diacritics only when the Unicode codetable does not include a precomposed form. The most common character in our practice for which no precomposed form is available is r̥; others will be noted in the body of the Guide where applicable.

The current version of Oxygen (our preferred XML editor) handles combining diacritics as separate. As a result, when you wish to delete a combined character or to select it in order to place markup around it, you will need two keypresses instead of one, otherwise stray undercircles may be left in unwanted places.

# Theoretical framework

Throughout this Guide, the word *graphic* is used in a technical sense meaning ‘related to writing.’ The study of written language will be called *grapholinguistics* (Meletis 2020a, 3). Like many areas of linguistics, grapholinguistics has been approached by theoreticians in various ways, and many of the relevant technical terms refer to (sometimes radically) different concepts depending on approach. Many of its scholars have worked primarily with alphabetic writing, enabling them to ignore features of other writing systems that cannot be readily explained in their terms. We in turn are concerned specifically with the transliteration of Indic writing systems to a Roman one, and are, for pragmatic reasons, at ease to ignore subtle and complicated aspects of written language that are not directly relevant to this. Nonetheless, we must define certain concepts with sufficient accuracy in order to be able to discuss the elements of writing productively and unambiguously. The following discussion, which we recommend you read through at least once, situates the concepts relevant to us in a rough theoretical framework. For future reference, the list of quick-and-dirty definitions §1.5 shall suffice.

## Some basic concepts

A distinction between so-called **etic** and **emic** aspects (e.g. Nöth 1990, 300) has been fruitful in several subfields of linguistics and will be important for our discussion of grapholinguistics. The former term concerns variable concrete realisations, while the latter pertains to invariant abstractions on the basis of shared function.[[4]](#footnote-4) Since our readers will be already familiar with the basic concepts of phonology, we begin by summarising some of these as useful analogies to several grapholinguistic concepts.

The concrete speech sounds constituting spoken language come in a practically infinite continuum. These etic sounds are referred to as **phones**. The study of their characteristics is called **phonetics**. According to widespread convention, we use square brackets to represent phones in written discussion, e.g. [ɐ].[[5]](#footnote-5) The phones of any language can be sorted into a limited number of emic entities termed **phonemes**, on the basis of shared linguistic function.[[6]](#footnote-6) The study of phonemes is called **phonemics**.[[7]](#footnote-7) To represent phonemes in written discussion, we enclose them in slashes, e.g. /a/.[[8]](#footnote-8) The diverse phones which may manifest a given phoneme are known as **allophones**. **Homophony** is the situation where two linguistic units (e.g. words) are identical with regard to speech sounds, yet have different meanings. **Phonotactics** is (the study of) the rules governing how phonemes and phones may combine into sequences in a particular language.

In grapholinguistics, the etic **graphs** are infinitely variable graphic signs that can be used for the representation of linguistic information. The study of graphs is called **graphetics**. In written discussion, graphs are enclosed in vertical bars, e.g. |a|.[[9]](#footnote-9) Their emic counterparts, **graphemes**, are a limited number of discrete abstract entities systematised on the basis of their shared function in representing language.[[10]](#footnote-10) The field of their study is **graphemics**.[[11]](#footnote-11) In discussion, we enclose graphemes in angle brackets, e.g. <a>.[[12]](#footnote-12) Diverse graphic signs which signify the same linguistic information are known as **allographs**. **Homography** is the situation where two graphic entities are visually identical, but have different significations. **Graphotactics** is (the study of) the rules governing how graphemes and graphs may combine into sequences[[13]](#footnote-13) in a particular language.

Thus, the Sanskrit phoneme /a/ may be instantiated phonetically by several allophones such as [a], [ɐ] or [ə]. This phoneme corresponds to the grapheme <a> in Indic writing systems. In the particular writing system that associates modern Devanagari with Sanskrit, this grapheme can be instantiated graphetically by several allographs such as |अ| or |अ|. In the DHARMA transliteration scheme, which is in fact another particular writing system that associates Indic languages with the Roman script, the same grapheme can be instantiated by allographs such as |a|, |A|, |*a*| or |a|.

This basic sketch might be all we needed if we worked only with ideal alphabetic writing systems where each and every phoneme of the language exactly corresponds to one grapheme of the writing system and vice versa. This, alas, is not the case, so several of the concepts outlined above, and in particular that of the grapheme, will require elaboration further on. It is important to keep in mind that entities such as the grapheme and the graph are analytical constructs we employ in order to systematise, and thereby inevitably simplify, a complex and often chaotic reality where smooth spectra are more typical than sharp distinctions. Therefore, in spite of our best efforts to carve nature at its joints, many of our concepts will have fuzzy boundaries (§2.5.4), and some of the phenomena we must deal with in transliterating Indic writing systems will fit our classification poorly.

## Scripts and writing systems

We start out from the premise that **writing** is *glottography*, the graphic representation of language.[[14]](#footnote-14) The representation of meaning as independent from language (called *semasiography*)[[15]](#footnote-15) is thus excluded by default, although we must eventually take it in our stride to some extent (§2.3.4). A **script** is an inventory of graphic signs used conventionally for the representation of linguistic information.[[16]](#footnote-16) A **writing system** is a set of rules governing how certain aspects of a particular language can be recorded by means of a particular script.[[17]](#footnote-17) It follows from this that scripts are in themselves independent of language, and a language may be associated with several writing systems, or none. The concept of a writing system, on the other hand, presupposes both a particular language and a particular script.[[18]](#footnote-18)

We hasten to add that the word “particular” in this statement may be understood at different points on a scale of concreteness. Indeed, to speak in terms like “the system for writing English in the Roman script,” as current grapholinguistic theorists often do, is already a generalisation relative to more specific systems.[[19]](#footnote-19) Accordingly, we also endorse sweeping generalisations such as **Indic script** for all of the Brāhmī-derived scripts and **Roman script** for all of the scripts derived from that of ancient Rome,[[20]](#footnote-20) and likewise **Indic writing system** and **Roman writing system** understood as the generic set of rules for employing variants of these scripts for any language with which they have been associated historically. In spite of individual differences at lower points of the scale, these rules in the broad sense still share a common systemic framework and prototypical building blocks.

### Writing system typology

Writing systems may be divided into major classes depending on the level of language at which they typically establish correspondences between graphic signs and linguistic information.[[21]](#footnote-21) We shall refer to this as the *dominant level of representational mapping* (Meletis and Dürscheid 2022, 212, 216). The writing systems we are concerned with here are **phonographic** or ‘sound-writing.’ Phonographic writing systems may be further classified as alphabetic, aksharic, abjadic or syllabographic. An **alphabetic** writing system — such as the Roman one — ideally matches each and every phoneme of the language to exactly one freely combinable graphic sign of the script. An **aksharic**[[22]](#footnote-22) system — such as the Indic one — is distinguished from alphabetic systems by the fact that it involves visual segmentation into chunks we shall refer to as characters (§2.4.1), each of which typically consists of a primary sign and zero or more dependent signs. The latter prominently include signs for postconsonantal vowels and secondary forms of consonant signs for use in consonant clusters. Regular characters based on a primary consonantal sign imply an inherent vowel which has no overt graphic representation.[[23]](#footnote-23) Other kinds of phonographic writing systems are only relevant to us inasmuch as they serve as useful contrasts to some aspects of aksharic systems. In a nutshell, the key feature of **abjadic** systems — as the Arabic one — is that not all of the relevant language’s phonemes are represented in writing: typically only the consonants are written.

The dominant level of representational mapping for each of the above kinds is that of phonemes. Conversely, **syllabographic** systems — like the Japanese kana systems — are also phonographic, but they employ signs that represent clusters of speech sounds (“syllables”[[24]](#footnote-24)). What distinguishes these from abjads and abugidas, which also operate with signs that correspond to “syllables,” is that syllabographic signs cannot be broken down into graphic components that individually represent individual phonemes. Finally, non-phonographic writing systems predominantly represent language at the level of words or concepts and may accordingly be called *logographic* or *ideographic*.[[25]](#footnote-25)

### Conversion between writing systems

For the conversion of one writing system to another, the terms ‘transliteration’ and ‘transcription’ are sometimes used interchangeably. Moreover, ‘transcription’ is widely prevalent in epigraphic and manuscript studies for the process of re-recording (using any writing system) the written text witnessed on an artefact. Notably, this usage is present throughout TEI and EpiDoc documentation. In a more general sense, the term is also used in many contexts for that of writing down a text witnessed in a different medium, primarily audio. In this guide, however, we use and encourage using these terms in specialised sense.[[26]](#footnote-26) **Transcription** in this technical sense means using a target writing system — often but not necessarily an artificial one intended to record speech sounds unequivocally — to represent how a (written or other) text *sounds*. **Transliteration**, in turn, is the use of a target writing system to represent how a text *is written* in a dissimilar source writing system. The modern Indic name written in Devanagari as बलदेव may be transcribed (in loose Anglicisation) as Baldev or even Buldeo and (in IPA) as [bɐldeːɔ], and it may be transliterated (in the DHARMA standard) as baladeva. The term **Romanisation** can refer to either transcription or transliteration where the target writing system is (a variety of) the Roman system.

In a nutshell, transcription is essentially concerned with the phones or phonemes of a spoken language, without regard to how they might be written in a source script; conversely, transliteration is essentially concerned with the graphemes of a written language, without regard to pronunciation (Wellisch 1978, 18). That said, transliteration systems in actual practice include a number of transcription-like features, at least for the sake of pronounceability and ease of acquisition.[[27]](#footnote-27) Also, “there is no single ‘scientific’ system whose principles can be applied uniformly to all scripts and for all purposes … Rather, there is a plurality of more or less justified but mutually incompatible requirements … so that a choice must be made among those requirements that are optimally needed to make the system work for a particular purpose or task” (1978, 314; emphasis original).

Our purpose in transliterating original texts is to facilitate their reading, editing and computer processing, and to do so in such a way that it remains theoretically possible (informed by thorough knowledge of the specific writing system and script employed in the original) to produce a reasonably accurate reconstruction of the original from the transliteration. Obviously, transliteration cannot possibly aim to represent each and every graphic detail of the source. What, then, counts as reasonably accurate? According to Wellisch (1978, 322), a transliteration system for philological and epigraphic purposes should strive toward “a one-to-one relationship between each grapheme in a target script and a corresponding […] grapheme in the source script” in order to be fully reversible. Unfortunately, Wellisch does not tell us what a grapheme is, so with this, we come to muddier waters, and we will have to take a closer look at grapholinguistics.

## The grapheme

The broader grapholinguistic literature is replete with mutually incompatible, indeed often contradictory, grapheme definitions[[28]](#footnote-28) to the extent that some leading theorists question the usefulness of this concept altogether.[[29]](#footnote-29) Our own working definition is as follows: **a grapheme** is a sign comprised of a signifier that is a graphic feature and a signified that is a minimal unit of abstract linguistic information pertaining to a particular domain of analytic interest. We find this grapholinguistically tenable,[[30]](#footnote-30) practicable for our purposes, and in harmony with Wellisch’s approach to writing and transliteration. We elaborate this definition below, and look at its consequences in the following subsections.

Graphemes are **analogous** to phonemes inasmuch as they are abstractions of graphic signs, while phonemes are abstractions of speech sounds. However, we do not extend this analogy to the degree of requiring graphemes to be capable of distinguishing semantic meaning.[[31]](#footnote-31)

Graphemes, being entities of a writing system, straddle the gap between the disparate domains of language and script. In this respect they are **referential**, establishing a connection from writing to language. We, broadly in agreement with numerous theorists,[[32]](#footnote-32) conceive of the grapheme as a sign[[33]](#footnote-33) comprised of a linguistic aspect as its signified and a graphic aspect as its signifier.

The **graphic aspect** of graphemes may be any graphic feature that unequivocally signifies a certain item of linguistic information by the conventions of the writing system in question, without requiring interaction with components of the language system, such as the lexicon. As a consequence, we do **not** require the graphic manifestation of a grapheme to be **segmental** (isolable in the linear flow of the script) or **autonomous** (independently combinable).[[34]](#footnote-34) Nor do we require the graphic aspect of a grapheme to be an overt, visually **isolable** graphic sign,[[35]](#footnote-35) meaning that holistic features such as the manner in which graphetic constituents are arranged can also correspond to graphemes if they signify linguistic information without needing input from the language system. Defining the graphic aspect acceptable for a grapheme in this manner is in our opinion necessary in order to be able to deal satisfactorily with some peculiarities of aksharic writing, which will be addressed in more detail in §2.3.1 and §2.3.2 below.

The **linguistic signification** of graphemes may belong to a broad range of linguistic domains, but we restrict this to a particular **domain of analytic interest**,[[36]](#footnote-36) which we discuss further in §2.3.3. Our current analytic interest is primarily in speech sounds, so the primary graphemes we deal with are those representing phonological units. However, what a grapheme signifies is in our view not an actual linguistic unit (such as a phoneme), but rather an **archetypal notion of a linguistic unit**. Grapheme-phoneme correspondence, i.e. the manner in which the archetypal phonemes inherent in a grapheme correspond to the actual phonemes of spoken language, is a complex process best kept separate from the study of graphemes themselves,[[37]](#footnote-37) that often involves contingency on other graphemic units in the context, as well as reciprocal interaction with higher levels of language processing (such as morphology and the lexicon). Even when correspondence is relatively straightforward, it may be under-specific[[38]](#footnote-38) or over-specific.[[39]](#footnote-39) When for the sake of brevity we speak of graphemes as signifying phonemes, we always mean archetypal phonemes, which may not correspond consistently to the spoken phonemes of the language being written.[[40]](#footnote-40) Finally, we require grapheme’s linguistic signification to be **minimal**,[[41]](#footnote-41) meaning that a grapheme cannot be subdivided into smaller units which themselves represent linguistic information in the same domain of analytic interest. What this entails is that there is no such thing as a complex grapheme, although graphemic units in different domains of analytic interest may be incorporated in or overlap one another.

### The akṣara is not a grapheme

Some discussions of writing systems and Indic palaeography refer to akṣaras as graphemes. However, akṣaras such as ke |के| and kta |क्त| fail to satisfy our minimality criterion: their constituents are genuine graphemes, since they signify the same kind of linguistic information as the corresponding independent signs (Meletis and Dürscheid 2022, 130), notwithstanding the fact that they are graphetically dependent on the primary forms. Denying grapheme status to such constituents would give rise to the awkward notion of the ‘sub-grapheme’ occasionally used for the parts of such akṣaras,[[42]](#footnote-42) while awarding grapheme status to akṣaras involving such constituents would obscure the pivotal difference between aksharic writing systems and syllabographic ones.[[43]](#footnote-43) We find it preferable instead to recognise that graphemes need **not** coincide with **autonomous graphetic segments**, although they normally do so in alphabetic systems and in some signs of aksharic systems. We shall refer to graphetic segments as characters (§2.4.1) in their emic aspect, and as glyphs (§2.4.2) in their etic instantiations.

### The inherent vowel of an akṣara is a grapheme

The inherent vowel of aksharic systems comprises a bona fide grapheme. This position is not normally taken in grapholinguistic circles,[[44]](#footnote-44) but it is a straightforward corollary of our grapheme definition. Linguistically, the inherent vowel is a unit belonging to our domain of analytic interest, while graphically, it is unequivocally signified by a graphic feature (namely an integral consonant-based akṣara that has no additional components which would negate that vowel or replace it with a different one), although it does not correspond to any visually isolable graphic sign. Denying grapheme status to the inherent vowel would also make it difficult to demarcate aksharic systems from other types of writing systems. On the one hand, doing so would force us to see akṣaras involving the inherent vowel as syllabographic graphemes. On the other hand, it would make us lose sight of a key difference between aksharic systems and abjads. A consonantal grapheme in an abjad can signify either the consonant alone or the consonant and an unspecified vowel, so whether a vowel is present (and if yes, then which vowel) can only be determined by referring to other modules of the language system (in particular, the lexicon). Conversely, in an aksharic system, the writing alone is sufficient for determining whether the default vowel is present or not.[[45]](#footnote-45)

### Domains of analytic interest

Script can represent many kinds of linguistic information. Meletis (e.g. 2019, 36; Meletis and Dürscheid 2022, 127), defines a ‘default grapheme’ as one that signifies a linguistic unit at the writing system’s dominant level of representational mapping, i.e. a phoneme in alphabetic, abugidic and aksharic systems, a syllable in syllabographic ones, and a morpheme in morphographic ones. Most writing systems, however, also incorporate conventional signs for other linguistic domains.

From the perspective of transliteration, we prefer to demarcate the linguistic signification of the grapheme in broader terms, as belonging to a domain of analytic interest. Our **primary analytic interest** is in phonological units, hence our primary graphemes coincide with Meletis’s default graphemes. However, lifting the restriction that graphemes must signify actual units allows us to grant grapheme status to other features in the domain of speech sound, such as the virāma (which suppresses a phonological unit, §2.4.5), graphemic allographs (which have additional linguistic signification beyond phonological units, §2.5.1.3) and some features of Indic writing systems that resist a clear classification (§2.5.4). It also provides a way to include other domains of analytic interest in our scope (§2.3.4).

### Supplementary graphemes

Texts written in any writing system can include graphic signs which signify information at a level other than the given system’s dominant level of representational mapping. The most common examples of such signs are punctuation marks, which primarily convey information about the syntactic, semantic and/or prosodic segmentation of the text. Word spacing, signifying morpehmic or syntactic boundaries, also falls in this category even though it normally involves no explicit graphic sign. There are also signs for abstract concepts: ciphers signify numbers, and certain signs signify miscellaneous concepts, such as the addition sign |+|, the percent sign |%| or currency signs like |$| and |€|. Some may pertain to language in an abstract way, like the avagraha of the Indic writing system or the apostrophe of the Roman one, which are often used for flagging elision. Others may be quite beyond the domain of glottography, such as “auspiciousness” presumably conveyed by many opening and closing symbols used in inscriptions, or “irony” conveyed by a winking smiley in a text message.

@need to mention abbreviation marks next to avagraha, and perhaps dedicate more space to them here or elsewhere; also connectors, hyphens?

Whether such signs are to be considered graphemes — and if yes, exactly how the grapheme ought to be defined to accommodate them — is a vexed question (cf. Meletis and Dürscheid 2022, 132–33). Meletis (2020a, 148; Meletis and Dürscheid 2022, 132) refers to them as non-default graphemes or grapheme-like entities, relegating them to a separate stage of analysis and treating them much less extensively. We feel that the best way to reconcile such signs with the framework presented above is to understand them as graphemes belonging to one or more supplementary writing systems, which are conceptually separate from (though generally associated with) the primary writing system used for a particular language-script pair, and which are not in themselves capable of representing any language in its entirety. But whatever their exact grapholinguistic status, all such signs need to be reflected somehow in transliteration, and to do so, we treat their signification as additional domains of analytic interest, supplementing the domain of speech sound.

It would, however, not be practicable to give full justice to the practically infinite variety of supplementary signs by transliterating each with a different target grapheme. We therefore classify written signs along the following lines.[[46]](#footnote-46) **Alphabetic signs** or alphabetic graphemes are the primary graphemes of a phonographic writing system, representing speech sounds. Thus, ‘alphabetic’ in this phrase does not necessarily imply an alphabetic writing system. Among non-alphabetic signs, **numeral signs** or **ciphers** are those that denote numbers. Alphabetic and numeral signs together are referred to as **alphanumeric signs**. Among non-alphanumeric signs, we distinguish the following categories. **Functional signs** @functional marks? are those that serve well-defined special graphemic functions, including punctuation marks as well as the avagraha. **Ideographic signs** @@@. We refer collectively to all other signs as **symbols**. Our transliteration scheme comes close to giving full justice to alphabetic signs, but becomes increasingly insensitive as we progress away from phonography. Some of the variety of non-phonographic signs may, however, be captured in the encoding of our digital editions.

### Other entities with a graphemic function

Although we have limited our working definition of the grapheme to entities involving a graphic feature, there are other features of writing that are both less concrete in terms of graphic features and less concretely pertinent to language, such as paragraph indentation, underlining, italicisation and so on. All of these, and more, are arguably graphemic functions, but such a profusion of multifarious and often overlapping graphemes would be all but impossible to systematise and certainly impossible to transliterate. In working with texts, we remain aware of these graphemic functions, but exclude them from the domain of interest for transliteration.[[47]](#footnote-47)

## Graphetic analysis

Having arrived at a concept of the grapheme that appears to be feasible in general and practicable for our purposes, we now proceed to investigate the status of salient graphic entities which are not graphemes by our definition. As illustrated in Figure 2.4.A, a glyph is a discrete and autonomous graphetic unit, whose graphemic counterpart we call a character. Glyphs may consist of one or more graphs, and characters may consist of one or more graphemes; in the latter case, we refer to the individual entities as components. On the purely graphetic level, each graph is made up of one or more graphic elements, which are in themselves “meaningless,” i.e. they do not have a graphemic counterpart.

The following subsections elaborate these concepts. Some of the terms and definitions we advance here may not be relevant to graphemics at large, but they are certainly useful for the analysis of aksharic writing. We therefore encourage you not only to read the definitions in order to understand the instructions of this Guide clearly, but also to use these terms — in the senses defined here — in your own philological and palaeographic discussions.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Figure .. Graphetic entities in the Devanagari glyph |klau| | | | | |
| graphemic comp. | | graphetic composition | | |
| grapheme | character | glyph |klau| | graph | element |
| <k> | <klau> |  | 1 |k| | A |
| B |
| C |
| D |
| <l> | 2 |l| | E |
| F |
| <au> | 3 |au| | G |
| H |
| I |
| J |

### Characters

We define a **character** as a minimal graphetically autonomous unit of a writing system, meaning that the character cannot be broken down into graphetically autonomous parts that, together, have the same graphemic signification as the character. In alphabetic writing systems, characters (as a rule) coincide with graphemes,[[48]](#footnote-48) but this is not necessarily so in other types of writing systems.[[49]](#footnote-49) In aksharic systems, some characters coincide with graphemes, as in the case of independent (typically initial) vowel signs such as Devanagari |अ| (which represents the character and grapheme <A>), and independent (typically final) consonant signs such as Bengali |ৎ| (representing <T>).[[50]](#footnote-50) In most cases, however, akṣaras are clusters of graphemes. Thus, in Figure 2.4.A above, <klau> is a single character in an Indic writing system, which consists of the graphemes <k>, <l> and <au>. Characters are emic units of a writing system in spite of being graphetically determined, and therefore we use angle brackets for representing them.

The term ‘character’ is widely used in a vague non-technical sense, and is rarely defined in a rigorous manner;[[51]](#footnote-51) instead, much of the grapholinguistic literature tends to deal with the character — as defined by us — under the blanket term ‘segment’. Importantly, a ‘character’ in information technology, specifically in the Unicode standard,[[52]](#footnote-52) is *not* what we define as a character.

### Graphs and glyphs

We have cursorily defined graphs in §2.1 above as the concrete graphic signs that can be used for the representation of linguistic information. More rigorously, we can now state that a **graph** is a graphic sign that corresponds to one grapheme. Having differentiated the grapheme from the character, we introduce the term **glyph** for the graphic manifestation of a character. Where the distinction between glyphs and graphs is irrelevant, we use the umbrella term **graphic sign**.[[53]](#footnote-53) Thus, in our terms, Devanagari |अ| and Roman |A| (corresponding to the character <A> in their respective writing systems) are simultaneously glyphs and graphs, while the Devanagari glyph |क्लौ| (corresponding to the character <klau>) in Figure 2.4.A is constituted of three graphs (|k|, |l| and |au|, which individually correspond to the graphemes <k>, <l> and <au>). As is the case with ‘character’, the term ‘glyph’ is rarely used in a technical sense and, when used, is rarely distinguished from ‘graph’.[[54]](#footnote-54)

As also noted in §2.1, we endorse referring to glyphs and graphs with the transliteration of the corresponding graphemes, especially when the visual appearance of the glyph or graph is irrelevant to the discussion or difficult to represent in Unicode. Thus, it is fully acceptable to use phrases such as “the graph |r| in the glyph |rddhe|.”

### Character and glyph complexity

**Characters** may be **simplex** when they consist of a single grapheme, and **complex** when they consist of more than one grapheme. Likewise, **glyphs** may be **simplex** when they consist of a single graph, and **complex** when they consist of more than one graph. Devanagari |अ| and Roman |A| are simplex graphs corresponding to simplex characters, while Devanagari |क्लौ| in Figure 2.4.A is a complex graph corresponding to the complex character <klau>.

A complex glyph is thus not quite the same as a **conjunct** or **ligature** in an aksharic writing system:[[55]](#footnote-55) a conjunct is always a complex glyph because it involves two or more consonant components, but a complex glyph is not necessarily a conjunct as it may consist of a consonant and a vowel component.

Graphemic and graphetic complexity do not fully overlap in an aksharic writing system, chiefly because the inherent vowel has no isolable graphetic counterpart (§2.3.2). In Figure 2.4.B, rows 1 and 2 show graphemically and graphetically simplex units of Roman and Devanagari script. Rows 3 and 4 show graphemically complex units of Devanagari, of which 3 is graphetically simplex, while 4 is graphetically complex. Row 5 shows a special case in Devanagari, with a graphetically simplex graphotactic allograph (§2.5.1.2) of a graphemically complex glyph where none of the three graphemes present in the character have an isolable graphetic counterpart.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Figure .. Character and glyph complexity | | | | | |
|  | grapheme | character | glyph | graph | comment |
| 1 | <A> | <A> | |A| | |A| | simplex character, simplex glyph |
| 2 | <A> | <A> | |अ| | |अ| | simplex character, simplex glyph |
| 3 | <k> | <ka> | |क| | |क| | complex character, simplex glyph  (vowel grapheme represented holistically) |
| <a> | — |
| 4 | <k> | <ku> | |कु| | |क| | complex character, complex glyph |
| <u> | |ु| | (vowel grapheme represented discretely) |
| 5 | <k> | <kṣa> | |क्ष| | — | graphetically simplex graphotactic allograph  for a graphemically complex glyph (vowel grapheme represented holistically) |
| <ṣ> | — |
| <a> | — |

#### Glyph components

We use the term **component** (or, for explicitness, **glyph component**) for a graph that is part of a graphetically complex glyph. Roman |A|, Devanagari |अ|=|a| and Devanagari |क|=|ka|, as well as |क्ष|=kṣa|, have no components because they are graphetically simplex, while Devanagari |क्लौ| consists of three components (1 |k|, 2 |l| and 3 |au|). In Devanagari |क्ल|=|kla|, only |k| and |l| are components, because <a> is represented holistically rather than by a visually isolable graph.

#### Markers

A **marker** is our name for a special set of components that can only appear in a graphetically dependent position, i.e. which can never manifest as autonomous glyphs. ‘Marker’ is not an established term in grapholinguistics,[[56]](#footnote-56) but is defined here in agreement with Ollett and Taylor (forthcoming). In actual usage we prefer to speak of consonantal “markers” simply as dependent consonants, and reserve the term ‘marker’ for other kinds of markers, primarily the dependent vowels.[[57]](#footnote-57)

### Graphic elements

Even graphetically simplex graphs may be quite complex shapes, for instance Devanagari |औ|=|Au| and Tamil |ொ|=|o|. Graphic complexity thus does not necessarily entail graphetic complexity. Palaeographic discussion nonetheless often needs to refer to parts of graphs, so we need a term for such parts that is distinct from ‘component,’ which is restricted to graphs (i.e. manifestations of graphemes) in a complex glyph. We therefore recommend the term **element** — or, for extra clarity, graphic element — for any visually discrete constituent parts of individual graphs, i.e. for salient shapes which are not themselves graphs. Elements can be distinctive features of graphs — as the horizontal strokes that distinguish Brāhmī |𑀓| <ka> from |𑀭| <ra> or Roman |E| from |F| — but they do not in themselves carry linguistic information.

Graphically simple graphs, such as Devanagari |े|=|e|, cannot be broken down into elements.[[58]](#footnote-58) When a graph is made up of several elements, these may be contiguous (as in Devanagari |ो|=|o|) or disjoined (as in Tamil |ொ|=|o|). Elements of graphs can sometimes look like individual graphs, as elaborated in §2.4.4.2 below.

A graphically complex element may itself be spoken of as consisting of multiple simpler elements. When discussing the parts that make up Devanagari |क्लौ| in Figure 2.4.A, it may, for instance, make sense to refer to the body of |k| (shown as elements B, C and D in the figure) as a single element. At the simplest level, we recommend the term **stroke** for elements which are uninterrupted lines and may be conceived of as a single stroke of the writing instrument. All the lettered elements in Figure 2.4.A are thus in fact strokes.

In referring to the details of a graph, chiefly in palaeographic description or a discussion of reading difficulties, we encourage you to use the terms ‘element’ and ‘stroke’ constructively. For pointing to particular graphic elements, also make use of intuitive biological and architectural analogues such as arm, leg, wing, tail, stem, lobe, arch, base, etc.

#### Diacritical marks

**Diacritical marks** (or, in short, diacritics) are, in our conceptual scheme, a special class of element which can combine with certain graphs to alter their graphemic signification. Most diacritical marks can be added to a range of graphs and often (though not always) alter the signification of those graphs in a somewhat consistent manner. For instance, in the DHARMA transliteration, the macron changes the unmarked short state of vowels to long, and the underdot changes the unmarked dental state of certain consonants to retroflex. Diacritical marks thus arguably have a graphemic function. However, what they signify is only a feature of a phonological unit, while the presence of that unit is already signified by a grapheme. Features of phonological units fall outside our domain of analytic interest, so from our perspective, a graph with a diacritical mark corresponds to a single grapheme, and is also graphetically simplex in spite of its graphic complexity.

As such, diacritical marks per se have no relevance to transliteration: like any distinctive element, they only matter inasmuch as they distinguish one graph from another.[[59]](#footnote-59) If a source grapheme is distinguished from another source grapheme by a diacritical mark, then the distinction itself must be preserved in transliteration, but it need not involve a diacritical mark, just as diacritical marks in the transliteration must indicate distinctions in the source, but not actual diacritical marks in the source.[[60]](#footnote-60) Conversely, we emphasise that the markers of the Indic writing system (as defined in §2.4.3.2 above) are *not* diacritical marks by our definition (even though secondary literature often refers to them as such), since they do represent graphemes at the same analytic level as the base signs. Other entities that may be perceived as diacritical marks will be discussed in §2.5.4.

#### Dual patterning

Some morphemes (i.e. semantically meaningful linguistic units) consist of a single phoneme (e.g. English “I” or “o!”), but the same phonemes (in themselves meaningless) can be constituents of other morphemes (e.g. “hi” or “go”). This feature of language is called dual patterning (Nöth 1990, 237), and it is also applicable to grapholinguistics, where it is a particular case of homography (§2.5.2). Most sign inventories utilise some recurring graphic shapes that can occur as (linguistically significant) graphs on their own, or as (linguistically insignificant) graphic elements in various combinations with other shapes. Importantly, even if such a shape can comprise a graph (i.e. manifest a grapheme) on its own (such as Devanagari |आ| <Ā>, |े| <e> or |ा| <ā>), that shape is still merely an element when it combines with other elements to constitute a different graph (such as Devanagari |ओ| <O> or |ो| <o>).[[61]](#footnote-61) In other words, Devanagari |ओ| is graphemically simplex in spite of its graphetic complexity. It is not a combination of the graphemes <Ā> and <e>, merely of elements which, incidentally, manifest those graphemes when they are not combined with other elements.[[62]](#footnote-62)

### Virāma: graph or diacritical mark?

The virāma, the “vowel killer” sign of aksharic writing systems, negates the inherent vowel of an akṣara, but does not signify any phonological unit, so it cannot be a grapheme at the writing system’s dominant level of representational mapping. Simultaneously, it cannot be dismissed as a mere diacritical mark,[[63]](#footnote-63) as it serves not to distinguish one grapheme from another, but to suppress a grapheme whose presence is indicated by another graphic feature.[[64]](#footnote-64) A regular akṣara without a virāma is comprised of one or more consonant graphemes[[65]](#footnote-65) and the holistically represented inherent vowel grapheme. If a virāma is added to that akṣara, none of these graphemes are changed to a different grapheme, but the signification of the vowel grapheme is negated.

All things considered, we deem it best to recognise the virāma as a primary grapheme. Permitting graphemes to represent any linguistic information pertaining to a domain of analytic interest (§2.3.3) allows us to do so: even though it does not represent a phonological unit, it does represent information pertaining to phonology, our primary domain. The practical consideration leading to this is that it is essential for a transliteration scheme used in philology and palaeography to make a distinction between a vowelless consonant expressed using a virāma and one expressed as a simplex glyph. For a rationale, we emphasise that functionally the virāma is fully analogous to vowel markers, which are definitely graphemes in their own right. A basic akṣara lacking a vowel marker signifies the presence of an inherent vowel, a vowel marker signifies the presence of another vowel in place of that inherent vowel, and the virāma signifies a zero-vowel in place of that inherent vowel.

It follows from the above that a basic consonant graph combined with a vowel killer is an autonomous and integral character (akṣara), even if it is employed in a non-final position as an alternative to part of a ligature and thus does not correspond to a syllable.[[66]](#footnote-66) That is to say, combinations such as Devanagari |द्‍म| <dma> and Tamil |க்க| <kka>) are not akṣaras but sequences of two akṣaras each.

## Complications

### Allography

We have briefly defined allographs above (§2.1) as diverse graphic signs which signify the same linguistic information. With the stricter definition of the graph as the etic counterpart of a grapheme (§2.4.2), this primarily means that **allographs** are graphs which manifest the same grapheme. However, even more so than with allophones in phonology, there are several different levels at which allography can occur, from the most superficial variation between one handwritten |a| and another, all the way to the striking variation found for instance in the graphs expressing the archetypal phoneme /u/ in Devanagari |उ| (<U>), |कु| (<ku>) and |रु| (<ru>). A qualitative distinction between the levels of allography might be grasped in terms of supplementary linguistic information carried by the graphs in question, as well as in terms of the conditions that determine the choice of one form or another. Accordingly, we propose distinguishing three kinds of allography: graphetic, graphotactic and graphemic.[[67]](#footnote-67) Our transliteration scheme provides a method for distinguishing graphemic allographs, but by choice remains blind to other kinds of allography which, however, may be recorded in computer markup applied to transliterated texts.

#### Graphetic allography

**Graphetic allographs** are alternative graphs which do not signify any linguistic information other than that contained in the corresponding grapheme, as in Roman |a| - |a| - |*a*| and in Devanagari |अ| - |अ| - |अ| or |झ| - |झ| - |झ|.[[68]](#footnote-68) The scope of our term ‘graphetic allography’ also includes the trivial variation between instances of a particular graph written in the same hand or printed in the same font, although in other contexts of research it may be useful to treat this most superficial kind of allography separately. The choice between graphetic allographs is *paradigmatic*, meaning that any one of a set can be freely swapped for any other. Their alternation may be essentially random, or it may be governed by aesthetic considerations.

To be sure, practically any graphic feature can be a *potential* carrier of additional linguistic (or quasi-linguistic) information, and thus have a graphemic role. This includes suprasegmental graphetic allography, the use of a different graph inventory for words or other chunks of text, such as italics for emphasis in a Roman text, Grantha for a Sanskrit word in a Tamil text, or a more ornate script for the royal signature on an Indic inscription. This kind of graphematic function is outside our domain of analytic interest (§2.3.5).

#### Graphotactic allography

**Graphotactic allographs** are alternative graphs whose occurrence is governed by graphotactic context, as in the |r| of Devanagari |र|=|ra|, |र्क|=|rka| and |क्र|=|kra| or the |u| of |कु|=|ku| and |रु|=|ru|.[[69]](#footnote-69) The choice between graphotactic allographs is *syntagmatic*, meaning that it is determined by the position of the graph in a sequence of other graphs and by the nature of the other graphs in that sequence. Consequently, graphotactic allographs carry implicit information about their surroundings, which may provide clues for reconstructing the context of a legible graph in a damaged inscription. For such situations, and for the rare cases involving an allograph other that expected in a given graphotactic context, we recommend optional computer markup, but we do not distinguish graphotactic allographs in transliteration.

The concept of **graphotactic allography** can be usefully extended to cases where graphotactic context requires or favours certain allographic formations **above the level of individual graphs**. In aksharic writing systems, this phenomenon can explain the existence of special glyphs such as Devanagari |क्ष|=|kṣa| and |ज्ञ|=|jña|, which are graphetically simplex (i.e. they cannot be analysed into components) while being graphemically complex (and more so than consonant glyphs with an inherent vowel, discussed in §2.4.3 above). Our interpretation also appears applicable to cases in alphabetic writing systems written in cursive handwriting or with typographic ligatures such as |ﬁ| and |ﬃ|, where certain sequences of graphs combine into a visual whole involving special forms of the individual graphs.

It would be theoretically possible instead to perceive higher-level graphotactic allographs like |क्ष| as syllabographic graphemes in an otherwise aksharic systems, and to perceive sequence-level graphotactic allographs like |ﬁ| as complex characters in an otherwise alphabetic system.[[70]](#footnote-70) However, whenever possible, we prefer to interpret features of any writing system in accordance with, rather than as exceptions to, the prevailing representational strategies of that writing system. Higher-level graphotactic allography does not necessarily produce graphetic simplicity: in Devanagari |श्र|=|śra|, for instance, the graphs for |ś| and |r| are isolable even though neither is identical to the base graph for these graphemes. The graphetically simplex graphotactic allographs are palaeographically derivable from graphetically complex forms, and are thus just an unusual combination of the standard rules and processes of the writing system, not a special case requiring separate rules. We therefore advance that the relevant graphemes are individually present in such graphetically simplex akṣaras,[[71]](#footnote-71) and that, analogously, the cursive or ligated units of alphabetic writing systems are series of simplex characters rather than complex characters.

#### Graphemic allography

Finally, **graphemic allographs** are alternative graphs which typically signify linguistic information in addition to, and at a different level than, that inherent in the grapheme, as in Devanagari |उ|=|U| versus |u| in |कु|=|ku| and |रु|=|ru|, and in Bengali |t| in |ত|=|ta| versus |ৎ|=|T| (final |t|).[[72]](#footnote-72) The distinction between upper and lower case (e.g. Roman |a| versus |A|) is also a case of graphemic allography in our view, although the additional linguistic information carried in these allographs is of course different from that represented by our Indic examples. Examples from non-aksharic writing systems might include Greek |σ| and |ς| (allographs for the grapheme <s>, the former being used in medial positions, the latter in final positions), or the isolated, initial, medial and final forms of Arabic script. The choice between graphemic allographs is neither free and random, nor mechanically determined on the basis of graphotactic context. Instead, it is driven by linguistic context at a level other than that represented in the graphemes themselves. Consider the Sanskrit words kr̥tam etat written in early Brāhmī as |𑀓𑀾𑀢𑀫𑀋𑀢𑀢| (involving the final allograph of <m> and the initial allograph of <e>) and as |𑀓𑀾𑀢𑀫𑁂𑀢𑀢| (involving the akṣara <me>). Both are legitimate alternatives in the writing system, but the former carries additional linguistic information: it implies a pause (and hence, a syntactical or semantic boundary analogous to that expressed by punctuation and/or spacing) between the two words. Likewise, the use of a Roman capital letter instead of a lowercase one can, among other things, indicate the beginning of a sentence or the beginning of a proper name.

In scholarly contexts where a diplomatic transliteration of a particular source is desired, our transliteration system uses the uppercase allographs of the corresponding Roman letters for the independent graphemic allographs of Indic graphemes (§3.3.2). In this case, our analytic interest includes the kind of additional information implicit in these allographs, so we effectively treat them as different graphemes than their default (in-akṣara) allographs.

### Homography

In our quick terminological sketch (§2.1) we have defined **homography** as a situation where two graphic entities are visually identical, but signify different things. Homography may take place at the level of words: for instance, English ‘read’ (present tense) and ‘read’ (past tense) are homographs, as they consist of the same graphs, but have different meanings. This kind of homography has no relevance to transliteration, because it also involves the same sequence of graphemes, and the difference becomes manifest only in the mapping of graphemes to phonemes and to meaning. However, full or partial homography can also involve graphs and glyphs, where the difference between homographs becomes manifest in the corresponding graphemes.

The scripts we work with employ a relatively limited repertoire of graphic elements. Each combination of these elements into graphs, graph sequences, glyphs and glyph sequences sits in a fuzzy cloud of allographs, and some of these clouds overlap. Examples include Roman |l| - |I| - |1| (lowercase L, uppercase I and the numeral one) or |O| - |0| (the letter O and the digit zero) at the level of graphs, and (especially handwritten) Roman |*k*| - |*lc*| or |*nu*| - |*un*|, or Devanagari |ख|=|kha| - |रव|=|rava| at levels above that of individual graphs.[[73]](#footnote-73) As a result, the graphemic interpretation of graphs sometimes requires input from context.

### Heterography

@may or may not want a brief paragraph on heterography here, see how much it is needed when the text is more or less final

### Polygraphy

Many writing systems employ established sequences of signs with a conventionally associated graphemic function, such as English |sh|, which corresponds to the phoneme /ʃ/ with great consistency. Such combinations are technically known as **polygraphs** (and as **digraphs** when comprised of two members). Polygraphs are common in alphabetic writing systems, though rare in other phonographic systems,[[74]](#footnote-74) and have been recognised as graphemes in some approaches.[[75]](#footnote-75) Our definition of the grapheme as a minimal unit precludes this: polygraphs can always be broken down into individual graphemes (such as <s> and <h>) belonging to the same domain of analytic interest. The phenomenon that these graphemes together correspond to a single phoneme is a matter of complicated grapheme to phoneme mapping.

The DHARMA transliteration system involves some digraphs (for diphthongs such as au and aspirated consonants such as kh). Such digraphs are clusters of two graphemes in the Roman writing system, but they consistently correspond to a single source grapheme. This is a complication that we accept in order not to break with established conventions, as discussed further in §4.2.1.

### Ambivalent classification

Every now and then, real-life writing systems inevitably exhibit a smooth transition from the class of complex glyphs to sequences of discrete glyphs on one side, and to simplex glyphs on the other side. It can therefore be difficult on one side to decide whether a certain sequence of graphemes should be interpreted as one character or several, and on the other side to judge whether a certain character should be interpreted as a single grapheme or several. We have no choice but to live with the fact that our analytical constructs are not always an ideal fit for the ground truth, especially when a writing system in the broad sense is considered with an extensive diachronic and/or synchronic scope.

Fuzzy boundaries are conspicuous in alphabetic writing systems, with spectra such as |oe| - |œ| - |oͤ| - |ö| from sequence to complex glyph to simplex glyph with diacritical mark, and [sz] - |ſʒ| - |ß| from sequence to simplex glyph. Such variations fall outside our purview, but we believe that the intermediate forms could be analysed equally as single graphemes and as complex characters, and that this must be judged according to the domain of analytic interest.

In Indic writing systems, special conjuncts such as |क्ष|=|kṣa| and |ज्ञ|=|jña| are sometimes added to alphabetic lists, implying that they are perceived by at least some of their users as simplex glyphs. We nonetheless feel that they are best fitted into the system as graphetically simplex graphotactic allographs of complex glyphs (as addressed in §2.5.1.2). The virāma behaves in some respects like a diacritical mark, and has certainly evolved out of graphic elements which do not qualify as graphs. We have chosen to recognise the fully-fledged virāma as a graph (§2.4.5), and we discuss transliteration practice pertaining to proto-virāmas in §4.4.1. The anusvāra and the visarga may be interpreted either as graphs in complex glyphs or as autonomous glyphs, as discussed in §2.5.4.1 below. Finally, §2.5.4.2 mentions some other phenomena that are difficult to classify.

#### Between independent glyph and dependent graph

The anusvāra and the visarga are traditionally considered to be dependent on akṣaras and can never occur in an initial position; nonetheless, they are always graphetically distinct, and can in many specific writing systems occupy a separate segmental space of their own, be physically separated from their “parent” akṣara by a physical feature, or even be graphetically associated with the following character. For the former reason, they are thus arguably components in our terms (forming a single complex glyph with the preceding akṣara), while for the latter reason it may be contended that they are independent simplex glyphs. We slightly prefer viewing them as components of complex entities, but as far as transliteration is concerned, the question is irrelevant: in either case they are graphemes in their own right, and are thus represented in transliteration by an equivalent grapheme, which in turn is always an independent segment in Romanised transliteration.

Similar considerations apply to the final consonants of Pyu, which are dwarfed by and graphetically subordinate to the regular consonant signs, and may therefore be perceived as components of the preceding akṣara in a system tweaked for the representation of closed syllables, while their evolutionary origins are in autonomous glyphs. The difference is, again, irrelevant to transliteration.

#### Other signs of vague status

Particular Indic writing systems include further graphic signs which are difficult to classify vis-à-vis graphemes, characters, graphs and glyphs, especially when their range of possible significations is diverse or when their signification is poorly understood. As a general rule of thumb, we prefer to err on the side of caution and recognise such signs as graphs (and thus as graphemes, rather than as elements without graphemic status) on the grounds that they fall within our domain of analytic interest even if they do not unequivocally represent a phonological unit and might, from a different perspective, rather qualify as diacritical marks. This approach allows us to transliterate the problematic sign with a consistent target grapheme, instead of having to introduce a series of target graphemes for each combination of the problematic sign with a primary grapheme. Among such problematic signs, our guide explicitly addresses anusvāra-relatives (§4.2.4), visarga-relatives (§4.2.5), the phenomenon of vowel support graphs (§4.5.2), the use of the |ā| marker to indicate length (§4.6.1.1), and the underdot “diacritic” added to akṣaras (§4.6.1.2); further such signs encountered in specific writing systems may be added as extensions (§3.2) to the DHARMA conventions.

# General principles of the DHARMA transliteration scheme

## Compatibility with other transliteration systems

Aside from increasingly obsolete ASCII-based transliteration schemes optimised for early computer processing, the only internationally prevalent schemes for the Romanisation of Indic scripts are ISO-15919 and IAST (the International Alphabet of Sanskrit Transliteration).[[76]](#footnote-76) The latter is the most widespread among Sanskritists, but does not cater for some graphemes associated with other Indian languages and is prone to become ambiguous when extended for this purpose. For this reason, the DHARMA transliteration scheme is based on the ISO-15919 scheme, extending it in order to handle graphemes of specific writing systems not covered in the standard, and modifying it in some technical details in order to allow for the representation of certain graphemic allographs (§3.3.2)[[77]](#footnote-77) and editorial markup (§3.6). Among writing systems not or not wholly covered by ISO-15919, our transliteration scheme is by and large compatible with current recommendations for the transliteration of Kannada (Ollett and Taylor forthcoming) and Burmese (Lammerts and Griffiths 2016).

If you are primarily used to working with IAST, keep in mind a key difference between that scheme and ISO-15919 (as well as the DMARMA scheme): namely that the former employs underdotted ṃ for the anusvāra and underdotted ṛ, ṝ and ḷ for vocals, while in the latter, the underdot is reserved for retroflex consonants, so anusvāra is transliterated ṁ with a dot above, and the vocals r̥, r̥̄ and l̥ with an undercircle.

## Extensibility

Over and above the transliteration signs discussed in this guide because they are relevant to the DHARMA project, the inventory of transliteration equivalencies may be expanded freely according to the needs of future projects for any linguistic or regional context that we have not yet catered for. For instance, our transliteration scheme does not provide for the Gurmukhi addak, a sign whose graphemic function is difficult to describe.[[78]](#footnote-78) Should it be desired to represent it in a text transliterated according to our conventions, it would probably be best recognised as an honorary grapheme (§2.5.4.2) with a dedicated transliteration.

While adding new signs to the inventory, the following rules of thumb should be considered.

* **compatibility**: unless there are strong reasons to the contrary, use the signs prescribed by ISO-15919 when applicable, and signs already in conventional use in the relevant subdiscipline when an ISO standard is not applicable
* **simplicity**: as far as feasible, avoid polygraphs and give preference to single target graphemes
* **uniqueness**: as far as possible, the Roman grapheme (or polygraph) selected for any particular source grapheme should not be identical to any target grapheme already in use for another source grapheme in the DHARMA scheme
  + deviate from this rule only when it is reasonable to assume that the two different source graphemes transliterated by an identical target grapheme or digraph will never co-occur in any source text

## Entities represented in transliteration

@@@

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x | dedicated char | function matters | phenomenality matters | note |
| alphabetic | + | + | - |  |
| decimal ciphers | + | + | - |  |
| non-decimal numerals | + | + | - |  |
| functional signs  avagraha, abbr. mark | + | + | - |  |
| functional symbols  punctuation, connectors | - | + | + |  |
| ideograms | - | ~ | + |  |
| symbols | - | - | + |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  | function | phenomenality |
|  | primary graphemes | alphabetic | transliteration | implied |
|  | numerals | decimal ciphers | transliteration | implied |
|  |  | non-decimal ciphers | transliteration+markup | implied |
| marks | functional signs | avagraha | transliteration | implied |
| .. |  | abbr. mark | transliteration | implied |
| .. | functional symbols | punctuation marks | tr OR markup | markup |
| .. |  | connectors | tr OR markup | markup |
|  | symbols | ideograms | implied | <> markup |
|  |  | misc. symbols | — | markup |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| class | item | presence | graphemic function | phenomenality |
| primary graphemes | alphabetic graphemes | transliteration | | implied |
| numeral signs | decimal ciphers | transliteration | | implied |
| non-decimal ciphers | transliteration + markup | | implied |
| marks | avagraha | transliteration | | implied |
| abbreviation marks | transliteration | | implied |
| punctuation marks | transliteration | markup | token |
| connectors | transliteration | markup | token |
| symbols | ideograms | markup | | token |
| misc. symbols | markup | implied | token |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| class | item | transliteration | markup | phenomenality |
| primary graphemes | alphabetic graphemes | + | — | implied |
| numeral signs | decimal ciphers | + | — | implied |
| non-decimal ciphers | + | + | implied |
| marks | avagraha | + | — | implied |
| abbreviation marks | + | — | implied |
| punctuation marks | + | + | token |
| connectors | + | + | token |
| symbols | ideograms | — | + | token |
| misc. symbols | — | + | token |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| class | item | transliteration | markup | phenomenality |
| primary graphemes | alphabetic | presence + function | — | implicit |
| virāma | presence + function | — | implicit |
| ideographic graphemes | decimal ciphers | presence + function | — | implicit |
| non-decimal ciphers | presence + function | | implicit |
| ideograms | presence + function | | implicit |
| marks | avagraha | presence + function | — | implicit |
| abbreviation marks | presence + function | — | implicit |
| punctuation marks | presence + function | | explicit |
| connectors | presence + function | | explicit |
| symbols | misc. symbols | presence | | explicit |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| class | item | presence | graphemic function | phenomenality |
| primary graphemes | alphabetic | transliteration | | implicit |
| virāma | transliteration | | implicit |
| ideographic graphemes | decimal ciphers | transliteration (+ markup) | | implicit |
| non-decimal ciphers | transliteration + markup | | implicit |
| ideograms | markup | | implicit |
| marks | avagraha | transliteration | | implicit |
| abbreviation marks | transliteration | | implicit |
| punctuation marks | transliteration + markup | | markup |
| connectors | transliteration + markup | | markup |
| symbols | misc. symbols | markup | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Figure .. Classification of @ | | | |
|  | presence | functional aspect | phenomenal aspect |
| primary graphemes | dedicated transliteration | | — |
| functional marks | dedicated transliteration | | — |
| numeral signs | dedicated transliteration (+ markup) | | — |
| ideograms | markup | symbol token | |
| symbolic marks | markup | | symbol token |
| abstract symbols | markup | — | symbol token |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Figure .. Classification of @ | | | | |
|  | transliteration | glyph presence | function | phenomenality |
| alphabetic graphemes | a, b, c… | implied | implied | implied |
| virāma | · | implied | implied | implied |
| decimal ciphers | 1, 2, 3… | implied | implied | implied |
| non-decimal ciphers | 10, 20, 100… | markup | implied | implied |
| ideograms | # | markup | implied | encoded |
| avagraha | ’ | implied | implied | implied |
| abbreviation marks | ° | implied | implied | implied |
| punctuation marks | . | implied | implied | encoded |
| connectors | § | implied | implied | encoded |
| abstract symbols | @ | markup | — | encoded |

* alphabetic includes virāma by courtesy
* is there an actual difference between a dedicated transliteration character and optional shorthand?
  + theoretically, dedicated is something for which no markup alternative exists
* 1. for alphabetic graphemes and the virāma we use dedicated transliteration characters
* in addition to representing the presence of the grapheme, these dedicated characters unequivocally identify its graphemic function
* we are not interested in representing the phenomenality of these graphemes, because how the source graph looks is implicit in the identification of the grapheme (the reader familiar with the applicable script will know, and idiosyncratic variation may be annotated)
* nothing changes here, of course
* 2. “ideographic” will be our category name for graphemes that signify concepts rather than speech sounds
* ideographic graphemes include numeral signs (ciphers), which are widely prevalent
* for numerals represented in decimal ciphers, we use dedicated target characters just as for alphabetic graphemes, so the same considerations apply
* in XML documents, we add semantic markup (<num> with @value), but this is not relevant to transliteration
* for other ciphers (any numeral sign other than the digits 0-9), we have no unambiguous transliteration equivalents, so we use markup (shorthand or XML) to disambiguate them
* here too, phenomenality is not encoded explicitly because it is implied by the function in the context of any particular script
* our encoding of numerals is not affected by the present revision of symbol encoding, so no worries here
* some of our texts include other ideographic graphemes, such as various Tamil signs for fractions and measures, and Burmese abbreviation signs
* we have no established method to deal with these, but we need one, so I’m proposing one below
* 3. “marks” will be the name for the motley category of units of script which signify neither speech sounds nor concepts, but do tell something about how the reader should convert the written text to language
* marks may be divided into two subclasses depending on the extent to which we want to record their phenomenality, but there is no sharp boundary between these subclasses, so we have to draw it arbitrarily
* “functional marks” are those to which we can assign a clear graphemic function while conversely we see no advantage to recording their phenomenality, because (like that of alphanumeric signs) the shape of the sign is implied by the identified function (within a given script)
* therefore we dedicate a transliteration character to functional marks, and record nothing else about them
* functional marks include the avagraha (whose transliteration does not change) and abbreviation marks like the Devanagari circle, for which we have no existing solution, but we’ll introduce one just in case it occurs somewhere
* this, too, does not affect symbol encoding, only transliteration
* “symbolic marks” are those that have a somewhat circumscribable graphemic function, but neither the function, nor the associated graph can be consistently identified in the range of texts we deal with (although clear functions and unequivocally associated signs for them may be present in some of the specific writing systems)
* symbolic marks include punctuation marks (in the strict sense of marks used for clear semantic and prosodic segmentation) and connectors (a new class that includes, but is not limited to, the space fillers which we already encode)
* we can’t dedicate target graphemes to symbolic marks:
* if we tried on the basis of function, we’d stumble on lots of cases where the function is vague
* if we tried on the basis of phenomenality, we’d spend hours looking for the best Unicode equivalent and still run out of options eventually
* therefore we dedicate to them a very small range of transliteration characters based on a very broad classification of function, and we add markup to (redundantly) represent the same functional classification, as well as to represent their phenomenality
* our treatment of symbolic marks changes in some ways and will be discussed below
* (space may technically also be perceived as a mark and may occasionally be filled with actual graphic signs as placeholders, but we do not encode it as a symbol and it will not be discussed here)
* 4. “symbols” (used in a strict sense here) is the catch-all for graphic signs that do not fit into the above categories because their graphemic function is too difficult to establish in terms of linguistic information due to its vagueness or complexity, and/or because they manifest in a wide variety of shapes which lack a consistent association with a particular function
* we use only XML encoding to represent symbols
* the presence of an XML element represents the presence of a symbol
* the phenomenality of the symbol is represented in the attributes of that XML element
* the function of symbols is not represented
* some particulars of the way in which we encode symbols will change, as detailed below

### @A RADICAL REVISION?

Moved to [GDOC](https://docs.google.com/document/d/1MyCopokX2hutpzwbEKn-T33dnSakGxNrPSNORYV3Tuk/edit?tab=t.0)

### Transliterating graphemes

@

### Representing complex glyphs and allographs

The Indic writing system by default employs complex glyphs for the representation of certain phonological sequences, while the Roman writing system of our transliteration lacks complex glyphs. Which adjacent graphemes combine into a complex glyph, and how that complex glyph is formed, is largely determined by the inbuilt rules of the Indic writing system. These rules, however, are somewhat malleable, and therefore our transliteration scheme provides some measures for reflecting exceptions to the general rule in order to allow for a more accurate diplomatic reconstruction of the originally inscribed source.

Most importantly, the independent graphemic allographs (as defined in §2.4.4) of vowel and consonant graphemes universally have the potential to represent important linguistic information (typically the presence or absence of a pause) in addition to that inherent in the grapheme. Since the alternation of Indic independent graphs and in-akṣara graphs is superficially parallel to the alternation of uppercase and lowercase Roman letters, the latter can be conveniently used to represent the former in transliteration (§3.4.1).

The Indic writing system at large has strictly deterministic rules for the grapheme sequences that can combine into a complex glyph, and for the selection of graphotactic allographs (§2.4.4) depending on position within a complex glyph. However, some specific varieties of the Indic system deviate from these rules more or less systematically, and idiosyncratic deviations also occur in specific written source texts. To be able to give these variations some degree of justice in transliteration, we use text-based (§4.6.3) or XML-based (EGD §###) editorial markup to indicate which target graphemes belong to a single complex source character, when this is not straightforward on the basis of the general rules of the writing system. Only XML markup (EGD §###) can reflect situations where the graphetic allograph employed is not the one expected in a given position (as in Figure 3.3.A/1, where <rya> is written with a body <r> and a subscript <y> instead of a superscript <r> and a body ><>), and where the spatial configuration of a ligature is unusual (as in Figure 3.3.A/2, where a prescript <g> has been joined to the left of a body <gh> instead of joining a subscript <gh> to a body <g>).

@markup for graphotactic allographs may also be relevant when only part of a character is legible

Attempting to reflect graphetic allography (§2.4.4) in transliteration would complicate the transliteration scheme by an order of magnitude, without much tangible gain in return. Therefore, we have deliberately chosen to ignore graphetic allographs in our transliteration. This includes some conspicuous variation, such as the use of two alternative glyphs within the same inscription for the same simplex glyph, or different forms of a vowel marker which may be attached to a consonant in different ways (as in Figure 3.3.A/3, 4). When deemed interesting or potentially relevant to scholarly study, such allographic variation can be noted in your palaeographic description, but will not be directly represented in the transliteration or the markup.

|  |  |  |  |
| --- | --- | --- | --- |
| Figure .. Allographs ignored in transliteration | | | |
| 1 | 2 | 3 | 4 |
|  |  |  |  |
| rya | rggha | ko | mo |

## Case sensitivity

@make this a subsection of the accuracy section?

The ISO-15919 scheme is case-insensitive (International Organization for Standardization 2001, 16, §8.1.1). Strict DHARMA transliteration, in contrast, is case sensitive in order to give distinction to graphemic allographs in transliteration. Uppercase letters in our scheme stand for the independent forms of Indic graphemes, while lowercase letters represent only the in-akṣara forms. The advantage of this is not only that a potentially graphemic feature of the original written text is preserved in transliteration, but also that in the transliteration of poorly legible and lacunose text it makes clear whether what can be made out is a dependent or independent graph, thereby facilitating conjectural restoration. Incidentally, this distinction also reduces the range of situations in which disambiguation (§3.6.1) becomes necessary for the digraphs of the transliteration system. The inevitable drawback of this is that in strict transliteration, uppercase cannot and must never be used for the purposes to which capitalisation is traditionally put in the Roman writing system, such as marking the initials of proper names, sentences and metrical units.

@refer to Jan Kučera here

email of 21 Jan:

9.8 In some transliteration conventions, upper-case letters are used to represent pure consonants, initial vowels or proper names. Using upper-case letters for pure consonants and proper names does not affect case insensitive reverse transliteration and as such is not in violation of Rule 1 of 8.1. Initial vowels in the middle of words are covered by Rule 15 of 8.1. When reverse transliteration is not needed, there is an option to use upper-case letter to indicate initial vowels in the middle of words, e.g. periIIIya for Example 3 in Rule 15 of 8.1.

[that example uses perii:i:iya for what I am assuming is பெரிஇஇஇய]

@also refer to Jan on these points:

Furthermore, I materialized your other suggestions as follows:

9.9 There is an option to indicate conjuncts that do not usually appear in the script using the equal sign = (Hex 003D). This is often utilized using ZWJ (Hex 200D) in the script, but not always.

9.10 There is an option to explicitly transliterate virāma using the middle dot · (Hex 00B7). This allows reversible transliteration of text using orthography that does not always mark virāma (such as historical Tamil or Brahmi).

### A note on the use of uppercase for independent vowels and consonants

Some of DHARMA’s predecessor projects have used a the character ° (degree sign) before transliterated vowels and/or after transliterated consonants to denote their special independent forms. DHARMA has decided on a projectwide level to discontinue using that notation, and to endorse and propagate the use of uppercase Roman letters instead. Intellectual considerations in favour of doing so include the following:

* unlike final consonants written with a vowel killer graph (transliterated with a middle dot · as per §0), the special independent forms do not involve an additional grapheme, so it is better to use a single character for their transliteration
* the default (unmarked) allographs of Indic graphemes are the in-akṣara forms, while the independent forms are the exception from the norm (marked), and this situation is superficially analogous to that of lowercase and uppercase letters in modern Roman writing
* uppercase letters are easy to enter on any keyboard, so their inclusion in the transliteration scheme helps productivity
* text-based search algorithms can easily be switched to case-insensitive mode and thus retrieve, for instance, taM Eva when searching for tam eva, whereas in order to retrieve tam° °eva for the same search string, special programming would be required
* using uppercase letters for the special forms allows us to keep the ° sign free for conventional use as a marker of truncation (§3.6.2)

## The accuracy of transliteration

The DHARMA transliteration system’s objective (§2.2.2), is to represent every source grapheme through a one-to-one relationship with target graphemes. This means that the system is mindful of demarcation (every source grapheme is represented separately from every other source grapheme) as well as individuation (source graphemes are distinguishable from other source graphemes as far as feasible in our domain of analytic interest). Depending on the context of application, we endorse two alternative approaches to transliteration, which we call strict and loose transliteration, as set out below.

In both strict and loose transliteration, the transliteration scheme falls short of ideal in two respects. On the one hand, in order not to break with established conventions, we use digraphs (rather than single graphemes) as the transliteration equivalents of certain source graphemes (§4.2.1). On the other hand, we diverge from the maxim “the truth, the whole truth, and nothing but the truth” in order to permit certain editorial additions and interpretative alterations to our transliterated text (§4.7), with the understanding that these are *always* editorial.

### Strict transliteration

**Strict transliteration** is predominantly diplomatic in nature. It aims to represent as much detail of a particular written textual instance as feasible. In accordance with this analytic interest, it awards full grapheme status to graphemic allographs (§2.5.1.3) and to various supplementary graphemes (§2.3.4). In addition, it strives for consistency in always using the same transliteration for a given source grapheme, regardless of how that grapheme may be pronounced in any given language and graphemic context.

### Loose transliteration

**Loose transliteration** is predominantly linguistic in nature. It is applicable to contexts where words, passages or complete texts in a source language are treated in the abstract, rather than as a particular written instance. Accordingly, some constraints of the strict system are relinquished, resulting in a shift toward the transcription end of the spectrum. Loose transliteration is not a rigorously defined system, and we expect that in contexts not requiring diplomatic accuracy, people will transliterate source languages in ways that are either intuitive or conformant to the general practice of the linguistic sub-field (or both). The degree of “looseness” depends on context, and may be for instance smaller in a critical edition and more extensive in isolated words or names mentioned in modern-language discussion. For these reasons, we only outline the basic features of loose transliteration here and give non-exhaustive specific suggestions in the body of this Guide.

* loose transliteration does not distinguish graphemic allographs from the base graphemes
  + this allows using uppercase target graphemes for traditional purposes, such as the capitalisation of the initials of loosely transliterated proper names
  + hence, whenever a proper name in a source language is mentioned in the course of discussion in an international language, we recommend using capital initials
* loose transliteration permits the silent normalisation of orthographic peculiarities (heterography, §#), including but not limited to
  + the alternation of double and single consonants in certain phonological contexts, particularly in Sanskrit
  + the alternation of anusvāra and visarga variants
  + the alternation of anusvāra with the class nasal or a generic nasal such as n
* loose transliteration permits (vaguely) phonological transcription where this is preferred to the accurate transliteration of the source graphemes, including but not limited to
  + distinguishing short e/o from long ē/ō even if the original writing does not do so
  + transcribing h for visarga in languages where it represents a final /h/ rather than the Sanskrit visarga
  + transcribing the actual phoneme or phoneme sequence represented by graphemes repurposed from their traditional signification in certain writing systems (§4.6.2)
  + transcribing single consonants for consonants doubled at morpheme boundaries in Old Javanese (e.g., lavann ika simplified to lavan ika, muvaḥhakan to muvahakan, at thana simplified to at hana)

## Transliteration and markup

@@@When creating a digital edition, we strive to keep the transliteration *representing* original content (i.e. what is written on a certain support) separate, or at least separable, from our annotations *describing* and *interpreting* various aspects of that content (for instance how it is written and laid out, how clearly it is readable, or what sort of information it carries). Content is transliterated according to the methods covered in this Guide, while annotation is added primarily in the form of TEI-compliant markup introduced in the Encoding Guides.[[79]](#footnote-79) The terms ‘markup’ and ‘encoding’ are fully synonymous in the context of digital editions, but elsewhere, ‘markup’ can also mean a non-electronic annotation system, such as the various brackets employed in printed epigraphic editions and the use of footnotes.

Ideally, this separation of concerns should be complete: no issues pertaining to the description of the physical manifestation of a text should be recorded in the transliterated text itself; and likewise, no issues pertaining to the content should be omitted from the transliterated text and recorded only in markup. In practice, there are a number of borderline cases that could arguably belong to either of these domains, with a certain degree of inevitable fuzziness and permeability. Given that we are primarily concerned with the faithful documentation of primary texts, the most fundamental of these details — the distinction of graphemic allographs — is addressed at the level of target graphemes (§3.3.2). Less tangible details are normally dealt with in markup, and our transliteration scheme includes some elements of “low-level markup” (i.e. markup comprised of characters at the level of the transliterated text rather than on the separate tier of XML encoding). Such markup may pertain to the transliteration itself (disambiguation, §3.6.1), to the editorial interpretation of the transliterated text (segmentation, §3.6.2; sandhi analysis, §3.6.3; and the truncation of words extracted from the source, §3.6.4), or to the description of the physical arrangement of the source (split akṣaras, §3.6.5). In addition, we foresee that our transliteration scheme will also be used in situations where TEI markup is not applicable, and therefore suggest some text-based markup alternatives (shorthand, §3.6.6) for certain phenomena.

### Disambiguation

Since our transliteration scheme involves some digraphs (§4.2.1), it is conceivable that in some cases the target graphemes constituting these digraphs might appear together in their own individual functions, rather than as a digraph. The ISO-15919 scheme (International Organization for Standardization 2001, 17, §8.1.15) employs the colon : as a disambiguation sign in such situations, as well as in sundry contexts where the graphetic composition of an original akṣara is unusual. The latter is in our perception a very different kind of situation, for which we prefer a different notation (§4.6.3). As for the former, the need to distinguish vowels in hiatus from diphthongs is eliminated by our use of uppercase for independent vowels in strict transliteration. The disambiguation colon is therefore only needed in the exceedingly rare cases where an <h> follows a stop consonant grapheme, in order to indicate that it is this combination, and not the aspirated consonant grapheme, that is present in the original.[[80]](#footnote-80)

* in strict transliteration, use the colon to disambiguate any occurrences of h preceded by a non-aspirated consonant which has an aspirated counterpart
  + e.g. p:h as opposed to ph
  + the disambiguation colon is not necessary and should not be used for the disambiguation of vowel clusters in strict transliteration, where vowels in hiatus are represented by uppercase target vowels
    - e.g. praUga, caUttho and daIĀ rather than pra:uga, ca:uttho and da:iā as in ISO-15919
* in loose transliteration, the colon may also be employed for the disambiguation of the diphthongs <ai> and <au> from the corresponding vowel clusters
  + but we recommend instead that you follow the established convention of using a diaeresis (pair of dots) above the second vowel in settings where you do not use uppercase for independent vowel graphemes
    - e.g. praüga, caüttho and daïā
  + do not use the diaeresis (or any other disambiguation) when one of the vowels has a macron, since in this case there is no ambiguity
    - e.g. āicca (strict āIcca), not āïcca
* in both strict and loose transliteration, the disambiguation colon and the diaeresis are unnecessary and therefore strongly discouraged wherever editorial segmentation (§3.6.2) by a space or hyphen intervenes between the target graphemes that might otherwise be read as a digraph, e.g.
  + strict mr̥ta Iva, loose mr̥ta iva; never mr̥ta: iva or mr̥ta ïva
  + strict mana-Icchā, loose mana-icchā; never mana:-icchā or mana-ïcchā

### Segmentation

The editorial segmentation of transliterated texts is strongly recommended in order to help the reader and to show how you analyse the text into words. Since the texts we work with typically use *scripto continua* — i.e. continuous writing without interword spaces — any and all spaces in our transliterated texts will be considered editorial. In other words, the spaces in our texts constitute interpretive markup. The same applies to hyphens — which have no equivalent in the source writing systems[[81]](#footnote-81) — and to new lines. The technical details and semantics of editorial segmentation will be discussed in §7.2, the essence of which is summarised here.

* in transliterated text which is not marked up in XML, new lines (§8.1) may be created
  + to correspond to original inscribed lines
  + to reflect the semantic or prosodic structure of the text
  + in XML documents, both of these functions are served by computer markup
* in all texts, with or without XML markup,
  + editorial spaces (§8.3) should always be inserted between independent words wherever possible
  + editorial hyphens (§8.4) should be inserted between words in compound where expedient
  + editorial hyphens coinciding with a line break must be placed after the break (§8.4.1)
* as discussed further in §8.2, editorial spacing and hyphenation
  + can and should be used between transliterated characters whose corresponding source graphemes belong to the same akṣara
  + cannot be used and must be avoided at word boundaries which are obscured by sandhi involving the complete fusion of one word’s final vowel with the next word’s initial vowel

### Sandhi analysis

Since transliteration is concerned with the graphemes found in the source text, sandhi should not normally be resolved. Phonographic graphemes must never be added, removed or altered in the process of transliteration. However, to accommodate the conventions of specific subfields, we permit adding a hyphen or an apostrophe to indicate the presence of particular kinds of sandhi, as detailed in §4.7.5.

### Truncation

In accordance with widespread convention, we endorse the use of ° (U+00B0 Degree Sign) as a marker of truncation, primarily when citing individual words verbatim from a source text, in discussion or a critical apparatus (EGD §###).

* truncation is not applicable in actual editions of source texts, only in strings extracted from the source
  + see §3.4.1 for a deprecated use of ° in transliteration by some of DHARMA’s predecessor projects
  + see §6.4.2 for the endorsed use of ° to transliterate abbreviation signs
* the degree sign for truncation should be used when a string of characters must be cut at a point where segmentation with a space or hyphen (§3.6.2) is not applicable, i.e.
  + when only part of a word is lifted from a text, for example at the beginning or end of a line
    - e.g. pari° (cited as a lemma from the word parihāra broken across epigraphic lines)
  + when a word lifted from a text is fused in vowel sandhi to an adjacent word
    - e.g. °oddyotita (for the word uddyotita fused in vowel sandhi to a preceding a)
* when words in source languages are cited in a modern-language discussion, it is fully acceptable to cite them without a truncation sign in stem (“dictionary”) form whenever the focus is on the word as a lexical item rather than on the verbatim received reading

### Placeholders for split akṣaras

An akṣara is normally an atomic unit of the Indic writing system. However, akṣaras interacting with a material feature of the support (such as a line break, or a defect or other feature on the writing surface) are sometimes graphetically separated into their constituent parts. When separation occurs in a way that cannot be reflected through the separation of the corresponding transliterated graphemes, we introduce dedicated characters we call placeholders. The placeholder characters ⌈ (left ceiling, U+2308) and ⌉ (right ceiling, U+2309) stand for detached parts of akṣaras which cannot be transliterated on their own. Their use is discussed and illustrated in §7.3.

### Shorthand

In the context of this Guide, ‘shorthand’ refers to the provisional use of something simple in place of something more complex. Specifically, transliteration shorthand refers to an accessible substitute for a special character that you cannot easily produce on your keyboard. Markup shorthand refers to simple text-based markup in place of more complicated TEI encoding. Shorthand can be helpful for productivity because it takes less time to enter and because markup shorthand can be scanned more easily by the human reader than computer markup. Indeed, the practices introduced in §3.6.1 to §3.6.3 are also a kind of shorthand inasmuch as the phenomena they represent could also be represented in XML markup. We call them ‘essential shorthand’, because — for the time being at least — they constitute an essential part of our transliteration scheme. We have not devised XML encoding solutions for these (although this could be done in the future) because requiring them to be encoded would complicate our XML editions inordinately.

Conversely, the shorthand practices introduced in this section always have a “proper” alternative. This latter should be used whenever feasible, while the shorthand alternative may be used when warranted by circumstances. Depending on these circumstances, we distinguish between ‘private shorthand’ (§3.6.6.1), which may be used in the production stage but must always be replaced with the proper alternative; ‘public shorthand’ (§3.6.6.2), which may be used in the production stage and in contexts not involving XML markup, but must always be replaced with the proper alternative in XML editions; and ‘optional shorthand’ (§3.6.6.3) which may be used in any context including XML editions in order to reduce code clutter and ease your work. No shorthand is mandatory: you are always welcome to stick to the proper solutions.

Since a proper alternative always exists for shorthand, the recommended shorthand solutions are intended to be unambiguous or minimally ambiguous in order to facilitate their conversion to the proper alternative by batch search-and-replace operations involving no or minimum human attention. In order for this to be possible, shorthand must be used rigorously in the proposed format. If you deviate from the recommendations or create your own private shorthand, make every effort to ensure that it can be likewise replaced efficiently. The specific shorthand solutions recommended by us are distributed in the main part of this Guide, but it is important that you familiarise yourself with the concept of shorthand and its private, public and optional varieties introduced below.

#### Private shorthand

Private shorthand may be used in the production stage to speed up the preparation of electronic texts, including collaborative text preparation, but it must always be eventually replaced with the proper transliteration or XML encoding. If any special character required for transliterating your texts is not easily accessible in your editing environment, feel free to substitute a character or sequence that is simple to enter on your keyboard. The substitute character or sequence should never occur in your documents in any other function. If it does, then it should only occur in contexts which clearly differentiate it from occurrences in another function. It is **your own responsibility** to keep careful track of what shorthand solutions you have used, and to replace them with the proper diacritical character or encoding when your work is completed, or to seek technical help for doing so. This Guide contains recommendations for the following kinds of private shorthand, shown with a red label in the relevant sections:

* private shorthand for transliteration
  + ĕ instead of ə (§4.3.2) DO WE REALLY NEED THIS? IF YES, SHOULD IT BE PUBLIC SHORTHAND?
  + \* instead of · (§4.4.3)
* private shorthand for markup
  + ’ or ' or +’ for editorial avagraha (§6.4.1.1; see also §6.4.1)
  + . (full stop) for supplied punctuation (§6.5.1.2)
  + §abc for space fillers with abc replaced by a symbol token (§6.5.2) I WOULD PREFER TO DEPRECATE THIS
    - to be distinguished from the public shorthand § (§6.5.2)
  + $abc for symbols with abc replaced by a symbol token (§6.6) I WOULD PREFER TO DEPRECATE THIS

#### Public shorthand

Public shorthand may be used in the production stage to speed up work, and is also applicable in contexts not involving XML markup. Public transliteration shorthand may be necessary in the course of publication in an environment where a font supporting all the required special characters is not available (§1.6.1). Public markup shorthand is intended mainly for print or on-screen publications not involving XML markup (and to some degree imitates the standard display rendering of our XML editions). All public shorthand must always be replaced with the proper alternative in XML editions. It is **your own responsibility** to keep careful track of what shorthand solutions you have used, and to replace them with the proper diacritical character or encoding when your work is completed, or to seek technical help for doing so. This Guide contains recommendations for the following kinds of public shorthand, shown with a blue label in the relevant sections:

* public shorthand for transliteration
  + underdot instead of undercircle diacritic (§4.2.2)
  + f and x instead of ḫ (upadhmānīya) and ẖ (jihvāmūlīya) (§4.2.5)
* public shorthand for markup
  + + to mark up numeral signs transliterated with more than one target character (§5.3.1)
  + \*abc for ideograms (§**Hiba! A hivatkozási forrás nem található.**) [PENDING DISCUSSION, BUT I THINK MY PROPOSAL WORKS]
  + | (vertical bar) and other graphetically similar Unicode characters for punctuation marks (§6.5.1.1) IF ALL OF THESE ARE PUBLIC SHORTHAND, THAT MEANS WE’LL HAVE TO REPLACE ALL SUCH SIGNS INCLUDING PLAIN | WITH MARKUP IN OUR XML EDITIONS – MAKE SOME OR ALL OF THESE OPTIONAL INSTEAD?
  + § for space filler symbols (§6.5.2)
    - to be distinguished from the public shorthand § IF RETAINING THAT
  + ¬ (U+00AC Not Sign) for word joiner signs (§**Hiba! A hivatkozási forrás nem található.**) NEWLY INTRODUCED, MAY OR MAY NOT WANT IT
  + graphetically similar Unicode dingbats for abstract symbols (§6.6)
  + \_ (underscore) for original space (§7.2)
  + uppercase C and V for illegible consonant and vowel (§4.7.2.1)
  + - (hyphen) for words cut across inscribed lines (§8.1)

#### Optional shorthand

Optional shorthand may be used in any context including XML editions in order to reduce code clutter and ease your work. Although proper alternatives for these shorthand solutions do exist and are preferred, the slight inconsistency resulting from their use is acceptable if they make your work easier. You do not have to replace optional shorthand with the proper implementation. In the future, we may make a projectwide decision to make these replacements automatically. This Guide contains recommendations for the following kinds of optional shorthand, shown with a green label in the relevant sections:

* optional shorthand for transliteration
  + ' (U+0027 Apostrophe) instead of right single quote (§**Hiba! A hivatkozási forrás nem található.** in the analysis of Dravidian sandhi; §6.4.1 as transliteration for the avagraha)
    - this will be processed in the same way as the right single quotation mark and may also be displayed as such
    - but for the sake of rigorous homogeneity in our editions, it is preferable to replace this sign with the right single quotation mark when finalising a digital edition
* optional shorthand for markup
  + = (the equals sign) to indicate that a pair of transliterated characters belong to the same akṣara in the source (§4.6.3.1)
    - there is therefore no straightforward way for automatic conversion between this shorthand and XML markup
    - as a baseline, we recommend using the = sign in the specific situations addressed in §4.6.3 and the XML encoding elsewhere
  + ē and ō in Dravidian languages where long and short versions of these phonemes are not distinguished in writing (§4.7.3)
    - since graphic distinction of this kind is rare in the texts we work with, we choose to add explicit XML markup only where the distinction is actually present in the source
  + ă, ĭ or ŭ in Southeast Asian languages, where a short vowel is written instead of an expected long vowel (§4.7.4) [OLD TG PROMISED AUTO-CONVERSION FOR THESE]

## Non-graphemic entities and transliteration

### Marks and imagery peripheral to the text

Non-alphanumeric symbols integrated into the normal flow of text, i.e. occupying the same kind of segmental space as alphanumeric signs, are to be treated in the same way as graphemes proper (§**Hiba! A hivatkozási forrás nem található.**) and represented accordingly in transliteration (§6.5). However, signs peripheral to the inscribed text, including scribal marks and decorative imagery, belong to a separate layer and may be represented in XML markup (§3.6) or described outside the transliterated text.

#### Scribal marks

Written documents may contain graphic features which serve to inform the reader how the text should be read, rather than forming part of the actual content of the document. Such marks added to a source text by a premodern scribe shall not be represented in transliteration. When scribal deletion or insertion involves marks, this fact is to be encoded in XML as per EGD §###.

#### Decorative features

Large symbols, abstract designs and figural features which are not integral to the linear flow the inscribed text are to be regarded as decorative features. They are neither to be represented in transliteration, nor encoded in XML editions, only to be described for human readers in the metadata of the text.

### The materiality of the support

On the whole, the characteristics of a source text’s layout, including the ways in which the materiality of the support may affect the physical arrangement of the writing, fall outside the domain of transliteration. Such characteristics can be described in general in the metadata, and some of them can be specifically encoded in XML markup. This Guide contains some instructions pertaining to layout (§8.1) and specifically addresses the special case where complex glyphs are split across a feature in such a way that the linear sequence of graphic components does not correspond to the logical sequence of graphemes (§7.3).

# Alphabetic graphemes

## Overview

@@@add an overview

## The basic inventory of Indic graphemes for Old Indo-Aryan

We assume that every project member is familiar with the standard transliteration equivalents of the basic graphemes of the Indic writing system, but for the sake of completeness we list them in Figure 4.2.A below. Additional considerations applicable to this basic repertoire are discussed in the following subsections.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Figure .. The basic inventory of Indic graphemes | | | | | | | | | | | |
| a | ā | i | ī | u | ū | r̥, r̥̄ | l̥, l̥̄ | e (ē) | ai | o (ō) | au |
| k | kh | g | gh | ṅ |  | c | ch | j | jh | ñ |  |
| ṭ | ṭh | ḍ | ḍh | ṇ |  | t | th | d | dh | n |  |
| p | ph | b | bh | m |  | y | r | l | v |  |  |
| ś | ṣ | s | h |  |  | ṁ | ḥ |  |  |  |  |

### Digraphs in the transliteration

Our transliteration scheme employs digraphs (§**Hiba! A hivatkozási forrás nem található.**) for diphthongs and for aspirated consonants.

As noted above (§3), transliteration schemes in practice inevitably fall short of ideal “pure” transliteration, and the DHARMA system is no exception to this. In order not to break with universally known conventions including the ISO-15919 standard, it employs digraphs (§**Hiba! A hivatkozási forrás nem található.**) for aspirated consonants and diphthongs. In this respect, it fails to establish a one-to-one relationship between the graphemes of the source and target scripts: the transliterated word ratha has five (target) graphemes, but there are only four (source) graphemes in the same word written in an Indic script, where, <th> is a single grapheme which, in Sanskrit, corresponds to the phoneme [tʱ]. It is therefore very important to keep in mind that in any discussion of Indic graphemes, *source* graphemes are meant, but some of these may be represented by digraphs (i.e. two graphemes) in transliteration. Furthermore, it may be necessary to disambiguate (§3.6.1) target graphemes which can appear in digraphs but are present on rare occasions in their individual roles.

In the rare situations where the Roman letters which normally constitute a digraph appear side by side in their own role, add a colon between the letters to disambiguate (§3.6.1).

### Vocalic r and l

If you are used to working with IAST rather than ISO-15919, note that vocalic r and l are transliterated in the DHARMA scheme with undercircles rather than underdots. The corresponding diacritical letters are not available in Unicode as pre-composed characters and will need to be composed by entering an *r* or *l* as applicable, followed by *◌̥* (U+0325 Combining Ring Below) and, if needed, by *◌̄* (U+0304 Combining Macron), in this order. Alternatively, copy and paste the composed characters from Figure 4.2.A above, or use shorthand (§3.6.6).

* if necessary, you may use underdots instead of undercircles as public shorthand for vocalic r and l, i.e.
  + ṛ instead of r̥
  + ṝ instead of r̥̄
  + ḷ instead of l̥
  + ḹ instead of l̥̄
* note that depending on the language you work with, ḷ and ṛ may be required for the transliteration of consonant sounds (§4.3.1)
  + if you use shorthand, it is your responsibility to avoid ambiguity

### Transliteration of e and o

According to Option 9.1 of the ISO15919 standard, for languages that do not make a distinction between the phonemes /e/ vs. /ē/ and /o/ vs. /ō/, we use the letters e and o to transliterate the corresponding phonemes, without adding a macron, regardless of whether they are normally pronounced long in the source language. Importantly, we apply the same rule to any **writing systems** that do not make this distinction, and this includes many historic Dravidian writing systems where a length-based opposition exists in the language, but is not reflected in writing. Since the specific signs for the long variants of these vowels (such as those in Tamil |கே| kē and |கோ| kō) are usually palaeographically derived from the original signs for the generic — and, in Sanskrit, long — vowel (such as those in Tamil |கெ| ke and |கொ| ko), the default transliteration in our scheme is always the unmarked Roman character e or o. See also §4.7.2 about the editorial distinction of the long phonemes /ē/ and /ō/ when written with the basic graphemes <e> and <o>.

### Anusvāra and its relatives

The basic anusvāra grapheme of Indic script, typically represented by a dot or a circle, is always transliterated as ṁ, with a dot above as in ISO-15959 rather than with a dot below as in IAST. In the linear sequence of transliterated characters, position the anusvāra where it logically falls in language, regardless of whether it is graphically above an akṣara, in a separate position inline, or even above the next akṣara. The graph representing the anusvāra may vary somewhat within a source, but unless this variation systematically corresponds to different linguistic information (i.e. if the various graphs are not allographs but separate graphemes), the transliteration should remain identical. Graphemes related to the anusvāra are discussed in the following subsections.

@

The default function of the anusvāra is to indicate the presence of a nasal consonant, whose locus of articulation is determined by the subsequent context. Used in this manner, the anusvāra is beyond doubt a grapheme by our definition. However, in certain languages in certain contexts, it can also qualify as a diacritical mark representing the nasal quality of a vowel whose presence is signified by a grapheme. Some standardised modern writing systems employ distinct graphic signs (the bindu |ं| and the candrabindu |ँ|) for these purposes, but such a distinction is by no means universal.

In the diplomatic transliteration of primary texts, we wish to make no assumptions about whether such signs were employed by their writers to represent a phoneme or to qualify a phoneme represented by another graph, and prefer to err on the side of caution. An additional rationale for doing so is that anusvāra variants may be perceived as always representing an abstract nasal phoneme, and the fact that it is sometimes realised as a nasalisation of the preceding vowel phoneme may be viewed as an issue of grapheme to phoneme correspondence. Therefore, our general approach is to treat all anusvāra variants as graphemes on their own right, and thus to represent them with a corresponding target grapheme.[[82]](#footnote-82)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Figure .. Anusvāra relatives | | | | |
| 1 | 2 | 3 | 4 | 5 |
| anusvāra | anunāsika/ candrabindu | ulu ricem | anusvāra-candra | Bengali variant anusvāra |
|  |  |  |  |  |
| saṁ | Om̐ | vr̥ttaṁ\* | tad-vam̃śe | m\* |

#### Anunāsika or candrabindu

If a candrabindu (crescent-and-dot) graph (Figure 4.2.B/2) is distinguished from the basic anusvāra in a way you consider, based on your knowledge of the source text and its writing system, to be graphemically relevant (i.e. to represent vowel nasalisation or a nasal sound other than the standard Indic nasal consonants), then distinguish it from the anusvāra in your transliteration:

* **anunāsika or candrabindu** → m̐
  + not available as a precomposed glyph: enter a regular m and ◌̐ (U+0310 Combining Candrabindu)
* do not use the candrabindu diacritic in combination with any other Roman letter, thus transliterate tām̐l lakṣmīm rather than tāl̐ lakṣmīm

#### Other anusvāra variants

pending <https://github.com/erc-dharma/project-documentation/issues/387>

* **Cam anusvāra-candra** → m̃
  + not available as a precomposed glyph: enter a regular m and ◌̃ (U+0303 Combining Tilde)
  + not covered by ISO-15919
* if your text employs a special glyph for (a kind of) anusvāra in addition to the regular form, then occurrences of the special glyph shall be transliterated as ṁ\*, including in particular
  + the Javanese/Balinese special anusvāra with a small stroke beside it (to indicate pronunciation as /m/), called ulu ricem in Balinese, as shown on the right in nāśaṁ\*
  + the alternative anusvāra character used in some mediaeval Bengali documents, shown in the image on the right
  + note that if you use an asterisk for this purpose, then you are advised not to use asterisks as shorthand for a zero vowel marker (§4.3.2.1)
* extension to others not covered in our corpora, e.g.
  + Gurmukhi ṭippī
  + Telugu half-anusvāra (also called candrabindu, but it is not an anunāsika, does not have a candra+bindu shape, and can co-occur with proper candrabindu in some texts, <https://unicode.org/L2/L2010/10392r2-chandrabindus.pdf> )

### Visarga and its relatives

Some varieties of the Indic writing system make a graphic distinction corresponding (with more or less regularity) to allophones of the visarga, using the sign called upadhmānīya before palatals and another sign called jihvāmūlīya before velars (Figure 4.2.C). When a distinction is made in the text you are transliterating, then preserve this distinction in transliteration regardless of whether the visarga alternatives are used systematically and correctly or not.

* **upadhmānīya** → ḫ
  + (U+1E2B Latin Small Letter H with Breve Below)
  + the public shorthand f may, when necessary, be used instead
* **jihvāmūlīya** → ẖ
  + (U+1E96 Latin Small Letter H with Line Below)
  + the public shorthand x may, when necessary, be used instead

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Figure .. Visarga relatives | | | | |
| 1 | 2 | 3 | 4 | 5 |
| visarga | combining upadhmānīya | combining jihvāmūlīya | inline upadhmānīya | inline jihvāmūlīya |
|  |  |  | ᳶ |  |
| yaḥ | ḫpu | traẖka | ḫ | yoẖka |

While the basic visarga is always written inline as a practically independent graph (§**Hiba! A hivatkozási forrás nem található.**), the jihvāmūlīya or upādhmānīya can, depending on the specific writing system, either appear independently (Figure 4.2.C/4,5) or behave like a consonant graph and form a conjunct with the following consonant (Figure 4.2.C/2, 3). Since all members of the visarga family are recognised as graphemes in our scheme and are thus transliterated with a separate character, it is neither possible nor essential for the transliteration to indicate which of these behaviours is present in a given source text. However, whenever deemed expedient, the markup described in §4.6.3.4 may be used to represent deviations from the expected behaviour.

## Graphemes extending the basic repertoire

This section is concerned with alphabetic graphemes of Indic writing systems used primarily for languages other than Middle Indo-Aryan and Classical Sanskrit. Systemic changes (i.e. innovations which do not consist in the introduction of novel graphs for specific graphemes) will be discussed further on, in §4.6.

### Graphemes of other Indian writing systems

The transliteration equivalences listed in this section are conformant with ISO-15919.

* **Dravidian (and other) short e and o**, as distinct from long ē and ō, are discussed in §4.2.3 above
* **special variants of the anusvāra** are discussed in §4.2.4.2 above
* **Tamil āytam**, |ஃ| → ḵ
  + (U+1E35 Latin Small Letter K with Line Below)
* **Dravidian alveolar nasal**, Tamil |ன| → ṉ
  + (U+1E49 Latin Small Letter N with Line Below)
* **Dravidian, Vedic and New Indo-Aryan retroflex lateral**, Tamil |ள|, Kannada/Telugu |ಳ|, Vedic/NIA |ळ| → ḷ
  + (U+1E37 Latin Small Letter L with Dot Below)
  + **Vedic aspirated retroflex lateral** |ळ्ह| → ḷh
* **Dravidian retroflex approximant / frictionless continuant**, Tamil |ழ|, Kannada/Telugu |ೞ| → ḻ
  + (U+1E3B Latin Small Letter L with Line Below)
* **Dravidian alveolar trill/stop**, Tamil |ற|, Kannada/Telugu |ಱ| → ṟ
  + (U+1E5F Latin Small Letter R with Line Below)
* **New Indo-Aryan retroflex flap**, Hindi |ड़| → ṛ
  + (U+1E5B Latin Small Letter R with Dot Below)
  + **New Indo-Aryan aspirated retroflex flap**, Hindi |ढ़| → ṛh

### Graphemes of Southeast Asian writing systems

The transliteration equivalences listed in this section are not covered by ISO-15919 (which is targeted at Indian writing systems).

* **special variants of the anusvāra** are discussed in §4.2.4.2 above
* **short mid-central vowel, “schwa”**, Javanese/Balinese pepet |ᭂ| → ə
  + U+0259 Latin Small Letter Schwa
  + if this character is difficult to produce, you may use the private shorthand ĕ
* **long mid-central vowel**, Javanese/Balinese pepet tedung |ᭃ| → ə:
  + U+0259 followed by a colon[[83]](#footnote-83)
  + in loose transliteration, ə̄ may be used instead
    - not available as a precomposed glyph: enter U+0259 and ◌̄ (U+0304 Combining Macron)
* **Khmer (and Mon-Burmese) glottal stop** → q
  + the Roman letter q
  + see also §### about the representation of independent vowels involving this component and §### about its use as a consonantal grapheme
* **barred/dotted variant of b in Mon and Pyu** → ḅ
  + U+1E05 Latin Small Letter B with Dot Below

#### Graphemic combination of the vowel markers |u| and |i|

|  |
| --- |
| Figure .. Combined ui |
|  |
| gui |

In Khmer, Burmese and Mon, the vowel markers which independently signify <u> or <ū> and <i> may be combined so that together they represent a particular phoneme. Since this is an established feature of the writing system, in principle the combination of these graphic elements is a single graph (cf. §**Hiba! A hivatkozási forrás nem található.**[[84]](#footnote-84)). Nonetheless, in accordance with the conventions of the field and in order to highlight the palaeographic precedent of this graph, we transliterate them individually. This transliteration approach may also be perceived as the use of a target digraph for a diphthong.

for the **vowel markers u/ū and i** used together to represent a particular phoneme in Khmer, Burmese and Mon (as in the Khmer character shown in the image):

* the vowel marker |u| or |ū| used in combination with the marker |i| to represent a phoneme shall be transliterated as ui and ūi
  + for example, the Khmer glyph in Figure 4.3.A is transliterated gui
* note that in certain writing traditions, a combination of the markers |u| and |i| may signify scribal deletion
  + scribal marks (§6.6) are not alphabetic graphemes and must not be transliterated as such, only represented in XML markup
* see also §4.6.3.6 about other circumstances in which an akṣara may have more than one vowel marker

## Vowelless consonants

Many historic variants of the Indic writing system employ special final (halanta) forms of the regular consonant graphemes to represent vowelless consonants (Figure 4.4.A). We consider these to be graphemic allographs (§2.4.4) of the consonant graphemes and deem it important to distinguish them from the default in-akṣara allographs in philologically accurate transliteration (§3.3.2), as described in §4.4.2. Conversely, many Indic writing systems (especially more recent ones) employ an explicit zero vowel marker (virāma, puḷḷi, patén/pangkon, etc.; also referred to as a vowel killer) in combination with the regular consonant graphs in order to represent vowelless consonants. In our view, the vowel killer is, for all practical purposes, a grapheme (§2.4.5), which must thus be transliterated with a corresponding target grapheme as per §4.4.3. Representing zero vowel markers by a separate character in the transliteration has the added advantage of allowing the application of markup to that sign.[[85]](#footnote-85) Considerations for distinguishing a final (simplex) form from (a complex) one involving a vowel killer are given in §4.4.1. In some source texts, a vowelless consonant may also be represented by the regular consonant graphs, as discussed in §4.4.4.

### Distinguishing final forms from characters with a vowel killer

Final forms may differ from the regular akṣara-forming graphs in any combination of size reduction, subscript positioning, stroke simplification and the absence of a headmark. Final consonant forms often also involve an additional “diacritical” stroke — such as a horizontal dash, a vertical squiggle above the primary graph, or a curl below it — which may be interpreted as a proto-virāma (see especially Figure 4.4.A/4). These transitional forms constitute a fuzzy boundary between simplex and complex glyphs.

The **primary criterion** for assigning a particular written instance to one of these classes is whether the body of the consonant is graphically identical to the form seen in regular akṣaras. If it is, and a stroke that may be interpreted as a zero-vowel marker is present, then transliterate it as a complex glyph with a virāma (§4.4.3). If, on the other hand, the body is graphically altered in one or more of the ways mentioned above, then transliterate it as a simplex final character (§4.4.2), even if a stroke that might be interpreted as a zero-vowel marker is present. Being fairly objective, this is a practicable criterion, but it does not necessarily do justice to all occurrences. In ambiguous cases, base your decision on your knowledge of the practice of the source text in question and of the writing system of the time and region. A relevant consideration is the productivity of these nascent vowel killer signs. If they appear only in final positions, with a small range of consonants, and especially if their form varies depending on the consonant, then it is better not to recognise them as virāma graphemes. Conversely, if they can appear word-internally (where ligatures would be a feasible alternative), are combined with a variety of consonants, and they have the same form regardless of the consonant, then it is more prudent to interpret them as actual virāmas.

### Final consonants as simplex glyphs

* **simplex final consonant forms must always be transliterated** as the corresponding uppercase Roman consonant, e.g. N, M, etc.
  + should you encounter simplex final forms of consonants for which our transliteration uses digraphs, use uppercase only for the first letter of the digraph, e.g. Th
  + guidelines for deciding what constitutes a special final form are given in §4.4.1 above

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Figure .. Final consonant graphs | | | | |
| 1 | 2 | 3 | 4 | 5 |
|  |  |  |  |  |
| yaN | dattaM | ṇāM|| | yaT | dr̥K |

### Independent consonants as complex glyphs involving a vowel killer

* complex glyphs involving a regular consonant form and an explicit zero vowel marker must always be transliterated as follows
  + transliterate the consonant component normally (with the lowercase equivalent)
  + transliterate the vowel killer as ·
    - U+00B7 Middle Dot
  + e.g. Devanagari |त्| → t·
  + if you need to transliterate vowel killers frequently but have difficulty entering the middle dot, you may use an asterisk \* as private shorthand
    - this shorthand must not co-occur with asterisks used for special forms of the anusvāra, §4.2.4.2
* the **Tamil puḷḷi**, when explicitly present in the source (cf. §4.4.4), is not to be treated differently from other vowel killers
  + e.g. |த்த| → t·ta

### Regular consonant signs for vowelless consonants: the “implicit puḷḷi”

Tamil inscriptions often use the regular consonant forms (which would imply the presence of the inherent vowel) for writing the non-final members of consonant clusters, as in Figure 4.4.B/1. For complete accuracy in the spirit of a universal transliteration of all Indic writing systems, these instances should be transliterated so that the inherent vowel is present in the transliteration. However, because this practice is widely prevalent, while conjunct akṣaras (ligatures) are rare in Tamil, we choose to make an exception for primary sources in this particular language,[[86]](#footnote-86) and prioritise transcription over accurate transliteration in the case of consonant clusters. That is to say, whenever a consonant cluster is present in a DHARMA-transliterated Tamil text, it is to be understood by default that the non-final consonants of that cluster were written in the source with the regular (akṣara-constituting) consonant glyphs. As a consequence of this decision, any cases where a consonant cluster is written differently in the source must be made explicit in the transliteration.

* where puḷḷi is not present in the source but is to be understood implicitly, as in Figure 4.4.B/1, simply transliterate the consonant cluster without any additional characters
  + e.g. |தத| (understood as த்த /tta/) → tta
* when puḷḷi is present in the source, as in Figure 4.4.B/2, always transliterate it like any other virāma (§4.4.3)
* when an actual ligature occurs in Tamil script, as in Figure 4.4.B/3, this must be treated as unusual akṣara composition, according to the instructions in §4.6.3.2

|  |  |  |
| --- | --- | --- |
| Figure .. Consonant clusters in Tamil | | |
| 1 | 2 | 3 |
| நந கக | ந்ந க்க | **C:\GoogleDrive\DHARMA project\Encoding Guide\Encoding Guide Images\Tamil ligatures from Manu\nnakka_SII_6_p_166.png** |
| nna, kka | n·na, k·ka | n=na, k=ka |

## Independent vowels

### Independent vowels as simplex glyphs

The aksharic Indic writing system normally represents vowels with markers (§**Hiba! A hivatkozási forrás nem található.**) attached to consonant graphs, or as inherently implied by the consonant graphs themselves. This method is incapable of representing vowels in an initial position (i.e. at the beginning of a graphic sequence) and vowels in hiatus (i.e. those following another vowel in a sequence). Therefore, aksharic writing systems include independent vowel graphs for use in such situations. As is the case with special vowelless consonant forms (§4.3.2.1), these independent vowels are in our view graphemic allographs (§2.4.4) of the vowel graphemes, and we deem it important to distinguish them from the default in-akṣara allographs in philologically accurate transliteration (§3.3.2), in the manner described in §4.5.1.

* if the original script employs a distinct character for vowel-only akṣaras (initial vowels and vowels in hiatus), these shall be mandatorily transliterated as follows
  + enter the corresponding uppercase Roman consonant, e.g. A
    - thus, इति → Iti, whereas कृतमिति → kr̥tam iti
    - for the independent forms of the diphthongs ai and au, capitalise only the first character of the digraph in your transliteration, i.e. use Ai and Au (whereas AI and AU would transliterate अइ and अउ, should these combinations occur)

### Independent vowels involving a vowel support

In specific Southeast Asian systems, the original graph for the independent vowel <A> has evolved into a sign representing a “zero consonant” or a “minimal consonant” (a glottal stop or a /h/-like glottal fricative).[[87]](#footnote-87) In this role, it can function as a *vowel support*, taking on vowel markers in combinations which replace the original independent vowel graphs, as described in §###. Moreover, in some writing systems it can even form conjuncts with consonant graphs, indicating that it was perceived by the users of those systems as a fully fledged consonantal grapheme, addressed in §###.

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As noted in §**Hiba! A hivatkozási forrás nem található.**, the graphs for certain independent vowels are in many Indic writing systems derived from other independent vowel signs and a vowel marker; however, some Southeast Asian systems have a full set of independent vowel signs derived from a single basic graph (the independent allograph of the neutral vowel) and appropriate vowel markers. In this role, the basic graph can be referred to as a “vowel support”, meaning a graph whose only function is to provide a “zero consonant” to which vowel markers can be anchored. Some of these systems go further and additionally employ this basic graph to represent an actual consonantal phoneme (a glottal stop, /ʔ/) rather than a zero consonant. In these latter, the graph in question has the capacity to form ligatures with other consonant graphs. This systemic change is complete in Khmer, where |អ| functions fully as a consonantal graph, but has been carried through to varying degrees in the writing traditions of Java, Bali and Lombok.[[88]](#footnote-88)

When this graph functions only as a vowel support, it is questionable whether it can be properly called a graph (i.e. the representation of a grapheme), or merely a graphic element. However, in a consonantal role it is definitely a graph, representing a grapheme. For this reason, we prefer to recognise it as a graph regardless of the role it plays, and always transliterate it explicitly. The following instructions for the strict and loose transliteration (§3.4) of vowels composed with a vowel support are summarised and illustrated for the Khmer and Balinese writing systems in Figure 4.5.B below.

|  |
| --- |
| Figure .. Vowel support |
|  |
| qət r̥ṅyəkən tikiṁ |

* in the **strict transliteration of all writing systems in which a vowel support exists**, regardless of whether it corresponds to a consonantal phoneme or is used only as a vowel support
  + transliterate the vowel support with the Roman letter q, as in Figure 4.5.A
  + when the same graph is used on its own to represent independent <A>, transliterate it as A (and not as qa)
  + likewise, independent vowel graphs which do not involve a vowel support must always be transliterated with the corresponding uppercase vowel, even if they clearly signify a consonant phoneme in addition to the vowel
    - for example, Khmer អេត → qeta but ឯត្ត → Etta
* the same transliteration is to be used when the graph representing the glottal stop combines into a ligature with other consonantal graphs
  + in a syllable-initial position, e.g. |អ្នក| → qnaka
  + in post-consonantal position, e.g.
    - |ផ្អក| → phqaka
    - |ល្អិត| → lqita (as opposed to |ល្ឥត| → lIta)
    - |ប្អូន| → pqūna (as opposed to |ផ្ឧន| → phUna)
    - |ក្អេក| → kqeka (as opposed to |ក្ឯក| → kEka and |ក្អែក| → kqaeka[[89]](#footnote-89))
* however, in the **loose transliteration** of characters involving a vowel support, **transcription** of the language has priority over transliteration of the script, therefore
  + in languages **where the vowel support is silent** (i.e. it stands for a zero consonant), as in Balinese in Figure 4.5.B, ignore it in loose transliteration and simply transcribe the relevant vowels
    - e.g. Balinese |ᬅᬾ| <qe> → e
  + in languages **where the vowel support signifies a consonant** (normally the glottal stop), as in Khmer in Figure 4.5.B, always transcribe it explicitly
    - in loose transliteration, either q or ’ (the right single quote) may be used to represent the glottal stop
    - note that this sound should be transcribed even when the vowel support is on its own (representing the independent vowel <A>)
      * e.g. Khmer |អ| <A> → qa or ’a
    - except for Sanskrit names and loanwords occurring in an Old Khmer text, whose loose transliteration should transcribe the Sanskrit and not involve the glottal stop (e.g. Amoghapura rather than qAmoghapura or ’Amoghapura)
      * even though Khmer speakers would have pronounced a glottal stop in these names and words

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Figure .. Independent vowels composed with a vowel support | | | | | | | | | |
| language and writing system | IPA  transcription | simplex glyph | | | complex glyph | | | | |
| glyph | transliteration | | glyph | components | transliteration | | |
| strict | loose | |
| strict | loose | lowercase | uppercase |
| Khmer | /ʔa/ | អ | | | | |A| | A | qa / ’a | qA / ’A |
| Balinese | /a/ | ᬅ | | | | a | A |
| Khmer | /ʔi/ | ឥ | I |  | អិ | |A| + |i| | qi | qi / ’i | qI / ’I |
| Balinese | /i/ | ᬇ |  | ᬅᬶ | i | I |
| Khmer | /ʔiː/ | ឦ | Ī |  | អី | |A| + |ī| | qī | qī / ’ī | qĪ / ’Ī |
| Khmer | /ʔu/ | ឧ | U |  | អុ | |A| + |u| | qu | qu / ’u | qU / ’U |
| Balinese | /u/ | ᬉ |  | ᬅᬸ | u | U |
| Khmer | /ʔuː/ | ឪ | Ū |  | អូ | |A| + |ū| | qū | qū / ’ū | qŪ / ’Ū |
| Khmer | /ʔe/ | ឯ | E |  | អេ | |A| + |e| | qe | qe / ’e | qE  / ’E |
| Balinese | /e/ | ᬏ |  | ᬅᬾ | e | E |
| Khmer | /ʔaj/ | ឰ | Ai |  | អៃ | |A| + |ai| | qai | qai / ’ai | qAi / ’Ai |
| Khmer | /ʔo/ | ឱ | O |  | អោ | |A| + |o|[[90]](#footnote-90) | qo | qo / ’o | qO / ’o |
| Balinese | /o/ | ᬑ |  | ᬅᭀ | o | O |
| Khmer | /ʔao/ | ឳ | Au |  | អៅ | |A| + |au| | qau | qau / ’au | qAu / ’Au |
| Balinese | /ə/ |  |  |  | ᬅᭂ | |A| + |ə| | qə | ə | Ə |
| Balinese | /əː/ |  |  |  | ᬅᭃ | |A| +  |ə| + |ā|[[91]](#footnote-91) | qə: | ə̄ | Ə̄ |

## Systemic innovations in the Indic writing system

The adaptation of the Indic writing system to languages whose phonology and phonotactics differed considerably from Old and Middle Indo-Aryan languages entailed a number of innovations in specific varieties of the writing system. We have attempted to group these according to the manner in which we approach their transliteration, which in turn is based on our understanding of their graphemic nature, but many of these innovations are difficult to classify in graphemic terms, so the structuring of this section is not entirely rigorous. Additional graphemes (among which we include the combination of the graphs for |u| and |i| to represent a particular phoneme, §4.3.2.1) have been covered above in §0. Herein, §4.6.1 treats graphic signs which are, or may be, diacritical marks in the source writing system, but are treated in transliteration as graphemes. In §**Hiba! A hivatkozási forrás nem található.** we cover cases where pre-existing graphic signs are repurposed for the writing of sequences that would be written in a more complex way by the standard conventions of the Indic writing system. Finally, §4.6.3 discusses what we can do in transliteration to reflect unusual ways of combining graphs into complex glyphs.

### Borderline diacritical marks

As explained in §**Hiba! A hivatkozási forrás nem található.**, diacritical marks in the strict sense are not graphemes and therefore should not be individually represented in transliteration. What matters is that the graphemes distinguished by diacritics in the source must also be distinguished — with diacritics or otherwise — in the transliteration. Thus, §0 above provides transliteration equivalences for a few diacritically modified source graphemes in our scope, while others may be added to the transliteration scheme as and when the need arises.[[92]](#footnote-92) However, as observed in §**Hiba! A hivatkozási forrás nem található.**, ambiguous situations do arise in the course of the adaptation and evolution of writing systems. This section contains provisions for graphic elements of some specific writing systems which are arguably diacritical marks, but which we nonetheless prefer to transliterate individually, as if they were graphemes.

#### The |ā| graph as a signifier of length in maritime Southeast Asia

In some Southeast Asian writing systems, we see the evolution of the original vowel marker for the grapheme <ā> into a diacritical mark signifying length in association with any vowel,[[93]](#footnote-93) and even with consonants.

@

The graph originally serving as the marker for the dependent vowel <ā> (Javanese tarung |ꦴ|, Balinese tedong |ᬵ|) is also used in some Indonesian texts as a signifier of vowel length or consonant doubling (Figure 4.6.A). In this function, it is a sort of diacritical mark, but treating it as such in transliteration would require an inordinate number of additional target graphemes, while transliterating it strictly according to its original graphemic value (like the adaptations discussed in §###) would obscure its function. We therefore grant special treatment to this phenomenon.

Taking advantage of the facts that the colon is widely used in transcription as an indicator of length and that the disambiguation colon of ISO-15919 is hardly ever needed in our transliteration scheme (§3.6.1), we dedicate the colon to the transliteration of this “honorary grapheme”, and use it as described in the following subsections. This is a slight inconsistency in the transliteration system, which we deem acceptable when weighed against the gain of providing easy keyboard access and intuitive interpretability for the length marker. If in any text or corpus an ambiguity should arise (i.e. both the disambiguation colon and the length marker colon need to be present), use the IPA triangular colon ː (U+02D0) for the length marker.

|  |  |  |
| --- | --- | --- |
| Figure .. The |ā| graph as a signifier of length | | |
| 1 | 2 | 3 |
|  | Macintosh HD:Users:username:Documents:PHILOLOGY PROJECT:Edisi Bhīmaswarga:BS Cahier d'Archipel:Figure4.jpg |  |
| qə:bni pilaṁ | gnәp:ipitu | turut:vaḥna |

* when the graph originally denoting <ā> is used in conjunction with another vowel marker to transform the latter into a long vowel, enter a colon (:) after the short vowel to transliterate the length marker
  + e.g. Figure 4.6.A/1 → qə:bni pilaṁ (see also §4.5.2 about the transliteration of the vowel support)
* when the graph originally denoting <ā> is attached to an akṣara to indicate the lengthening (doubling, gemination) of the consonant component of that akṣara, enter a colon (:) after the transliterated consonant to which the doubling pertains
  + e.g. Figure 4.6.A/2 → gnәp:ipitu (pronounce /gәnәp pipitu/, Old Sundanese “fully seven”)
  + the colon shall be next to the transliterated consonant even if it is not adjacent in the original
    - e.g. Figure 4.6.A/3 → turut:vaḥna (pronounce /turut tvaḥna/, “you should follow his behaviour”)

#### Underdotted akṣaras in mainland Southeast Asia

to be written up once <https://github.com/erc-dharma/project-documentation/issues/387> is decided

* **akṣaras with underdot in Mon, Pyu and Burmese** → ṃ
  + U+1E43 Latin Small Letter M with Dot Below
  + to be added where? after the akṣara? after the consonant? e.g.?
  + because the function of this underdot is poorly understood, we prefer to transliterate it as if it were a separate grapheme, even though it may be merely a diacritical mark

### Repurposed graphic signs

Certain signs (graphs or glyphs) in certain varieties of the Indic writing system have taken on a secondary signification as a context-dependent alternative to their primary signification shared in all varieties of the Indic system. Situations where an identical graphic representation corresponds to several different graphemic significations may be regarded as homography (§**Hiba! A hivatkozási forrás nem található.**). Proper homographs are essentially different graphemes which are, incidentally, manifested by identical graphs, and should accordingly be transliterated on the basis of their graphemic value (cf. §4.7.1).

@homography now largely removed from theoretical background, may need to reintroduce somewhere

#### Signs with a secondary phonographic function

The present section is concerned with innovations in specific writing systems which repurpose a simple (and not necessarily alphabetic) graph or glyph of the generic Indic writing system to optionally represent phonological information that would be expressed in a more complex way according to the usual conventions of the Indic system. A similar phenomenon in modern international writing is the use of the numeral sign |2| to represent the English word “to” or the corresponding sequence of phonemes, as in the phrase “go 2 bed” or the word “2gether”. The graphic sign can thus have two significations: the conventional one and the innovative one.

@part of homography moved to top

@but if moving the alphanumeric signs down to the symbol section, then rearrange so there is no subsection here

Situations where an identical graphic representation corresponds to several different graphemic significations (the way |2| can mean either the number 2 or the phonemes /tʊ/) may be regarded as homography (§**Hiba! A hivatkozási forrás nem található.**). Proper homographs are essentially different graphemes which are, incidentally, manifested by identical graphs, and should accordingly be transliterated on the basis of their graphemic value (cf. §4.7.1).

However, in this case homography is combined with heterography, meaning that a single graphemic value can be expressed in two ways: the conventional (complex) way and the innovative (simpler) way which is homographic to a different signification. Transliterating only the graphemic value would entail loss of information (equating “together” to “2gether”) about the alternative that was employed in any given instance in a source text.

In view of this complication, in the strict transliteration of such graphemes we choose to adhere to the primary graphemic value that is universal to Indic writing systems, disregarding their innovative phonetic value in accordance with the principle that transliteration is concerned primarily with graphemes, and not with their pronunciation in any particular language (§**Hiba! A hivatkozási forrás nem található.**). However, in loose transliteration (§3.5.2) we prioritise the phonetic value applicable in any given context, i.e. actually transcribe such graphemes rather than transliterating them. In XML editions, moreover, the transliterated primary signification may be normalised through computer markup (EGD §###) to the transcribed secondary signification.

The actual cases of repurposing that we are aware of are mostly Old Sundanese (Figure 4.6.B), but analogous phenomena in other specific writing systems should be handled in the same way.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Figure .. Repurposed graphic signs | | | | |
|  | 1 | 2 | 3 | 4 |
|  | Macintosh HD:Users:username:Pictures:Naskah Nusantara:Perpusnas:Bima Swarga:Bhīma Swarga 623 P 16:sastra.png | Macintosh HD:Users:username:Pictures:Naskah Nusantara:Perpusnas:69 L 626:di jeroning wawangunan.png | Macintosh HD:Users:username:Pictures:Naskah Nusantara:Perpusnas:L 621 P15:ku nu rye.png |  |
| strict | sasṭā | di jә2niṁ vavaṁṅun:an· | ku nu rye | rahyiṁ |
| loose | sastra | di jәroniṅ vavaṅunan | ku nu reya | rahiyaṅ |

* when the glyph Macintosh HD:Users:username:Documents:PHILOLOGY PROJECT:Edisi Bhīmaswarga:BS Cahier d'Archipel:tra_b.jpg ṭā is used in Old Sundanese to represent the phonemes /tra/
  + use ṭā in strict transliteration and tra in loose transliteration
  + e.g. Figure 4.6.B/1 → sasṭā; loose transliteration: sastra
* when the numeral sign |2| is used in Old Sundanese to represent the phonemes /ro/ (presumably because the word for the number 2 is ro or roro in Javanese, whose writing tradition heavily influenced Sundanese)
  + use 2 in strict transliteration and ro in loose transliteration
    - since the target grapheme <2> does not represent a number in this case, the XML markup for numbers (EGD §###) must not be used
  + e.g. Figure 4.6.B/2 → di jә2niṁ vavaṁṅun:an·; loose transliteration: di jәroniṅ vavaṅunan (“in the interior of the building”)[[94]](#footnote-94)
* when subscript <y> is used in Old Sundanese to make an akṣara bisyllabic (so that the body consonant and the attached vowel marker are to be pronounced first, followed by /ya/)
  + use yV in strict transliteration and Vya in loose transliteration
  + e.g. Figure 4.6.B/3 → ku nu rye; loose transliteration: ku nu reya (“by many [people]”)
  + e.g. Figure 4.6.B/4 → rahyiṁ; loose transliteration: rahiyaṅ[[95]](#footnote-95)
* when the independent glyph <R̥> is used in Old Javanese for expressing the syllable rǝ
  + use R̥ in strict transliteration and rǝ in loose transliteration
  + e.g. sǝR̥ḥ corresponding to sǝrǝh in loose transliteration (with the visarga also normalised to h)

### Variation in glyph composition

As noted in §3.3.2, the universal rules of the Indic writing system determine which graphemes combine into a single complex glyph and which do not, but there are some systematic as well as idiosyncratic deviations from these rules. This section introduces text-based editorial markup involving the = (equals) sign, to be used when graphemes combine into a complex source in a way other than what would be expected on the basis of the general rules of the Indic system.

@perhaps elaborate, here and/or in the basic principles mention of the = sign: we basically use the = for akṣara composition that differs from the general Indic rule but is systemic in specific writing systems [or maybe not… consider and write up or discard]

#### Optional shorthand for complex glyphs

We use the = (equals) sign as optional shorthand in the role of a character joiner, as simple text-based markup for use between two target graphemes that are manifested as parts of a single character in the source, even though they would normally manifest as (parts of) separate characters according to the general rules of the Indic writing system. This markup — based on the convention of using an = sign (a double hyphen) instead of a space to indicate that the end of one transliterated word and the beginning of the next belong to a single source akṣara — is a simple alternative to the XML-based markup introduced in EGD §###. The latter can replace the former in any function and has a broader scope than the shorthand. Nonetheless, because the shorthand is simpler to produce and to read, we approve of employing it in XML editions, especially for cases of systematic variation that the informed reader will be able to interpret. Prominent cases of such variation are discussed with specific recommendations in the following subsections.

* when the character joiner sign is placed between two graphemes which are separated by an editorial space (§###) or hyphen, always put the = sign first, and the space or hyphen second

#### Conjunct consonants in writing systems where they are not the norm

Some specific writing systems, notably for the Tamil language, allow the writing of consonant clusters with regular consonant signs, which are then to be understood as if they were accompanied by a vowel killer (puḷḷi). As per §4.4.4, we treat this as the default mode of writing consonant clusters in these writing systems. Occasionally, however, ligatures composed according to the standard manner of the Indic writing systems may also be used in texts employing this system. The possibilities for writing a consonant cluster in Tamil are illustrated in Figure 4.4.B. In the transliteration of consonant clusters written with a ligature, it is recommended that you use the optional character joiner sign = to indicate that the graphemes in question belong to a single akṣara.

* where a Tamil text written in Tamil script employs a ligature, as in Figure 4.4.B/3
  + use the = sign between the corresponding transliterated consonants to distinguish the ligature from the script’s default method of writing conjunct consonants as two glyphs with an explicit or implicit zero vowel marker, e.g.
    - n=na (as distinct from |ந்ந| n·na and |நந| nna)
    - *k=ka* (as distinct from |க்க| k·ka and |கக| kka )
* Tamil ligatures should be made explicit in this manner whenever feasible
* however, the = sign must never be used in ligatures of a writing system where conjoining is the default method of representing consonant clusters, and this includes Tamil written in Grantha

#### Double kāl in Tamil

|  |  |
| --- | --- |
| Figure .. Double kāl | |
|  | |
| rā, r=ā | ā=r |

* when in Tamil script a fusion of two kāl signs appears, as in Figure 4.6.C, which may be interpreted either as <rā> or as <ār>, proceed as follows
  + make an interpretive decision as to what grapheme sequence was intended (§4.7.1)
  + transliterate that sequence as follows
    - for <ār>, add the character joiner sign to indicate that these graphemes belong to a single glyph in original
    - for <rā>, the joiner sign is not necessary, since these graphemes would naturally constitute one akṣara
      * but you may choose to add the = sign nonetheless to make it explicit that a fused double kāl is present
  + if ambiguity is present, then record it (in an apparatus note or through XML encoding)

#### Independent and dependent upadhmānīya and jihvāmūlīya

As noted in §4.2.5 (with Figure 4.2.C), upādhmānīya and jihvāmūlīya can either appear independently or behave like a consonant graph and form a conjunct with the following consonant. If these two behaviours alternate within a single text, or if the behaviour of these signs in a particular text is not what would be expected on the basis of related texts (in the same language, from the same region and time), then note the default behaviour in your palaeographic description and record the deviations from it. The character joiner sign = may in this case be optionally used in the edition to indicate the idiosyncratic association of the visarga variants.

@it may, after all, be more logical to avoid the = sign and use uppercase for the independent forms

* if the default behaviour is visarga-like, then idiosyncratic combining upadhmānīya and jihvāmūlīya may be transliterated ḫ= and ẖ=, indicating that it combines with the following consonant
  + e.g. Figure 4.2.C/2: ḫ= pu; Figure 4.2.C/3: traẖ= ka
* if the default behaviour is consonant-like, then idiosyncratic inline upadhmānīya and jihvāmūlīya may be transliterated =ḫ and =ẖ, indicating that it, like a visarga, is associated more closely with the preceding akṣara
  + e.g. Figure 4.2.C/5: yo=ẖ ka

#### Alternative behaviour of the superscript |r|

In most varieties of the Indic writing system, the grapheme <r> has, in addition to its basic form, two graphotactic allographs (§2.4.4) for use in complex glyphs. The superscript |r| (e.g. in Devanagari |र्क| <rka>) indicates that the phoneme /r/ is to be pronounced before the body consonant of a complex akṣara, while the subscript |r| (e.g. in Devanagari |क्र| <kra>) means that it is to be pronounced after the body consonant. Indonesian writing systems, however, often employ the superscript graph (called layar or surang) in an alternate mode in order to cater for closed syllables, where the /r/ phoneme represented by it is to be pronounced at the end of the sequence corresponding to the akṣara with the superscript r, as in |ᬲᬫᬃ| <*samar*> and in Figure 4.6.D. We shall refer to this as the Indonesian mode, as distinct from the Indian mode where the subscript |r| is to be interpreted in the traditional way, as in |ᬲᬯᬃ| <*sarva*>.

Because this is a systematic feature of certain writing systems, we prefer to transliterate both modes in the sequence in which they were intended to be pronounced. If a given text uses only one of the two modes, then it is sufficient to note this in the text’s palaeographic description. If both modes are present within a single text, then you must declare one of the modes (the dominant one) to be the default for the text and note the exceptions which use the other mode. In addition, you can use the optional character joiner sign = the graphic attachment of the <r> grapheme to the preceding or the following grapheme. This is recommended for the non-dominant mode in a text that uses both modes, and may (for the sake of explicitness) be used with every instance of a superscript |r| in any text where alternates modes might be applicable.

|  |
| --- |
| Figure .. Indonesian superscript |r| |
|  |
| Ina=rpaṇakan· |

* if the Indonesian mode is dominant in a text,
  + preferably add = to instances of the Indian mode
    - e.g. ᬲᬯᬃ → sar=va
  + for maximum precision, optionally also add = to instances of the Indonesian mode
    - e.g. ᬲᬫᬃ → sama=r
* if the Indian mode is dominant in a text,
  + preferably add = to instances of the Indonesian mode
    - e.g. ᬲᬫᬃ → sama=r
    - e.g. Figure 4.6.D → Ina=rpaṇakan·
  + for maximum precision, optionally also add = to instances of the Indian mode
    - e.g. ᬲᬯᬃ → sar=va

#### Multiple vowel markers within a complex glyph

The only systematic usage of more than one vowel marker graph in a complex glyph in our scope is the simultaneous presence of |u| and |i| in some writing systems of Mainland Southeast Asia. Since we prefer to see this as an established graphic sign for the distinct grapheme <ui>, it has been treated above under §4.3.2.1. When the function of the same vowel markers is to indicate deleted characters, then we are not dealing with a grapheme proper, but with a scribal mark, for which see §3.7.1.1.

Any other instance of more than one vowel marker in an akṣara is likely to be a result of non-standard orthography or simple scribal error (e.g. intended scribal correction from one marker to the other, without deletion of the former). XML markup is available for normalising non-standard usage (EGD §###) and correcting scribal error (EGD §###) or encoding scribal correction (EGD §###). Since our transliteration system employs lowercase Roman vowels for source vowels materialising as markers (and uppercase for those materialising as independent vowel signs), the transliteration of the received text in itself indicates unambiguously when more than one vowel marker is present in a source akṣara. Therefore, simply transliterate both vowel markers, in an arbitrary order that seems most plausible. Nonetheless, when deemed desirable, such occurrences in the source can be made explicit by adding the optional character joiner = between the two transliterated vowels. For example:

|  |  |
| --- | --- |
| Figure .. Multiple vowel markers | |
| 1 | 2 |
|  |  |
| du=ā | mr̥=i |

* Figure 4.6.E/1 → du=ā
  + this instance is probably a scribal mistake for an intended ddhā, and its editorial correction is to be encoded as per EGD §###
* Figure 4.6.E/1 → mr̥=i
  + the simultaneous use of the vowel markers |r̥| and |i| (as well as of subscript |r| and the |i| marker) to represent the sonant /r̥/ is not uncommon, so we prefer to perceive it as non-standard orthography (rather than a scribal mistake), and encode its normalisation as per EGD §###

#### Independent vowel signs as parts of complex glyphs

In some Southeast Asian varieties of the Indic writing system, some of the graphs which traditionally represent independent vowels can combine into complex glyphs with consonantal graphs. Situations where complex graphs representing independent vowels (i.e. combinations involving a vowel support) form ligatures with consonants have already been mentioned under §4.5.2 and are not relevant here, since the “vowel support” graph in that case represents a regular consonantal grapheme. This section is concerned with simplex vowel graphs which are normally standalone glyphs, but which form ligatures in certain specific writing systems, as in Figure 4.6.F.

|  |  |
| --- | --- |
| Figure .. Independent vowel graphs in ligatures | |
| 1 | 2 |
|  |  |
| maR̥k= R̥mpva | Umiṅsor= I |

Our transliteration scheme represents such graphs with uppercase Roman characters (§4.5.1). The same transliteration is to be used for the identical graphs when they enter into ligatures. However, since this would imply that the graphs transliterated in this manner are also independent glyphs (§2.4.1), it is preferable in this case to indicate with the character joiner sign that they form a complex glyph with an adjacent grapheme.

* where an independent vowel graph is combined with regular a consonant graph or a superscript |r| graph to form a complex glyph
  + transliterate the vowel in uppercase as usual
  + preferably add the = sign between the consonant and the vowel sign to indicate that the two belong to the same akṣara
  + e.g. Figure 4.6.F/1 → maR̥k= R̥mpva
  + e.g. Figure 4.6.F/2 → Umiṅsor= I

## Editorial interpretation

Transliteration is ideally a mechanical representation of the source graphemes, to be kept clearly apart from any editorial interpretation. However, the identification of those source graphemes is in fact already an interpretive act, and in the specific cases discussed below, we endorse adding a limited amount of editorial interpretation to the transliterated text.

@make this a top section after layout?

### Silent identification of homographs

When determining the graphemic function of a graphic sign, it is sometimes impossible to collapse the solution space to a single point. The best practice in such cases is to establish the most likely reading and transliterate it, then address alternatives and uncertainties in XML markup (EGD §###) and/or a commentary (apparatus note), as applicable.

@move all repurposed signs, or only the tha/cha/1, back somewhere here?

* note that alternative readings of a graphic sign may be graphemically disparate, such as
  + the Tamil postscript vowel marker kāl |ா| or the character <ra> |ர|
  + in several historic scripts, the complex glyph for <su> or the simplex glyph for <A>
  + a visarga or a punctuation mark
  + a consonant glyph with innate a or a final consonant
* when interpreting homographs and near-homographs, we recommend that you prioritise the alternative which is (in your, sometimes subjective, judgement) the most appropriate to the context
  + this includes extending the benefit of doubt to the scribe or engraver in the case of homographs and near-homographs such as
    - dependent short or long i
    - subscript ṇ or n
  + in such cases, prefer to transliterate the grapheme expected in the context unless the distinction is clearly made by the same scribe elsewhere in the original
    - in the latter case, transliterate the inferior grapheme and encode editorial correction (EGD §###)

### Poorly legible text

When transliterating text that is ambiguous or not confidently legible in the original due to damage to the support or unusual execution of graphic signs, the most likely reading must be selected as primary and transliterated. All uncertainty in reading is to be encoded in XML as per EGD §###. For partially legible akṣaras, feel free to use the shorthand introduced below.

#### Wildcards for unidentified consonants and vowels

* as public shorthand, you may use uppercase C for an illegible consonant component and uppercase V for an illegible vowel component of an akṣara
  + since final <c> and <v> are extremely unlikely to occur in the texts, this will not interfere with our use of uppercase Roman letters for final consonants
  + nonetheless, in documents encoded in XML, this shorthand must be converted to the appropriate encoding (EGD §###)

### Distinction of long ē and ō from short e and o

As noted in §4.2.3, writing systems of the period we work with very rarely make a graphic distinction between the short and long versions of /e/ and /o/, even when this is a phonemic distinction in the language being written. When the palaeographically primary graph is employed for writing a phoneme known to be long, the rigorous approach would be to transliterate the primary (short) grapheme and optionally add an editorial normalisation in XML (EGD §###). However, since distinct graphs for the long counterparts of these vowels do not, as a rule, occur in the texts in our purview, we have made a projectwide decision to adopt shorthand involving transliteration with a macron. The target graphemes ē and ō will therefore always be understood in our practice as editorial, equivalent to the XML markup for the normalisation of an originally written short vowel. As a consequence, any graphically distinct long vowels present in the source will have to be marked up explicitly as such in XML. This makes the editing of texts that do make this distinction more cumbersome, but greatly simplifies the editorial markup of the majority of the texts we edit.

* pending decision on github shorthand issue
* optional shorthand for cases where the generic (short) graph for |e| or |o| stands for the long phoneme /ē/ or /ō/ in a language where the length of these vowels is a phonemic distinction that has no graphic reflection in the writing system
  + use ē or ō instead of e or o to transliterate (actually, transcribe) these instances
* **if the distinction is absent in the source**, i.e. the graphs representing the phonemes /ē/ or /ō/ are graphically indistinguishable from those representing the phonemes /e/ or /o/, then
  + the default transliteration for all instances of the generic graph is e or o
  + for any instances of the generic graph which in your opinion represent the long phoneme, you may choose to add editorial markup, which may take the form of
    - either the above optional shorthand
    - or XML markup for editorial normalisation of a short vowel to a long one (EGD §###)
* **if the distinction is present in the source**, i.e. the graphemes <ē> or <ō> are graphically distinguishable from the graphemes <e> or <o>, then
  + the observation that the distinction is present must be explicitly made in the palaeographic description of the text
  + the default transliteration for all instances of the (theoretically) short grapheme is e or o
  + for any instances of the (theoretically) short grapheme which in your opinion represent the long phoneme, you may choose to add editorial markup, which may take the form of
    - either the above optional shorthand
    - or XML markup for editorial normalisation of a short vowel to a long one (EGD §###)
  + all instances of the long grapheme (whatever phoneme it may represent) must be transliterated with ē or ō and **mandatorily marked up** in XML as original (EGD §###)

### Short vowel written where a corresponding long vowel is expected

Where a short vowel is written in place of an otherwise identical long vowel, you may choose to add a breve to the transliterated short vowel as shorthand indicating that the short vowel in question is the original spelling (and not a typographic mistake in your edition). This is especially recommended for Sanskrit loanwords in Indonesian vernacular documents, following Damais (1955, 15), but need not be applied in such documents if they never make a graphic distinction between short vowels and their long counterparts. This shorthand is equivalent to XML markup for originally inscribed non-standard usage (EGD §###).

* optional shorthand for short vowels written where a corresponding long vowel is expected
  + use ă, ĭ or ŭ when a, i or u is used instead of expected ā, ī or ū

### Sandhi analysis

Since we are concerned with the transliteration of what is written in an original source, sandhi should, as a rule, never be resolved in our texts. However, when the addition of simple text-based markup can serve to highlight the presence of certain kinds of sandhi, we approve of using hyphens to indicate epenthesis (§4.7.5.1) and apostrophes to indicate elision (§4.7.5.2) when such markup is in accordance with the conventions of the subfield.

#### Epenthetic consonants

When an epenthetic consonant is inserted into certain sequences, you may use a hyphen joining that consonant to the preceding grapheme. The use of this analytical hyphen is optional. The epenthetic consonant is regarded as belonging to the former word, and should be separated from the next word by a space (§8.3) or, if in compound, by a hyphen (§8.4) or, optionally, nothing.

* examples in Tamil:
  + I-p-peruṅ-kōyil (இப்பெருங்கோயில் i+perum+kōyil)
  + tiru-mēṉi-y āṭa (திருமேனியாட tiru+mēṉi + āṭa)
* example in Kannada: samavr̥tti-y appavōl (ಸಮವೃತ್ತಿಯಪ್ಪವೋಲ್ samavr̥tti + appavōl)
* non-standard Sanskrit sandhi involving an epenthetic m, s or r may be indicated in the same way, e.g.
  + paṁca-s-triṁśottaratame
  + mleccha-rājye-m apūjitaḥ
* note the above hyphenation must not be used in the following cases
  + when epenthesis takes place on the phonological level, but its graphic reflection involves the alteration of graphemes rather than the insertion of an additional grapheme (as in Sanskrit tad dhi from tat + hi), then we have no choice but to treat the altered grapheme as part of the latter word, and an analytical hyphen must not be inserted
  + when a normally single consonant is doubled in non-standard Sanskrit orthography when in conjunction with an r (or, occasionally, in other formations), this is not regarded as epenthesis; analytical hyphenation is not applicable, and the doubled consonant is understood to belong with the word to which the single consonant belongs
    - e.g. tair ggatvā

#### Elision of final vowels

The elision of a final vowel, in particular of the “overshort” final u of Tamil and short final vowels of other Dravidian languages (lōpasandhi), may be indicated by adding an apostrophe in place of the elided vowel. The use of this analytical apostrophe is optional. The elided vowel is regarded as belonging to the former word, and so the apostrophe should be separated from the next word by a space (§8.3) or, if in compound, by a hyphen (§8.4). The apostrophe should not be used if elision takes place inside a compound that you do not segment with hyphens.

The mandatory use of a space after this apostrophe also serves as a mechanistic distinction from the apostrophe used for the avagraha (§6.4.1). Such a distinction is important because the apostrophe representing elision is a feature of linguistic analysis and constitute essential markup shorthand (§3.6.6), whereas the avagraha in Sanskrit is an actual grapheme which could conceivably be present in the original, and absent, it may be supplied by the editor for the sake of normalisation

* example in Tamil: arit’ eṉṟu (அரிதென்று aritu + eṉṟu)
* examples in Kannada:
  + enag’ īge (ಎನಗೀಗೆ enage + īge)
  + aṁt’ āgi (ಅಂತಾಗಿ aṁtu + āgi)
* do not use the apostrophe in lexicalised compounds, as well as in any compounds you choose not to segment with hyphens
  + e.g. in Tamil, koṇṭ-āṭu (கொண்டாடு koṇṭu + āṭu)
* the apostrophe should preferably be ’ (U+2019 Right Single Quotation Mark)
  + if necessary, the optional shorthand ' (U+0027 Apostrophe), which is accessible on most keyboards, may be used as an alternative

### Free annotation

@@@write here a few lines about the palaeographic description, the critical apparatus and the commentary

# Numeral signs

## Overview

As outlined in §**Hiba! A hivatkozási forrás nem található.**, numeral signs can be considered graphemes for all practical purposes, and as such, we strive to transliterate them one-to-one. The Arabic numerals[[96]](#footnote-96) 0 to 9 provide straightforward equivalents for the corresponding ciphers in source writing systems. This takes care of decimal digits, i.e. the numbers 0 to 9 represented in any notation, as well as of all numbers represented in a decimal place-value notation,[[97]](#footnote-97) to be transliterated as per §5.2. However, no such equivalent offers itself for most numeral signs employed in sign-value notation (§5.3.2) with the exception of some fractions (§5.3.4), nor for numbers denoted by vertical bars (§5.3.3). To transliterate such signs, we must resort to deploying several target characters (usually, several Arabic numerals). In this case, the transliterated text requires markup (§5.3.1) expressing the fact that the target characters in question represent a single numeral sign of the original. The relevant markup is ideally in XML, but we provide shorthand options which may be used instead. Be mindful of the use of editorial spaces (§8.3.1.1) around numerals, regardless of whether their representation involves encoding, shorthand, or neither.

In XML editions, but nowhere else, all numbers written in numeral signs must, and all numbers written in words may be encoded so that the value of the number as a whole is recorded in the encoding, as described in EGD §###. This encoding is not applicable to (originally) numeral signs which are used in a function other than to denote numbers, such as the cipher <2> for the phonemes /ro/ (§**Hiba! A hivatkozási forrás nem található.**) and the cipher <1> used as an auspicious symbol (§###).

## The digits 0 to 9

|  |  |
| --- | --- |
| Figure .. Numeral signs 0-9 | |
| 1 | 2 |
|  |  |
| 1218 | 8 |

Any numeral sign which denotes an integer between 0 and 9 is to be transliterated plainly with the equivalent Arabic digit. The numeral signs themselves require no markup, but the value of the number is to be marked up in XML editions. These rules apply not only to multi-digit numbers represented in place-value notation (Figure 5.2.A/1), but equally to any digit that stands on its own (Figure 5.2.A/2), as well as to such digits additively combined with other numeral signs (Figure 5.3.A/2,3,5).

## Other numeral signs

Signs denoting numbers other than integers between 0 and 9 — unless they can be conventionally represented by a single target character as some fraction signs (§5.3.4) can — require markup (§5.3.1) in order to disambiguate them from sequences of graphemes. The various kinds of such numeral signs in our scope are discussed in the following subsections along with the relevant instructions.

### Markup for numeral signs transliterated with more than one target character

Whenever a single numeral sign in the source is represented by a group of two or more characters in transliteration, the latter must be marked up to indicate that the target characters are to be understood together. Markup optimally takes the form of XML encoding, as per EGD §###. In contexts where XML is not involved (including the preparatory stage of XML editions, if desired), we recommend using the + (plus) sign for this purpose.

* as public shorthand, use the + (plus) sign after any group of target characters which together represent a single numeral grapheme of the source
  + although the use of the + sign is inspired by the conventional transliteration of sign-value ciphers in additive notation, in our scheme it does not signify addition, and its use is not identical to that conventional transliteration

### Signs for numbers greater than 9

Integers 10 and above, when represented by a single source character, shall be transliterated with the corresponding multi-digit Arabic number followed by a + sign. Multiples of 100 and of higher powers of 10 are in many Indic writing systems represented by glyphs that are (or may arguably viewed as being) composed of two numeric graphs (for the respective power of 10 and a multiplier). For our purposes, this is irrelevant, and these glyphs shall be transliterated according to their final value.[[98]](#footnote-98)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Figure .. Numbers greater than 9 | | | | |
| 1 | 2 | 3 | 4 | 5 |
|  |  |  |  |  |
| 10+ | 80+ 2 | 200+ 80+ 2 | 100+ 20+ | 1000+ 4 100+ 4 10+ |

* in Figure 5.3.A/1, |10|, i.e. the number ten written with a single glyph, such as Brahmi |𑁛| → 10+
  + note that the + must be present even though nothing is added to this 10
* in Figure 5.3.A/2, |80| |2|, i.e. the number eighty-two written with a glyph denoting eighty and one denoting two, such as Brahmi |𑁢𑁓| → 80+ 2
* in Figure 5.3.A/3, |200| |80| |2|, i.e. the number two hundred and eighty-two written with glyphs respectively denoting two hundred, eighty, two → 200+ 80+ 2
* in Figure 5.3.A/4, |100| |20|, i.e. the number one hundred and twenty written with a glyph denoting one hundred and one denoting twenty → 100+ 20+
  + note that the + must be present after 10
* |80| |10|, i.e. the number ninety written (unusually) with a glyph denoting eighty and one denoting ten, such as Brahmi |𑁢𑁛| → 80+ 10+
  + note that the + must be present after 10
* in Figure 5.3.A/5, |1000| |4| |100| |4| |10|, i.e. the number one thousand four hundred and forty written in Tamil notation with glyphs respectively denoting one thousand, four [times], one hundred, four [times], ten → 1000+ 4 100+ 4 10+
  + note that the + must be present after 100, 100 and 10, but not after the instances of 4
* for the editorial spacing of such numbers, see §5.3.1

### Numbers denoted by bars

|  |
| --- |
| Figure .. Number bars |
|  |
| III+ |

Cambodian inscriptions may denote numbers by groups of vertical bars (daṇḍa). This notation shall be transliterated by an identical number of I (uppercase i) characters to distinguish it from the use of regular Indic numeral signs. The transliteration must be followed by a + character in order to disambiguate these target characters from the transliteration of the independent vowel <I>. This applies even when there is only a single bar for the number 1.

* in Figure 5.3.B, three vertical bars denoting the number three → III+
* for the editorial spacing of such numbers, see §5.3.1

### Fraction signs

|  |  |  |
| --- | --- | --- |
| Figure .. Numbers greater than 9 | | |
| 1 | 2 | 3 |
|  |  |  |
| ½ | ½ | 1/40+ |

The Unicode codetable provides for a number of “vulgar fraction signs”, some of which enjoy wide font support, while others are absent from most fonts. For a limited set of fractions, we therefore prefer to use the vulgar fraction signs, because they provide a single target character for the transliteration of a single source character, just as Arabic numerals do. For any other fractions which are represented by a single sign in your source text, use Arabic numbers to record the nominator and the denominator, separated by a slash and marked up as a single source character with the + sign.

* use the vulgar fraction signs for the following fractions:
  + one half → ½ (U+00BD Vulgar Fraction One Half), as in Figure 5.3.C/1
    - double-barred variants of the cross-shaped Khmer fraction sign, as in Figure 5.3.C/2, shall always be transliterated likewise, as ½
  + one third → ⅓ (U+2153 Vulgar Fraction One Third)
  + two thirds → ⅔ (U+2154 Vulgar Fraction Two Thirds)
  + one fourth → ¼ (U+00BC Vulgar Fraction One Quarter)
  + three fourths → ¾ (U+00BE Vulgar Fraction Three Quarters)
* for any fraction signs other than the above, transliterate as a common fraction using a slash, and add a + sign after the denominator, e.g.
  + one eighth → 1/8+
  + one fortieth → 1/40+ as in the Tamil fraction sign of Figure 5.3.C/1
* for the editorial spacing of such numbers, see §5.3.1

# Non-alphanumeric signs

## Overview

For our purposes, a non-alphanumeric sign is a graphetically independent glyph[[99]](#footnote-99) that forms an integral part of a written text but does not constitute an alphabetic or numeric grapheme. Further considerations are given below for distinguishing non-alphanumeric signs from alphanumeric graphemes (§6.2.1) and peripheral graphic features (§6.2.2).

@@@20250725: leaving the arrangement of this section (and the corresponding intro text) unfinished and messy, pending agreement on symbol encoding and related issues

@start using ‘secondary grapheme’ for functional signs and perhaps more?

### Classification and representation of non-alphanumeric signs

We classify non-alphanumeric signs on a pragmatic basis, namely that of the extent to which we wish in our editions to represent on the one hand their function, and on the other hand their phenomenal (graphetic) appearance. This classification is summarised in Figure 6.1.A. Self-evidently, wherever a non-alphanumeric sign is present in the source, it must likewise be present in the transliteration of the source text. However, because of the tremendous variety of such signs, it would be utterly impracticable to dedicate a transliteration equivalent to each one, as we do in the case of alphabetic graphemes and numeral digits. Therefore, to represent most such signs, we must resort to markup (XML as per EGD §### or shorthand as introduced in the relevant subsections below). For the classification of signs represented through markup, we use short tags called symbol tokens (§6.1.2). Whenever the broad classification afforded by symbol tokens is deemed insufficient, the phenomenal aspect of non-alphanumeric signs may be described more extensively in annotation outside the edition, and this of course also applies to signs for which we use no symbol tokens.

Certain non-alphanumeric signs have a clearly established graphemic function that pertains concretely to the linguistic meaning of the written text (§6.3). Such signs, which together we designate as **functional signs**, include the avagraha (§6.4.1) and the abbreviation mark (§6.4.2). Because there are only a few kinds of such signs, and because their graphemic function is clear, functional signs are represented in our transliteration by a dedicated target character which establishes their function as well as their presence, while their phenomenal aspect is ignored. This treatment is identical to our treatment of alphabetic graphemes and numeral digits.

Some varieties of the Indic writing system include special signs that conventionally denote a particular word, morpheme or concept (§6.3). As a label of convenience, we refer to these as **ideograms** (cf. §2.2.1). Varieties occurring in our corpora are auspicious signs (§6.3.1) and special word or concept “abbreviations” in Tamil (§6.3.2) and Burmese (§6.3.3). In modern international writing systems, examples of ideograms include glyphs such as the percent sign |%|, the dollar sign |$| or the ampersand |&|. Many ideograms, like the latter two examples, are derived from alphanumeric signs, so it may be difficult to establish whether a particular glyph is alphanumeric or ideographic (§6.2.1). The graphemic function of ideograms is usually clear, but due to their large number it is not feasible to dedicate transliteration characters to them, as we do for functional signs. Instead, we represent them through markup, and identify them with symbol tokens. The tokens, typically the emic names of these glyphs in the particular writing systems where they occur, simultaneously identify the functional and the phenomenal aspect of ideograms.

Other non-alphanumeric signs fulfil a graphemic function that is less circumscribed and/or pertains to a more abstract level of the text’s linguistic content. We use the umbrella term **symbol** for such signs. What distinguishes symbols from other non-alphanumeric graphemes is that

since the graphemic function of symbols cannot always be established precisely (or at all), and a specific function is not consistently correlated with a specific glyph, we always represent symbols through markup involving tokens which specify their phenomenal aspect.

Among symbols, we distinguish **functional symbols** @symbolic marks? (§6.5), for which it is possible to establish a graphemic function with some accuracy and confidence, and **abstract symbols** (§6.6) whose graphemic function can only be described in vague terms or not at all. Accordingly, the markup representing symbols includes an identification of the function for the former class, but not for the latter. Functional symbols are thus much like the functional signs introduced above. Indeed, our assignment of specific kinds of signs to one of these classes or the other is somewhat arbitrary.

The practical difference between them is that we use dedicated target characters for functional signs and markup for functional symbols.

is determinable. The most prominent members of this class are punctuation signs (§6.5.1). Other functional symbols serve to fill up uninscribed space (§6.5.2), to indicate words broken by a physical feature such as a line end (§6.5.3), and to tag abbreviations (§6.4.2).

this table perhaps to be replaced by new one under §3.3

|  |  |  |  |
| --- | --- | --- | --- |
| Figure .. Classification of non-alphanumeric signs | | | |
|  | presence | functional aspect | phenomenal aspect |
| functional marks | dedicated transliteration characters | | — |
| ideograms | markup | symbol token | |
| symbolic marks | markup | | symbol token |
| abstract symbols | markup | — | symbol token |

### Symbol markup and tokens

@@@

## What is not a non-alphanumeric sign?

@scribal metamarks should also be mentioned in this section

### Ambiguously alphanumeric signs

* note that ideograms **do** **not include** the following
  + regular alphanumeric graphs of the writing system in question, in any combination and including ornamental renditions, are to be transliterated normally and not treated any differently from regular text
    - when alphanumeric graphs are followed by a graphetically separate abbreviation mark, treat the abbreviation mark as per §6.4.2
    - when an alphabetic or numeric glyph (such as that for <1>, <tha> or <cha>) is used in a context where its alphanumeric function is irrelevant and an auspicious function is likely, the glyph should nonetheless be transliterated normally
    - but see alternative treatment below
  + here, “special sign” means that the sing being employed is not identical to the glyphs that normally represent a combination of the graphemes <O> or <Au> with <ṁ> or <m̐> in the writing system in question
    - as for instance the Devanagari sign |ॐ| is not identical to |ओं|, etc.
  + if you are uncertain whether a glyph for oṁ (etc.) is an ornamental rendition of the regular graphs or a special sign, choose at your discretion
    - in general, we recommend identifying glyphs as special only when they
      * are palaeographically older
      * belong to a clearly different script inventory
      * or are cursively simplified
* @still need somewhere to treat alphanumeric signs repurposed as symbols, e.g. tha, cha and 1 as closers or auspicious marks
  + put this in 5.2, repurposed graphic signs?
    - but then it’s increasingly ill-placed before the numeral signs
    - so move numeral signs to a top-level section, and create another top-level section for special graphemic functions after that, which would then include all repurposed graphemes, 2-ro as well as these?
  + if they are in the same script as the rest of the text, then they are to be transliterated at face value regardless of assumed function
    - if they are in a different script (including ornamental modifications), then they are to be treated as logograms like oṁ
* fff

### Graphic features peripheral to the text

When transliterating a source text, we are only concerned with signs which are either known to belong to the conventional inventory of its script, or are integral to the text. Graphic features peripheral to the text of an inscription or manuscript, chiefly decorative features and premodern editorial marks, are to be ignored (§3.7.1). Conversely, signs which do not differ conspicuously in size from, and are smoothly integrated into the linear flow of, alphanumeric glyphs (i.e. which occupy the same kind of segmental space as alphanumeric signs) are considered on a par with proper graphemes and must be represented explicitly in transliteration, even if their precise graphemic function may not be definable.

## Ideograms

Many such signs can be derived from (clusters of) alphabetic graphs, but this is not necessarily the case, and even when it is, there is not always a clear correspondence between the phonemes represented by those graphs and the morpheme represented by the sign. Due to the open-ended variety of such signs, it would be pointless to dedicate target characters to each. Instead, ideograms are to be encoded in XML, and for contexts not involving XML we propose a generic shorthand. Specific examples of ideograms are treated in the subsections below.

The shape of ideograms is usually difficult to describe, but most have their own names in the particular writing systems where they are used. Therefore, the tokens

@numerals too

* public shorthand for ideograms
  + use the \* (asterisk) character followed (without an intervening space) by the token for the sign in question
  + the authorised tokens for specific signs are given in the following subsections
* with the present scope of the DHARMA project, we see no need to explicitly distinguish any ideograms other than those listed below, but as and when the need arises, further ideograms may be introduced, provided that they can be confidently identified in a given writing system
  + tokens used in an XML edition must be included in the authority file for symbol taxonomy (EGD §###)
  + for strictly non-XML contexts, new tokens may be used as needed, but adding any new tokens to the authority file is nonetheless recommended

### Auspicious signs

Symbols whose graphemic function is not clearly understood are often referred to as “auspicious”. In our transliteration and encoding, however, these must be represented as abstract symbols (§6.6), while this subsection is concerned only with signs which are confidentially identified as representing an auspicious word or, in a particular variety of the Indic writing system, are known to conventionally represent auspiciousness as their only signification.

* special signs for the word oṁ: public shorthand \*oṁ

### Tamil ideograms

### Burmese ideograms

* @better switch back to \*n etc. as per the referenced guide, this would work better as generic shorthand for logograms such as \*oṁ
  + or not: the numeral signs have the + after them, but the shorthand for other symbols (if retained) start with the sign
* Burmese abbreviation signs shall be transliterated by an alphabetic letter followed by an asterisk, according to the conventions of the field (Lammerts and Griffiths 2016, 3), e.g.
  + ၌ → n\*
  + ၍ → r\*
  + ၎ → r\*
  + ၏ → e\*
* if such abbreviations occur in your corpus, especially within the same text, then you must be careful in using the asterisk as shorthand for any other function
* @add reference to spacing (§8.3.1.4) once the status of ideograms has been sorted out

## Functional signs

Functional signs are glyphs unambiguously associated with a graphemic function that pertains to the morphological or lexical level of the linguistic content of the written text. To this we assign the avagraha (§6.4.1), a special grapheme in many varieties of the Indic writing system, on the grounds that its function is to help the identification of morphemes that would be otherwise homographic (§**Hiba! A hivatkozási forrás nem található.**). Another concrete graphemic sign is the abbreviation mark found in some varieties of the Indic writing system (§6.4.2), which is used in conjunction with a sequence of alphabetic graphemes (which may or may not be otherwise meaningful) to indicate that they comprise an abbreviation standing for a word that is not fully written. Abbreviation marks, thus, also support the identification of morphemes. Finally, some varieties of the Indic writing system include ideograms, which directly represent a word, morpheme or concept (§6.4.2). The graphetic appearance of functional signs may vary from script to script, but since their graphemic function is unequivocal, we represent only that function in transliteration, by a dedicated target character or shorthand. This treatment is analogous to that of alphanumeric graphemes. Their graphetic details, when of palaeographic interest, can be described for human readers outside the edition.

### Avagraha

A sign identified in the source as an avagraha must always be transliterated. Avagrahas not present in the source but expected in modern standard spelling may be supplied by the editor, marked up in XML as editorial (§6.4.1.1). Be mindful of spaces around avagrahas (both original and editorial), as instructed in §8.3.1.2.

* use the transliteration ’ (U+2019 Right Single Quotation Mark) to represent original avagraha
  + e.g. Devanagari |ऽ| → ’
  + if necessary, the optional shorthand ' (U+0027 Apostrophe), which is accessible on most keyboards, may be used as an alternative
* original avagrahas must be transliterated regardless of whether their usage conforms to modern conventions
  + when it does not, XML markup may be used to normalise the spelling (EGD §###)

#### Editorial avagraha

According to modern spelling convention, the avagraha is used in Sanskrit when an initial short /a/ is elided due to sandhi after a final /e/ or /o/. Where an avagraha is expected according to this convention, but none is present in the source, it may be supplied by the editor in order to facilitate the interpretation of the edited text. Editorial avagrahas in principle require XML markup as per EGD §###, but since the texts in our scope hardly ever contain an original avagraha, you may choose to use shorthand instead.

Guidelines for supplying avagraha:

* supply avagraha only to indicate the elision of initial <a> after <e> or <o> in sandhi
  + never supply avagraha to indicate the merging of initial <a> or <ā> with a preceding <a> or <ā>, as is occasionally done in Devanagari texts
  + note that the use of the apostrophe for certain kinds of sandhi analysis (§4.7.5.2) is superficially similar to the supplying of avagraha, but essentially different because the avagraha is an actual grapheme of the Indic writing system that may or may not be present in the source and may be supplied by the editor when it is not, while the apostrophe for sandhi analysis is editorial markup (§3.6.3)
* supplying avagraha is recommended in general, and especially in cases where the received text would be meaningful (and often contradictory in meaning) both with and without an avagraha
  + for example, the inscribed sequence sohataḥ may stand for so hataḥ (“he was killed”) or so ’hataḥ (i.e. saḥ ahataḥ, “he was not killed”), so if you interpret the text as the latter, then supply an avagraha to make this clear
  + if you feel that such ambiguity is a deliberate poetic device (bitextuality, śleṣa), then the decision whether or not to supply an avagraha should be based on what you consider to be the prima facie meaning of the text
* the recommendation of supplying avagraha applies likewise to words in compound, whether hyphenated (§8.4) or not
  + e.g. yaśo’mr̥tam or yaśo-’mr̥tam and saro’nte or saro-’nte are preferable to yaśomr̥tam or yaśo-mr̥tam and saronte or saro-nte
* as private shorthand, you may use only ’ or ' (§6.4.1) for editorial avagrahas, and eventually supplement them with XML markup
  + if original avagrahas may also be present, then we recommend that you use
    - either +’ for editorial avagrahas
    - or ’! for original avagrahas
    - or both
  + should your text, or some of the texts you work with, also contain apostrophes in other functions, be especially careful when replacing editorial avagrahas with markup
    - if the apostrophe for Dravidian elision sandhi (§4.7.5.2) may also be present, you can distinguish it mechanically from an avagraha by the fact that the elision apostrophe is always followed by a space, while the avagrha never is

### Abbreviation marks

Certain varieties of the Indic writing system employ an abbreviation mark, such as Devanagari |॰| (also called the lāghava sign). The abbreviation mark flags a sequence of one or more alphabetic graphemes as an abbreviation of a word, but does not in itself constitute an abbreviation (unlike ideograms, §**Hiba! A hivatkozási forrás nem található.**). We are not aware of any occurrence of such a sign in our corpus so far, but in order to provide for the eventuality, we propose the following approach.

* a symbol confidently identified as an abbreviation mark, regardless of its graphetic appearance, shall be transliterated as ° (U+00B0 Degree Sign)
  + the same target character is used outside editions as text-based markup indicating truncation (§3.6.4)
  + in order to disambiguate these two usages of the degree sign, abbreviation marks must always be marked up as such in XML editions (EGD §###)
* when a symbol’s identification as an abbreviation mark is doubtful, it is preferable to transliterate or encode it as an abstract symbol (§6.6) and to address its possible function in an apparatus note or other commentary

## Functional symbols

In the usage of this Guide, ‘symbol’ specifically means a graphic sign which is neither alphanumeric nor unequivocally associated with a definable graphemic function directly pertinent to the linguistic content of the text. This does not mean that symbols have no graphemic function, but when they do

When some kind of graphemic function can be assigned to a symbol, we speak of a functional symbol. The correspondence between specific glyphs and specific graphemic functions is often vague and may vary not only from one writing system to another, but also within a writing system or even within a single text. Consequently, we foreground their graphetic appearance, even if in a specific text or subcorpus a distinctive sign is consistently associated with a definable function.

@@@

Symbols integral to the text exhibit great graphic diversity in the source texts and can serve a variety of graphemic functions that cannot always be identified with precision. In our editions, we attempt to capture some of both kinds of variation by means of machine-readable XML encoding (EGD §###), and further encourage all editors to describe the visual appearance of symbols found in their texts in human-readable terms in the palaeographic description accompanying the edition. Nonetheless, we also wish to represent at least some of the phenomenal and functional variation already at the level of transliteration. The following subsections distinguish, and give instructions for the transliteration of, the functional categories of punctuation marks in a strict sense (§6.5.1), functional symbols (§**Hiba! A hivatkozási forrás nem található.**) and abstract symbols (§6.6).

To the category of ‘functional symbols’, we assign non-alphanumeric signs which have a confidently identifiable graphemic function[[100]](#footnote-100) other than punctuation, in particular space fillers (§6.5.2) and word joiners (§**Hiba! A hivatkozási forrás nem található.**). Our treatment of such symbols differs from that of the avagraha (§6.4.1) in that we wish to represent both their function and their graphic appearance in our editions. When transliterating or encoding such symbols, be mindful of the use of editorial spaces around them (§8.3.1.4), bearing in mind that space fillers may, and word joiners by default do, occur inside words.

### Punctuation signs

In the terms of this Guide, ‘punctuation mark’ is used in a sense restricted to graphic signs employed in the original for syntactic or metrical segmentation into relatively small units, similar in function to a modern comma, full stop, question mark, exclamation mark, colon or semicolon.

* the scope of punctuation marks **generally includes** signs
  + whose shape is simple and abstract (non-figural), such as the vertical bars, dots, circles and dashes used widely for punctuation in the Indic writing system
    - or which are ornamental elaborations of such shapes
  + whose linguistic function is primarily to segment the text into relatively small units such as sentences, clauses, list items or metrical units
  + which occur repeatedly in the body of a single text
* the scope of punctuation marks **generally excludes** signs
  + whose shape is figural or complexly ornamental, and is not derived from one of the simple basic shapes used for punctuation
  + whose linguistic function may be to mark the beginning or end of an entire inscription or to segment a text into a small number of large units
    - but which, in addition to or instead of this linguistic function, usually have a non-linguistic (semasiographic, cf. note 14 in section §**Hiba! A hivatkozási forrás nem található.**) meaning such as auspiciousness, or serve as embellishment
  + which occur only once per text or once per major section of text
  + signs of this nature are to be treated as abstract symbols (§6.6)

#### Transliterating punctuation signs

In all editions, original punctuation must always be preserved in transliteration, but any punctuation supplied by the editor must be clearly distinguished from original punctuation (§6.5.1.2). For both original and supplied punctuation marks, be mindful of the use of editorial spacing (§8.3.1.3).

* editorial punctuation may, however, be supplied using XML markup, see EGD §6.3.6
* as outlined in the introduction to this section, punctuation marks shall be represented
  + 1. at the level of transliteration, by the dedicated character . (full stop, period), which by our convention shall be understood as an abstract punctuation mark without any assertion as to its physical appearance
  + 2. at the level of XML encoding, with a relatively simple classification of their shapes
  + 3. at the level of human-readable metadata, in additional human-readable detail
* as an intermediate step between levels 1 and 2 above, we recommend the use of shorthand markup for the basic forms of common punctuation characters, as follows:
  + all of the following shorthand characters should be followed by a space in transliteration, but not preceded by one
  + | (U+007C Vertical Line): for signs comprised of a single plain vertical bar (corresponding to the symbol token “danda”)
    - when transliterating two or more iterations of single vertical lines, make sure you add a space between them to differentiate them from double daṇḍas
  + || (U+007C Vertical Line, twice): for signs comprised of a double plain vertical bar (corresponding to the symbol token “ddanda”)
  + / (regular slash): for signs comprised of a single vertical bar with a hook, crossbar or ornamental addition (corresponding to the symbol token “dandaOrnate”)
  + // (two regular slashes): for signs comprised of a double vertical bar with a hook, crossbar or ornamental addition (corresponding to the symbol token “ddandaOrnate”)
  + , (comma): for short, predominantly vertical and often curved strokes normally floating at or above median height, including half-sized daṇḍas and the raised comma-like sign that is the basic punctuation mark on Java and Bali (modern Balinese ᭞) (corresponding to the symbol token “comma”)
  + ~ (U+223C Tilde Operator): for signs comprised of a single horizontal dash, plain or with ornamentation (corresponding to the symbol token “dash”)
  + @ (“at” sign) for any punctuation mark that does not easily fall under any of the above categories (such as more or less complex dots and circles)
    - the transformation of this character into XML markup will definitely not be automated and will have to be handled by you manually if you use this shorthand

#### Supplying punctuation

In your XML editions, never supply punctuation at the ends of stanzas and hemistichs, nor at the end of large semantic units which you encode as paragraphs (EGD §###). Any original punctuation at such points must be preserved in transliteration as it is. Supplying punctuation at the ends of smaller semantic units, such as sentences, is permitted and recommended whenever you feel that this is helpful to the reader of your edition. Punctuation supplied by the editor must always be marked up in XML as such (EGD §###).

* as private shorthand, you may use a . (full stop, period) for supplied punctuation while preparing your edition, then convert it to the proper encoding

### Space filler signs

@write when symbol encoding finalised

rewrite for connectors

include cases like [this one](https://github.com/erc-dharma/tfd-nusantara-philology/issues/186#issuecomment-2850085692), where a stretch of manuscript surface unsuitable for writing was filled up with symbols

* in the terms of this Guide, “**space filler**” is used in a sense restricted to symbols whose function is clearly and unambiguously to fill up space in a line to the binding-hole or margin
  + symbols that do not meet this functional criterion shall be encoded as abstract symbols even if they are identical in visual appearance to symbols used as space fillers elsewhere in the document or the corpus
  + @keep or discard §abc as shorthand
    - ADD PRIVATE SHORTHAND LABEL IF NOT DISCARDING
  + instead or in addition, introduce § as public shorthand

### Word joiner signs

@write when symbol encoding finalised

* see discussion in Taxonomy
* difficult to distinguish from space fillers
  + if the same sign occurs in unbroken words, space filler
  + if narrow sign, probably word joiner
* @introduce public shorthand ¬ (U+00AC Not Sign) for this purpose instead of former editorial hyphen at end of line or use ⸗ U+2E17 Double Oblique Hyphen

## Abstract symbols

@write when symbol encoding finalised

We use the term ‘abstract symbol’ for any symbol that has not been confidently identified as fulfilling the function of a punctuation mark (§6.5.1) or other functional symbol (§**Hiba! A hivatkozási forrás nem található.**). When transliterating or encoding symbols, be mindful of the use of editorial spaces around them (§8.3.1.4).

* note that auspicious (maṅgala) symbols should never be transliterated as the words siddham or om̐
* as outlined in the introduction to this section, abstract symbols shall not be represented at the level of transliteration and should ideally always be handled in XML markup (supplemented by human-readable description)
  + the essential feature of the relevant XML markup is the use of symbol tokens (EGD §4.2.3)
* to simplify your work, especially when you are creating an e-text that will not (yet) be marked up in XML, you may choose either of the following shorthand methods for representing abstract symbols
  + as tokens, using $abc
    - where “abc” (any sequence of letters, followed by a space) will be converted into a symbol token in the XML tag representing the symbol
    - ADD PRIVATE SHORTHAND LABEL IF NOT DISCARDING
  + as public shorthand, feel free to use dingbats of your choice, i.e. any Unicode character approximating the original glyph (e.g. ◊ 卐 ✤ ⁜)

# Layout and transliteration

## Lines and blocks

@@@move stuff from descriptive and interpretive blocks

## Blank space

As noted in §3.6.2, all spaces in our transliterated texts will be considered editorial. Conversely, spaces present in the source and deemed significant must always be represented in XML markup as per EGD §###. To speed up work and to provide a means of representing original spaces in text that will not be encoded in XML, we suggest using the \_ (underscore) sign as shorthand. Be mindful of the use of editorial spaces (§8.3.1.5) around both encoded and shorthand representations of original space.

@add note about interlinear space

* whether a space in the source is significant is up to your discretion, but here are some rules of thumb
  + spaces for layout are never significant, including
    - blank space at the left of a right-aligned line or at the right of a left-aligned line
    - spacing between most or all characters of a line justified to the two margins
    - spacing between metrical units when these result in a column-like arrangement for an entire text or section
    - layout may be represented by various encoding methods (EGD §###)
  + small spaces (less than a typical character width) around numerals, punctuation marks and other symbols are generally not significant
  + spaces (including small spaces) used in lieu of punctuation (i.e. for semantic segmentation) are generally significant
* as public shorthand, use the \_ (underscore) sign to represent original spaces in transliterated text
  + if you plan later to batch convert the shorthand to XML encoding, then it is recommended that you use this only for basic interword spaces, which are large enough to be called a space but smaller than the width of two average characters
  + any other spaces — such as space left blank for filling later, or because of a defect or feature of the material — can only be handled in XML
    - if you frequently encounter such spaces in your work, feel free to devise and employ private shorthand for them

## Glyphs or graphs split by an intervening feature

@finalise as per <https://github.com/erc-dharma/project-documentation/issues/284>

add mention of eventual encoding alternative as per <https://github.com/erc-dharma/project-documentation/issues/336>

and also inadvertent splits as in <https://github.com/erc-dharma/project-documentation/issues/237>

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Figure .. Split glyphs and graphs | | | | |
| 1 | 2 | 3 | 4 | 5 |
|  |  |  |  |  |
| malaṁka | dr̥vya | sa | ke |  |
|  |  |  |  |  |
| mala<>ṁka | dr̥v<>ya | sa<>⌉ | ⌈<>ke | A⌈<>horātri |

* certain glyph components are treated as separable in some scripts, such as the prescript and postscript vowel markers in Tamil கொ *ko* or the pr̥ṣṭhamātrā e in varieties of Nagari (as in the images to the right)
* while the separation of a postscript *ā* marker from its consonant could be represented accurately in transliteration, separations involving prescript markers are impossible to duplicate due to the non-linear nature of the original script
* we therefore introduce two *placeholder characters* into our transliteration scheme:
  + ⌈ (left ceiling, U+2308) to represent a prescript component split off from the following original character
  + ⌉ (right ceiling, U+2309) to represent a postscript component split off from the preceding original character
  + if you have difficulty entering these characters, you can instead use [[ and ]] respectively, which will be automatically converted to the above special characters
* in transliteration, put all of the transliterated characters belonging to the split original character on that side of the interruption where the consonant body is located, and add the applicable placeholder character on the other side of the interruption, thus:
  + க<>ா as kā<>⌉
  + ெ<>க as ⌈<>ke
  + கெ<>ா as ko<>⌉ (likewise for split au)
  + ெ<>கா as ⌈<>ko (likewise for split au)
* in the above examples, ignore the dotted circle representing the body associated with dependent vowel signs
* in the above examples, <> represents the interruption, which must be encoded appropriately (or, if you are only creating an e-text for later markup, clearly indicated in the transliteration) as follows:
  + line break: EGD §3.2.1 (if you are not using XML tags, start a new line in the e-text)
  + space imposed by a physical feature of the support: EGD §4.3.5 to §4.3.8 (if you are not using XML tags, use an \_ character as per TG §6.6)
    - e.g. *A⌈\_horātri* for the second line in the above copper-plate image
* if you encounter a character with a split-off part other than a prescript or postscript vowel marker, please contact us to discuss its most suitable representation
* see also EGD §4.1.4 about encoding lacunae and reading difficulties in combination with split characters, including in particular situations where an original glyph (component) may be either the Tamil postscript vowel marker kāl (ா) or the character ra (ர)
* the use of these placeholder characters is **optional, but strongly recommended** in all cases where you have access to the original or a surrogate
  + if you only have access to a printed edition or choose not to employ placeholder characters, you should still put all your transliterated characters pertaining to a single akṣara on one side of the interruption, i.e. avoid transliterations such as k<>ā, k<>e, k<>o

# Editorial segmentation of transliterated text

In addition to transliterating a source text, you will usually want to segment it in one or more ways. Division into larger blocks may be descriptive — on the basis of the physical layout of the original — or interpretive — on the basis of the semantic and/or prosodic structure of the text. Both of these concerns are to be addressed primarily through XML markup, but they are discussed briefly in §8.1.

However, for a lower level of semantic analysis, we prefer simple editorial spacing (§8.3) of independent words and hyphenation (§8.4) of words in compound. The same kind of segmentation could be achieved, in some cases more rigorously, through computer markup, but at present we see no advantage in doing so. Conversely, due to the ubiquity of such segmentation, using XML for this purpose would greatly increase code clutter and impede working with our files. Using basic markup consisting in spaces and hyphens keeps the files more human-readable, but it may in the future serve to facilitate the electronic lemmatisation of texts. Furthermore, it not only helps the reader understand the texts you edit, but, in ambiguous cases, expressly communicates your parsing of the text. Finally, it is in many cases advantageous for on-screen display and typesetting.

The insertion of editorial segmentation is facilitated by Romanised transliteration, but hampered in some cases by vowel sandhi. We discuss the consequences of both in §8.2. We also provide some general considerations for cases when, and when not, you should use editorial spaces and hyphens (§8.5).

## Descriptive and interpretive blocks

Editions encoded in XML must accurately represent both the extrinsic structure of the source (EGD §###) — i.e. how the source text is broken up into inscribed lines and, if applicable, into pages or other distinguishable inscribed zones — and its intrinsic structure (EGD §###) — i.e. how it is constituted of semantic or prosodic units (paragraphs, stanzas and verse lines). When preparing a draft for an XML edition or transliterating a text that will not be encoded, you may create new lines for either or both of these purposes and, if applicable and desired, add line numbering and/or headers for specific groups of lines. When converting to XML encoding, all such segmentation and labelling must be removed.

Whether you are using new lines or XML tags for epigraphic lines and zones (i.e. descriptive blocks) and for units of intrinsic structure (i.e. interpretive blocks), always be mindful of the proper use of spaces (§8.3.1) and hyphens (§8.4.1) at such points.

* when a line break, whether representing extrinsic or intrinsic structure, falls inside a word
  + this must normally be encoded in XML
    - see EGD §### about inscribed lines cutting words, and §### about verse lines cutting words
  + when XML encoding is not involved, a hyphen may be used as public shorthand at the end of the former line
* when an editorial hyphen (for compound segmentation) coincides with a line break, put it at the beginning of the latter line (§8.4.1)

## Segmentation versus akṣaras and sandhi

While the boundaries of morphemes are frequently hidden inside an akṣara of Indic script and thus not separable, Romanisation allows us to separate any two adjacent graphemes for the purpose of analysis. Thus, wherever interpretive segmentation of any kind is applicable, akṣara boundaries can and must be disregarded. However, some of our source languages feature vowel fusion sandhi, whereby the final vowel of one word and the initial vowel of the next word merge into a single vowel phoneme, represented in writing by a single grapheme. In such cases we transliterate the resulting grapheme faithfully and forego interpretive segmentation. We furnish some specific cases and examples below.

* where interpretive segmentation is called for, it can and must be used even if a morpheme boundary is within an akṣara in the source text, including
  + independent words, e.g. Sanskrit तदेव → tad eva
  + words in compound, e.g. Sanskrit तत्पुरुष → tat-puruṣa
* this continues to apply if graphemes on either side of the boundary are altered due to sandhi or orthographic convention, so long as the graphemes can be allocated to one side of the boundary or another, including
  + the reduction of vowels to semivowels, e.g. in Sanskrit
    - गच्छत्येव → gacchaty eva (from gacchati + eva)
    - मन्वादि → manv-ādi (from manu+ādi)
    - महर्षि → maha-rṣi (from mahā+r̥ṣi)
  + the use of the class nasal where standard orthography would employ an anusvāra, e.g. in Sanskrit
    - उक्तञ्च → Uktañ ca
    - शरणङ्गतः → śaraṇaṅ gataḥ
  + the assimilation of initial /h/ to a preceding stop, altering the /h/ to a corresponding aspirate, e.g.
    - Sanskrit तद्धि → tad dhi (for tat + hi) and तद्धित tad-dhita (for tat+hita)
    - Old Javanese buAt-thajyanya (derived from bvat haji, §8.5.1)
    - note that in these cases, the phonetic sequences may be more appropriately segmented into /tadd hi/ and /buatt-hajyanya/, but the written form involves the graphemes <dh> and <th>, which, though transliterated by digraphs, are indivisible
  + the generation of graphemes not originally present in either of the morphemes, to be segmented as in the examples below
    - Sanskrit putrām̐l lakṣmīḥ (from putrān + lakṣmīḥ)
    - Sanskrit dīnārair ddaśabhiḥ (orthographic variation of dīnārair daśabhiḥ)
    - Old Javanese darpaṇa ryy avakta (orthographic variation of darpaṇa ry avakta)
    - Old Javanese tann inaku (from tan + inaku)
    - Tamil இப்பெருங்கோயில் → I-p-peruṅ-kōyil (from I + perum + kōyil)
    - Tamil திருமேனியாட → tiru-mēṉi-y āṭa (from tiru + mēṉi + āṭa)
      * see §4.7.5.1 for the use of the hyphen in Tamil sandhi analysis
  + the complete elision of one of the phonemes (and the corresponding grapheme)
    - Tamil arit’ eṉṟu (for aritu + eṉṟu)
      * see §**Hiba! A hivatkozási forrás nem található.** about the elision of final u in Tamil
    - the elision of initial a after a preceding o or e in Sanskrit does not involve morpheme boundaries inside an akṣara, so it can be segmented without any difficulty, e.g. tato pi (for tataḥ + api)
* conversely, the fusion of a final and an initial vowel into a single vowel must be distinguished from elision, and can never be segmented, including the following cases in Sanskrit
  + kr̥tārtha (from kr̥ta+artha) and sāpi (from sā + api)
    - note that editorial avagraha (§6.4.1.1) must never be added to indicate the merging of initial a or ā into a preceding a or ā
      * should one or two original avagrahas be present in such a case, they must of course be transliterated (§6.4.1)
  + gacchatīva (from gacchati + iva)
  + seyam (from sā + iyam)
  + gataujas (from gata+ojas)

## Editorial spacing

Editorial spaces should normally be inserted between words that are not compounded to one another.[[101]](#footnote-101) In addition to obviously independent words — including inflected nouns, finite verbs, verbal derivatives, invariant particles, etc. — fixed expressions should in general be regarded as phrases rather than compounds, and their members should accordingly be separated by spaces. Suggestions for segmentation in specific situations are given in §8.5, especially §8.5.1 to §8.5.4. In spacing your texts, make sure you are familiar with §8.2 about the interaction of segmentation with akṣaras and sandhi.

The good practice guidelines in §8.3.1 improve consistency across the project and, in some cases, prevent conflict, redundancy or ambiguity when a text is encoded in XML and rendered for display. The additional subsections contain practical suggestions and rules for using spaces in various contexts and situations. These apply equally to text which is encoded in XML and to text which is not.

### Good practice in editorial spacing

Avoid redundant spaces; in particular:

* never start a line with a space
  + when creating a draft for an XML edition, where you simply enter line numbers at the beginning of each line of the source, make sure you remove the intervening space when converting the numbering to XML markup
* never use more than one space at any point

#### Space and numerals

Around numeral signs, use spaces as follows.

* numeral digits 0-9 (§5.2) must be separated by an editorial space from any adjacent text, symbols or numeral signs
  + except that additional digits belonging to the same multi-digit number written in place-value notation must not be separated by spaces, as in Figure 5.2.A
* all other numeral signs (§5.3) must be separated by an editorial space from any adjacent text, symbols or numeral signs
  + this includes groups of numeral signs that represent a number together, as in Figure 5.3.A/2-5
  + no spaces must be added
    - between the target characters that stand together for a single numeral sign in the source
    - between the target characters and a + sign used as shorthand (§5.3.1)

#### Space and avagraha

The avagraha, editorial or original (§6.4.1), is to be spaced as follows.

* avagraha must never be separated by a space from the following word, to which the elided vowel belongs
* avagraha must always be separated by a space from a preceding independent word, e.g. so ’bhūt and not so’bhūt
* if the word preceding the avagraha is compounded to the next word, then a space must not be inserted, but a hyphen may be used for compound segmentation, e.g. saro’nte or saro-’nte

#### Space and punctuation marks

Around punctuation marks (as defined in §6.5.1), spaces should be deployed as follows.

* never add a space before a punctuation mark
  + even though editions of Indic texts (both in transliteration and in Indic scripts) often do so
* always add a space after punctuation marks if they are followed by text
  + except when a punctuation mark is (for whatever reason) inside a word
* should several punctuation marks appear in a group, do add spaces between them
  + this is particularly important if you use shorthand to transliterate certain punctuation marks

#### Space and symbols

Around all other symbols including ideograms (§###), functional symbols (§**Hiba! A hivatkozási forrás nem található.**) and abstract symbols (§6.6), use spacing as follows.

* + symbols must generally be separated by a space from any other characters adjacent on either side
    - including alphabetic graphemes, numeral signs and other symbols
    - except when a symbol is (for whatever reason) inside a word, in which case there should be no spaces around it

#### Space and original space

Around a significant space in the source, whether it is encoded in XML or represented by shorthand (§7.2), use editorial spaces as follows.

* original spaces must generally be separated by an editorial space from any characters adjacent on either side
  + including alphabetic graphemes, numeral signs and other symbols
* except when an original space is (for whatever reason) inside a word, in which case there should be no editorial spaces around it

## Editorial hyphenation

Compound words should generally be segmented with hyphens, particularly in Sanskrit and other compound-heavy languages, while complex morphemes other than compounds — such as new words derived by affixation — should not be segmented analytically. Suggestions for segmentation in specific situations are given in §8.5, especially §8.5.7 on nominal compounds. The hyphenation of compounds is optional (though encouraged) and need not be exhaustive. Hyphenation is primarily intended to help the reader reconstruct how you analyse compounds, and should be used at your discretion. In hyphenating your texts, make sure you are familiar with §8.2 about the interaction of segmentation with akṣaras and sandhi.

The good practice guidelines in §8.4.1 improve consistency across the project and, in some cases, prevent conflict, redundancy or ambiguity when a text is encoded in XML and rendered for display. They apply equally to text which is encoded in XML and to text which is not.

### Good practice in editorial hyphenation

* use hyphens only for the purposes endorsed by this guide, i.e.
  + normally, only for the segmentation of compounds
  + for a specific kind of sandhi analysis (§4.7.5.1)
  + in specific circumstances, as public shorthand for words cut across inscribed lines (§8.1)
* editorial hyphens will normally have alphabetic graphemes on both sides
  + in rare cases, an editorial hyphen may have to be placed next to a different feature, which is normally represented by XML encoding, but may in some circumstances be represented by shorthand
    - such features include symbols, original spaces, the ends of epigraphic lines, and the ends of verse lines
    - in all of these cases, the editorial hyphen must be placed after the feature

## Segmentation guidelines

It is in some cases difficult to decide whether certain morphemes of a source language are to be considered dependent (bound) or independent (free), and whether a dependent morpheme is a compound member or an affix. The prevailing conventions vary considerably, so — depending on your background — you may be tempted to segment differently than what we suggest. We cannot provide exhaustive rules, much less a rationale for such rules, but in order to increase homogeneity of practice across the project, we propose some rules of thumb and considerations for editorial analysis and recommend that you override these only with good reason. Most of our discussion primarily concerns Sanskrit, while some additional (and partly different) rules are given for Tamil and Old Javanese. When working with other languages, make an informed choice after considering any parallelisms with the guidance given here.

### Phrases

On the whole, words constituting a phrase must always be separated with spaces. However, phrases may become parts of compounds, or may be subject to morphological derivation with affixes. In both of these cases, they are to be treated as compounds. Thus,

* in Sanskrit:
  + iti kartavyam → iti-kartavyatā
* in Old Javanese:
  + tahi tikus → manahi-tikusa
  + bvat haji → buAt-thajyanya
    - for the positioning of the hyphen in this second example, see also §8.1

### Grammaticalised structures

Combinations of verbs and substantives with other words should be understood as phrases wherever reasonably possible. This includes grammaticalised structures (performing a function like that of conjugation or declension). For example, in Sanskrit,

* periphrastic perfects, e.g. varayāṁ cakāra
  + especially since other words may intrude inside such a construction, e.g. saṁraṁjayāṁ ca prakr̥tīr babhūva
* past tense formed with imperfect and sma, e.g. samādiśati sma
* verbal prefixes used as prepositions with substantives, e.g.
  + ā samudrāt
  + anu gaṅgām

### Multiple function words

Pairs or groups of function words (mainly conjunctions) are to be considered separate, even when frequently used together in a meaning that is not evident from the individual meanings of these words. For example, in Sanskrit,

* atha vā
* kiṁ ca and kiṁ tu (even if spelt kiñ ca and kin tu)
* api ca and api vā
* anyac ca
* tad yathā
* na hi
* etc.

However, for such **Sanskrit structures borrowed into other languages**, forego segmentation if the structure is listed as a single word in the relevant dictionaries, where applicable. For example,

* Old Javanese kimuta
* Old Cam kintu

### Repetitive structures

When words (chiefly pronouns or substantives) are iterated with the same inflectional ending in order to express a generalised or distributive meaning, each iteration is to be treated as an independent word. Repetitions of this kind should therefore not be hyphenated, even though they are sometimes classified as a special type of compound (āmreḍita).

* words iterated with the same inflectional ending shall be spaced, for example
  + yasya yasya
  + dine dine
* when the first iteration does not have an inflectional ending, the formation is of course to be treated as a compound and accordingly hyphenated (if sandhi allows), for example
  + ekaikam (from eka+eka, not segmentable)
  + pūrva-pūrvāḥ
* in more complicated cases, proceed according to your discretion
  + hyphenation may be preferred in the following cases
    - if the word forms used may be either inflected or uninflected, as in ahar-ahar
    - if the iterations have different inflectional endings, as in ekam-ekāḥ
  + hyphenation or no segmentation may be preferred when such a doubled word is followed by other compound members or a suffix, e.g. dinaṁ-dinaṁ-vivardhamāna
  + no segmentation is to be preferred when an iterative formation is well established in a particular meaning, as in paramparā
* however, **repetitions in Old Javanese** are to be considered compounds (§8.5.8)

### Quasi-compounds

In non-standard Sanskrit, strings of nouns may appear without (or with occasional) inflectional endings. Such strings constitute neither a proper compound nor a syntactically correct phrase without emendation. They are much like compounds, but in order to avoid an interpretation that their author probably did not mean, we generally prefer to separate them with spaces.

* for example,
  + lamvoṣṭha dedamita mahādeva guṇṭhaka ity evam-ādibhyo
    - compare lamvoṣṭha-dedamita-mahādeva-guṇṭhakety-ādibhyo, lamvoṣṭho dedamito mahādevo guṇṭhaka ity evam-ādibhyo, etc.
  + samrāṬ vākāṭakānāṁ mahārāja śrī-pravarasenasya
    - compare samrājo vākāṭakānāṁ mahārājasya śrī-pravarasenasya, samrāḍ-vākāṭaka-mahārāja-śrī-pravarasenasya, etc.
* do feel free to hyphenate such structures if you feel that this is helpful for the reader
* such structures may be normalised or emended in XML markup (EGD §###), but this is only recommended if minor editorial intervention can render them into standard language, or if their interpretation would be ambiguous without intervention

### Verbal formations

Sanskrit structures whose posterior member is a verb (typically from the roots kr̥, as, bhū and gam) or its derivative may often be perceived either as verbs with special prefixes, as compounds involving verbs, or as adverbial phrases. The segmentation of such structures is left to your discretion, based on whether you deem the structure to be separable. We offer the following specific considerations.

* structures whose anterior member is an adverbial morpheme that only occurs when prefixed to verbs — such as tiras, tiras, puras and āvis — may be hyphenated or treated like regular verbal prefixes and left unsegmented, e.g.
  + āvir-bhavati or āvirbhavati
  + tiro-bhūta or tirobhūta
* structures whose anterior member is a noun without any affix — such as alam, namas and śrad — should normally be hyphenated
  + e.g. namas-kr̥tya, śrad-dadhāmi
  + but may at your discretion be treated as phrases (and thus spaced) when the nominal part could occur without the verbal part
    - e.g. astaṁ gacchati, astaṁ gataḥ (compare astaṁ ca savitā yātaḥ)
* formations expressing becoming or making into something, formed with a nominal anterior member derived with the ending -ī or -ū (the taddhita suffix cvi), should be preferably hyphenated, e.g.
  + svī-karoti, svī-kr̥tya
  + vaśī-bhavati, vaśī-bhūta
  + tanū-karoti
* structures with adverbial anterior members formed from nouns with suffixes (taddhita) other than those listed above are best treated as phrases and thus segmented with spaces, e.g.
  + brāhmaṇasād gatāḥ
  + khaṇḍaśaḥ karoti

### Nominal compounds

Nominal compounds should, as a rule, be segmented with hyphens unless they are proper names (§8.5.7.2). Compound hyphenation is optional and intended mainly to help the reader understand the text and follow your interpretation. General considerations for doing so are addressed below, while §8.5.7.1 discusses particular cases where hyphenation is not always desirable. Note that words derived from nominal compounds (§8.5.8) should be left unsegmented.

* regular nominal compounds are to be segmented with hyphens where sandhi permits (cf. §8.2)
  + Sanskrit mahā-devī, nānā-śāstrābhyāsopabr̥ṁhita-niśita-vimala-buddhiḥ
  + Tamil tiru-makaḷ
* the scope of Sanskrit nominal compounds includes those where the anterior member retains a declensional ending (aluk samāsa)
  + e.g. ante-vāsin, bhayaṁ-kara
  + however, in classical Sanskrit, most such compounds tend to be basic compounds (§8.5.7.1) and names (§8.5.7.2), so it is often preferable not to segment them
    - e.g. dhanaṁjaya, puraṁdara
* in **long compounds**, it is generally preferable to leave smaller, close-knit subunits — especially basic compounds (§8.5.7.1) — without analysis, e.g.
  + aneka-tulābhāra-dāna-dhārā-prakṣālita-kalmaṣaḥ (not an-eka or tulā-bhāra)
  + paramabhaṭṭāraka-mahārājādhirāja-rājaparameśvaraḥ (not parama-bhaṭṭāraka-mahā-rājādhirāja-rāja-parameśvaraḥ)
  + snāna-pavitrīkr̥ta-śirasāṁ (not -pavitrī-kr̥ta-)
* in **complex compounds** involving subordinate relationships between some of the members, hyphenate in the way you deem best suited for interpreting the compound, including
  + hyphenating where you would otherwise prefer not to hyphenate, e.g.
    - a-cāṭa-bhaṭa-prāveśya (not acāṭa-)
    - aśva-gaja-śāstra-jña (not -śāstrajña)
    - asi-carman-vat (not -carmanvat, cf. §8.5.8)
  + not hyphenating where you would otherwise prefer to hyphenate
    - e.g. brahmadeyī-kr̥tya (not brahma-deyī-)
* in a poetic text where a **bitextual reading** (śleṣa) depends on two alternative segmentations of the same sequence of graphemes, choose one of the following options at your discretion
  + forego all or part of the segmentation so as not to impose either segmentation on the text
  + prioritise the meaning you translate as primary, segment according to that, and optionally mention the alternative segmentation in a note to your translation

#### Basic compounds

By ‘basic’ compounds we refer to short compound nouns whose meaning is either straightforward or widely known. Such compounds do not necessarily have to be analysed into their members, and are in fact better left unsegmented when they are part of a longer compound. They include in particular the following categories.

* compounds with a conventional meaning that cannot be derived straightforwardly from the meaning of the members, e.g.
  + mahā-rāja (‘great king’) or mahārāja (a particular kind of ruler)
  + nr̥-pati (‘man-lord’) or nr̥pati (a king)
  + dina-maṇi (‘day-jewel’) or dinamaṇi (the sun)
  + turaṁ-gama (‘quickly-goer’) or turaṁgama (a horse)
* compounds whose anterior member cannot occur on its own and is thus rather a prefix, i.e. a-/an-, sa-, su- and ku-
  + e.g. an-artha, sa-putra, ku-rājan
* compounds whose posterior member is a verbal root (with or without an explicit kr̥t suffix such as -t)
  + e.g. śāstra-jña, śatru-jit
  + especially if such a compound has a non-evident conventional meaning, e.g.
    - dvi-ja (‘twice-born’) or dvija (a bird; a member of the upper classes)
    - madhu-kara (‘honey-maker’) or madhukara (a bee)
* compound cardinal numerals, e.g.
  + dvā-daśa
  + pañca-viṁśati
  + see also §8.5.8 about ordinals
* nominal derivatives of verbal formations for which hyphenation is recommended in §8.5.6, e.g.
  + namas-kr̥ta
  + āvir-bhūta
  + svī-kr̥ta

#### Proper names and styles

Proper names should not normally be segmented into compound members.

* e.g. jayasiṁha, puṇḍravardhana, not jaya-siṁha, puṇḍra-vardhana
* compound proper names may be segmented on a case by case basis when this is deemed helpful for interpretation, for example when the literal meaning of a name or part of a name is foregrounded
* do use hyphens to separate honorifics and titles from names
  + e.g. śrī-jayasiṁha-vallabha, viṣṇuvardhana-mahārāja
  + long sequences of such items may be treated as quasi-compounds (§8.5.5)
  + when such words seem to be used as part of a name rather than styles attached to it, segment on the basis of what you interpret to be the name, e.g.
    - bhīmarājākhyaḥ (a person named Bhīmarāja rather than a king named Bhīma)
    - śrīdharaśarman (a Brahmin named Śrīdharaśarman rather than ‘the honourable’ Dharaśarman)

### Derivatives of compounds

Secondary derivatives of Sanskrit compound nouns are not themselves compounds and should therefore not be hyphenated.

* for example, cāturvarṇya is not a compound
  + it is derived from the compound catur-varṇa, but is itself not composed of the members \*cātur and \*varṇya and should not be segmented
* when the derivation does not involve a vr̥ddhi alteration of a vowel, it is still better to forego hyphenation in order to help with the interpretation
  + e.g. asicarmanvat, ‘having a sword and a shield’, consists of the suffix -vat added to the compound asi-carman as a whole, rather than being a compound of asi and carmanvat
    - at your discretion, if you feel this is helpful for the analysis of a complex compound, instead make an exception and separate the suffix, as well as all members, with a hyphen (cf. §8.5.7)
* compound ordinal numbers are also derivatives of compounds and should not be hyphenated, e.g.
  + caturviṁśa
  + caturviṁśatitama

### Affixes and clitics

Morphemes which are not considered independent in a given language should normally not be separated by any segmentation from the word or stem with which they are associated. In particular:

* the following Tamil formations **must not be separated** from the words to which they are attached
  + enclitic particles (e.g. ē, ō)
  + forms of the verb āku-tal (e.g. āṉa, āy, āka) when used adverbially
* the following Old Javanese formations **must not be separated** from the words to which they are attached
  + enclitic pronominal suffixes (-(ṅ)ku etc.)
  + possessive constructions built with the linker -ni (-nikaṅ, etc.)
  + the definite article -*ṅ*
  + the conjunction -*n*

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1. Version 2 bears the internal version number 1.1, but since the automatic versioning in the HAL-SHS repository assigned it number 2, we have chosen to adopt that numbering to eliminate future inconsistencies. [↑](#footnote-ref-1)
2. References to the EGD in this document pertain to EGD version 2, released simultaneously with TG version 4. The acronym EGD stood for Encoding Guide for Diplomatic Editions in the first version. [↑](#footnote-ref-2)
3. See note 52 about the concept of a Unicode character. [↑](#footnote-ref-3)
4. Note that this dichotomy is not quite the same as the anthropological distinction of “emic” and “etic” as an insider and outsider perspective; the point of connection is that “etic” refers to an objective and impartial description of characteristics, while “emic” is concerned with subjective meaning within a system. [↑](#footnote-ref-4)
5. On the few occasions where we mention phones, we represent them in the IPA phonetic alphabet. The accurate pronunciation of the IPA signs is not relevant to our discussion. [↑](#footnote-ref-5)
6. The linguistic function of phonemes is generally understood to be the distinction of semantic meaning, demonstrable through minimal pairs in a language’s lexicon, i.e. words that have different meanings while differing only in having one or the other phoneme candidate at a certain point. [↑](#footnote-ref-6)
7. The term ‘phonology’ is sometimes used in this specific sense, but this leaves us without a technical name for the study of speech sounds encompassing both phonetics and phonemics. [↑](#footnote-ref-7)
8. For representing phonemes, we either use the standard spelling (for English) or DHARMA transliteration (for source languages), or use the IPA equivalent of a representative phone (e.g. /ɔ/), as deemed expedient for the phoneme in question. [↑](#footnote-ref-8)
9. When the illustration of actual graphic appearance is desired, we use an approximation of the shape concerned. When discussing graphs and graphic units of Indic scripts without needing to (or being able to) illustrate their form, we use transliteration (e.g. |rddhe|, |r|). [↑](#footnote-ref-9)
10. The function of graphemes will be addressed in at length in §2.3. [↑](#footnote-ref-10)
11. The term ‘graphematics’ is perhaps more prevalent in current scholarship, but the two are largely synonymous (Meletis 2020a, 26 n. 29), and we see no reason to break the analogy with ‘phonemics’. [↑](#footnote-ref-11)
12. Since graphemes are emic concepts and not etic written signs, the symbols used for their notation are arbitrary (cf. Meletis 2020a, 252–53, n. 9). In this document, we always represent the graphemes of Indic writing systems in transliterated form. [↑](#footnote-ref-12)
13. Including characters (§2.4.1) and glyphs (§2.4.2). [↑](#footnote-ref-13)
14. With Meletis (2020a, 20). [↑](#footnote-ref-14)
15. As, for example, through the symbols |☢|, |🎜| or |👍|. [↑](#footnote-ref-15)
16. With e.g. Wellisch (1978, 15) and most theorists. [↑](#footnote-ref-16)
17. With Weingarten (2013, 17–18), in agreement with Meletis and Dürscheid (2022, 65–66) and essentially reconcilable with Wellisch (1978, 15, 13), and Coulmas (2003, 35). [↑](#footnote-ref-17)
18. With Weingarten (2013, 18) and most recent theorists. [↑](#footnote-ref-18)
19. Such as that for writing twenty-first century Bronx English on a computer in Arial, or that for writing Shakespearean English by hand in insular minuscule. [↑](#footnote-ref-19)
20. The terms ‘Roman’ and ‘Latin’ are near-synonyms in the context of scripts and writing systems. Coulmas (2006, 285–87, s.v. Latin alphabet) uses ‘Latin’ specifically for ancient Rome and ‘Roman’ for the broad family of scripts and writing systems derived from the former (ibid. 2006, 438–39, s.v. Roman alphabet). We try to follow suit even though this does not appear intuitively preferable and runs counter to Unicode terminology which identifies all “Roman” letters as Latin. [↑](#footnote-ref-20)
21. There exist various and not entirely compatible typologies of writing systems. We broadly follow Meletis (2020a, 142–51), q.v. for a discussion of other typologies. For an in-depth study, see e.g. Daniels (2018). [↑](#footnote-ref-21)
22. In addition to *aksharic* (with varied spellings), technical terms widely used for such writing systems include *abugida* and *alphasyllabary*. The diverse definitions offered for each of these terms are not altogether compatible. See also note 41 below, and see e.g. Gnanadesikan (2017) for a discussion and an attempt at a clearer typology of phonographic writing systems. She endorses the term *āksharik*, which we adopt here apart from the spelling, since it fits the system of related terms better than “akshara script” suggested by Salomon (2003, 78). [↑](#footnote-ref-22)
23. The inherent vowel may be absent (or optional) in some specific Indic writing systems, notably early Tamil Brāhmī (Salomon 1998, 36; 2003, 104). The only truly essential feature of an aksharic writing system is that it employs dependent signs for postconsonantal vowels. [↑](#footnote-ref-23)
24. The *graphic syllables* predominantly represented by the signs of syllabographic writing systems do not necessarily correspond to speech syllables; for further discussion, see e.g. Coulmas (2003, 62–66); Meletis and Dürscheid (2022, 240–42). [↑](#footnote-ref-24)
25. See Coulmas (2003, 40–41). More recently the term *morphographic*, ‘morpheme-writing’ has gained ground (Meletis and Dürscheid 2022, 243–49). [↑](#footnote-ref-25)
26. With Wellisch (1978, 18) and Coulmas (2003, 36). [↑](#footnote-ref-26)
27. There is no hard reason why we should not transliterate धर्म as x%it% (so long as the matching of source signs to target signs is consistent throughout our transliteration scheme), yet most of us prefer more intuitive transliterations such as dharma. [↑](#footnote-ref-27)
28. See Meletis (2019, 27–34) for an overview. [↑](#footnote-ref-28)
29. Notably Daniels (2018, 164–71). [↑](#footnote-ref-29)
30. Our approach has much in common with that advocated by Meletis (e.g. 2019), but we have adapted some of his notions in altered form, and reject others. Discussion of where, how and why we agree or disagree with him and other grapholinguists will be kept to a minimum in order to be able to proceed as quickly as possible to our actual subject matter. [↑](#footnote-ref-30)
31. With Fedorova (2013, 50) and Weingarten (2013), contra Meletis (e.g. 2019, 35–36). [↑](#footnote-ref-31)
32. Including Fedorova (2013, 50), Weingarten (2013, 19) and Meletis (e.g. 2019, 35). [↑](#footnote-ref-32)
33. In the specific semiotic sense of a dyadic sign, see e.g. Nöth (1990, 59–60). [↑](#footnote-ref-33)
34. With Meletis (e.g. 2019, 41) and Weingarten (2013, 18), contra Fedorova (2013, 50). [↑](#footnote-ref-34)
35. With Weingarten (2013, 20), largely contra Meletis (e.g. 2019, 35). [↑](#footnote-ref-35)
36. Broadly in agreement with Meletis (e.g. 2019, 36; Meletis and Dürscheid 2022, 127). [↑](#footnote-ref-36)
37. With Meletis (e.g. 2020a, 65; Meletis and Dürscheid 2022, 121). [↑](#footnote-ref-37)
38. Where a grapheme signifies a set of phonemes which typically share some phonological features, e.g. English <s>, which can stand for /s/ in “bits,” /z/ in “heads” and /ʒ/ in “vision,” as well as for /ʃ/ in certain accents. [↑](#footnote-ref-38)
39. Where the grapheme identifies a particular allophone rather than a phoneme proper, as in Sanskrit <ñ> and <ṅ> or standard Hindi <ṣ>, which correspond to phones that are (arguably) context-dependent allophones of /n/ and /ś/ respectively. [↑](#footnote-ref-39)
40. Strangely, Meletis balks from this conclusion, with complicated consequences bordering on the absurd (e.g. Meletis 2019, 36–38). To us, it is a logical extension of his thoughts about the separateness of grapheme-phoneme correspondence rules. [↑](#footnote-ref-40)
41. Contra Weingarten (2013); more or less with Meletis (e.g. 2019, 35), who requires a grapheme to be a minimal unit with both a linguistic value and a capacity to distinguish semantic meaning. [↑](#footnote-ref-41)
42. ‘Sub-grapheme’ is not a widely current grapholinguistic term and is rarely defined. For Fedorova (2013, 50), it includes both diacritical marks (which we discuss under elements, §2.4.4.1) and the components of complex akṣaras. In the technical literature on character recognition, it seems to be more or less identical to what we call elements (§2.4.4). [↑](#footnote-ref-42)
43. This lack of distinction is implied by the term *alphasyllabary*, which we consider inappropriate. [↑](#footnote-ref-43)
44. Meletis (e.g. 2020a, 100) explicitly denies that the inherent vowel of aksharic systems is a grapheme, even though recognising it as one seems to be a logical extension of his approach to graphetically non-segmentable grapheme clusters (q.v. note 71), and would be conceptually analogous to how Meletis and Dürscheid’s (2022, 235–36) awards grapheme status to the vowels of the Cree writing system. [↑](#footnote-ref-44)
45. The grapheme corresponding to the inherent vowel of an aksharic system is of course present even when — in particular contexts in particular languages — the inherent vowel is not pronounced, or pronounced differently than in other contexts. That is a matter of grapheme to phoneme mapping, not essentially different from cases such as the grapheme <e> of English, which may be silent or may be pronounced in various ways. [↑](#footnote-ref-45)
46. Largely in agreement with e.g. Coulmas (2006, 86, 292, 421; s.vv. cipher 1, letter, punctuation 1) and Neef (2015, 711). [↑](#footnote-ref-46)
47. Largely with Meletis (2020a, 49–54; 2020b, 256–57). [↑](#footnote-ref-47)
48. See §2.5.1.2 about typographic ligatures and §2.5.4 about potential complex characters in alphabetic systems. [↑](#footnote-ref-48)
49. In true syllabographic systems, graphemes and characters again coincide. Our notion of the character seems difficult to reconcile with cursive abjadic systems such as Arabic, but it could be applied productively to non-cursive abjads such as Hebrew, to typologically complex writing systems such as Hangul and Mayan hieroglyphics, and probably also to morphographic systems. [↑](#footnote-ref-49)
50. See Figure 4.4.A for examples of final consonants in premodern Indic writing systems. [↑](#footnote-ref-50)
51. Ollett and Taylor (forthcoming) do define a character in the same way as we do: as “an element of the writing system that can be used independently according to the logic of that writing system”. Wellisch’s (1978, 16) definition is somewhat vague but appears compatible with ours. Neef’s (2015, 711) treatment of the character seems to encompass both our grapheme (a term Neef avoids) and our character. Iyengar (2024) rejects the notion of the grapheme, but his understanding of the akṣara corresponds straightforwardly to our etic glyph and emic character. [↑](#footnote-ref-51)
52. In Unicode, a character is an abstract element of the script defined as a “member of a set of elements used for the organization, control, or representation of textual data” (ISO/IEC 10646 2020, 2, §3.5). That is to say, a Unicode character can be either a “graphic character” (which is much like the grapheme as we define it; ibid. 5, §3.28), a “control character”, or a “format character”; both of the latter influence the processing and rendition of adjacent characters. Accordingly, many specimens of what we call a character are composed of several Unicode characters. Devanagari क्त्र <ktra>, for instance, consists of one each for the graphemes <k>, <t>, <r> and <a>, plus two instances of the Unicode virāma control character (one each after the first two consonants). [↑](#footnote-ref-52)
53. The Unicode definition of a ‘graphic symbol’ as the “visual representation of a graphic character or of a composite sequence” (ISO/IEC 10646 2020, 5, §3.29) appears to be identical to our ‘graphic sign’. [↑](#footnote-ref-53)
54. Iyengar (2024, 420) defines a graph in a way we find on the whole compatible with ours. According to Meletis (2020a, 46, n. 57), ‘graph’ and ‘glyph’ can be considered synonyms. Neef (2015, 711) uses only ‘glyph’ and does so in a sense that seems to cover both our graph and our glyph, while Coulmas (2006, 173–74, s.v.) defines a graph much as we define a glyph, and all he has to say about ‘glyph’ (2006, 168, s.v.) is that the term has been “used in the description of writing systems whose units were not well understood”, such as Mayan, where it is a “collective designation that can refer to a logogram, a phonetic sign or a compound sign”. [↑](#footnote-ref-54)
55. In the context of Roman typography, ‘ligature’ refers to typographic ligatures, which we prefer not to perceive as complex characters (§2.5.1.2). [↑](#footnote-ref-55)
56. Meletis (2020a, 100) simply describes the corresponding graphemes as graphetically subsegmental and dependent or bound, while Weingarten (2013, 18) calls them affigated graphemes. [↑](#footnote-ref-56)
57. To which we might add the virāma, for which see §2.4.5 See also §2.5.4.1 about the anusvāra and visarga. [↑](#footnote-ref-57)
58. From an alternative viewpoint it might be said that they are simultaneously elements, much in the way that simplex glyphs are simultaneously graphs. [↑](#footnote-ref-58)
59. For instance, the diaeresis (Umlaut) distinguishes |ö| from |o| in the Roman writing system for German, the macron distinguishes |ū| from |u| in the DHARMA transliteration system, and the nuqta (dot) distinguishes |ड़| from |ड| in Devanagari for Hindi. For our purposes, these elements are in the same class as the horizontal stroke that distinguishes Brāhmī |𑀓| <ka> from |𑀭| <ra>. [↑](#footnote-ref-59)
60. Thus, Devanagari |ड| is transliterated ḍa, while |ड़| is transliterated ṛa. In the source graphemes, a diacritical mark in |ड़| indicates that the grapheme stands for a flap allophone of the stop phoneme represented by the base graph |ड|; an incidentally identical-looking diacritical mark in the transliteration of both indicates the retroflex quality of both phonemes, but the distinction of the graphemes takes place in the base graph. [↑](#footnote-ref-60)
61. For contrast, compare the digraphs mentioned in note 74 above. [↑](#footnote-ref-61)
62. We thus emphatically disagree with Meletis (e.g. 2020a, 101), in whose view Tamil |ொ| <o> corresponds to two separate graphemes. His reasoning is that the graphs |ெ| <e> and |ா| <ā> can occur separately on their own, hence they correspond to separate graphemes, hence their combination is not minimal, and the association of |ொ| with the phoneme /o/ is a matter of higher-level grapheme-phoneme correspondence. We assert that it is simply the strokes comprising Tamil |ொ| that happen to be homographic to those comprising the graphs |ெ| and |ா| <ā>. This is irrelevant to the grapheme status of Tamil <o>, just as the fact that Latin |Y| looks like a combination of |V| and |I| is irrelevant to the grapheme status of <y>. (And this in spite of the history of the graph |Y|, which was in fact deliberately created from the primary graphs for |U| and |I|, originally to represent a vowel phoneme “in between” these two!) [↑](#footnote-ref-62)
63. See also §2.5.4 about ambivalent classification, and §4.4.1 for good practice pertaining to proto-virāmas. [↑](#footnote-ref-63)
64. We are not aware of any linguistic publication that discusses the status of the virāma vis-à-vis graphemes. Theoretical frameworks which equate akṣaras to graphemes can unproblematically handle the virāma as a diacritical mark which changes one grapheme to another, and this implicit understanding may be in the background of the fact that the virāma is often referred to as a diacritic (e.g. Gnanadesikan 2017, 18). However, such approaches implicitly treat the Indic script as syllabographic rather than aksharic (cf. note 41), which we find unacceptable. Weingarten (2013, 22) implies that he considers the virāma to be a grapheme, but since his broad grapheme concept includes diacritical marks, this does not support our stance. Iyengar (2024, 427–28) treats the virāma as a graph (defined much as we define it, cf. note 54), which would imply that on the emic level (which Iyengar dismisses) it is a grapheme. Meletis does not address the status of the virāma as far as we are aware, but Meletis and Dürscheid (2022, 233) state that it “appears as the diacritic <◌्>” which, unless the angle brackets (indicating graphemes) are a mistake for vertical bars (denoting graphs), implies that they are willing to recognise it as at least some sort of grapheme. [↑](#footnote-ref-64)
65. There is no inherent rule in the Indic writing system that would forbid adding a virāma to a conjunct glyph, and practical examples of this do exist (e.g. Devanagari |र्द्| <rd·>, Tamil |க்ஷ்| <kṣ·>). [↑](#footnote-ref-65)
66. With Iyengar (2024, 430–31). [↑](#footnote-ref-66)
67. Our distinction between graphemic and graphetic allography is inspired by Meletis (e.g. 2020b), but he defines these concepts in a very different way. For him (e.g. Meletis and Dürscheid 2022, 64), the crux is the physical template (“basic shape”), identified strictly on the basis of phenomenal criteria such as the number and topological arrangement of graphic elements. He further classifies graphetic and graphematic allography in terms of whether the alternation takes place within or between inventories (scripts), and whether the choice between any given set of forms is paradigmatic or syntagmatic. Iyengar (2024, 427–28) uses the label ‘homophonous heterography’ for some cases of what we call graphemic allography, but is concerned only with the phonological signification of alternate graphic representations, and ignores their potential graphemic role. [↑](#footnote-ref-67)
68. Meletis (2020b, 257–59) would call pairs like |अ| and |अ| graphematic allographs because they involve different “basic shape,” and recognise only the allography of |अ| and |अ| as graphetic (Meletis 2020b, 255 Fig. 3). Our concept of graphetic allography thus includes Meletis’s graphetic allography and his free graphematic allography. [↑](#footnote-ref-68)
69. In Meletis’s terms (2020b, 259–60), our graphotactic allographs are positional graphematic allographs, but that category also includes many cases of what we consider true graphematic allography. [↑](#footnote-ref-69)
70. See also §2.5.4 about the inevitable fuzziness of classification. [↑](#footnote-ref-70)
71. Largely in agreement with Meletis (2019, 41, 45–46 n. 32), who recognises such “graphetically non-segmentable clusters” as a challenge, but, in spite of his blanket requirement of visual isolability (ibid*.*, 35), his last word on them is that they correspond to sequences of individual graphemes in the same way as the more transparent complex akṣaras. [↑](#footnote-ref-71)
72. Meletis seems to consider our graphemic allography no different from his positional graphematic allography (Meletis 2020b, 257–60), except possibly for the matter of upper and lower case in Roman, about which he is undecided (2020b, 260–61). [↑](#footnote-ref-72)
73. See also §2.4.4.2 for a separate discussion of graphic elements homographic to graphs. [↑](#footnote-ref-73)
74. Examples can, however, be found even in the Indic system, such as the use of |ळ्ह| for [ḷh], a Vedic allophone of /ḍh/; the use of the combination <ys> in some North Indian scripts of the first millennium CE to represent the phoneme /z/, which does not occur in Sanskrit; or, arguably, the concurrent use of the dependent vowels |ui| in Khmer, Burmese and Mon to represent a vowel phoneme alien to Sanskrit. [↑](#footnote-ref-74)
75. Coulmas (2006, 129, s.v. digraph 1) asserts that polygraphs are graphemes in their own right. Meletis and Dürscheid (2022, 128–29) classify certain polygraphs as “complex graphemes” (cf. note 39), but deny grapheme status to most. [↑](#footnote-ref-75)
76. The pamphlet describing the ISO in full (International Organization for Standardization 2001) is accessible to project members in our Sharedocs repository. A summary is freely available on Wikipedia (2025b). IAST is also described on Wikipedia (2025a). The schemes used in many traditional Indic epigraphic publication and those still current in India have much in common with both of these, but are less standardised, and generally employ more polygraphs in order to approximate English phonological transcription better. The transliteration in the Madras Tamil Lexicon is identical to ISO-15919 on all fundamental points. [↑](#footnote-ref-76)
77. @mention new ISO standard here or change this sentence and mention it only under case sensitivity. [↑](#footnote-ref-77)
78. The addak |ੱ| usually indicates the gemination of the following consonant, but may also function as a stress marker for the preceding vowel. [↑](#footnote-ref-78)
79. TEI markup also plays a role in determining how our text will be ultimately presented to users on screen and in print, but this is yet another separate concern and will not be addressed here. [↑](#footnote-ref-79)
80. Since the disambiguation colon hardly ever occurs in our texts, we have chosen to employ the colon in a different role too, namely for the use of the *ā* marker in Indonesian scripts as an indicator of vowel length or consonant doubling (§4.6.1.1) [↑](#footnote-ref-80)
81. See §### about the transliteration of word joiner signs. [↑](#footnote-ref-81)
82. However, in non-diplomatic contexts (i.e. loose transliteration, §3.5.2), primarily when transliterating a modern language with a known orthography and pronunciation, we have no objection to using diacritical marks indicating vowel nasality, e.g. to transliterating Hindi हाँ as hā̃. [↑](#footnote-ref-82)
83. In the Javanese/Balinese writing system, this phoneme is always written by adding a length marker to the basic grapheme <ə>, so for the sake of consistency we transliterate it as per §###. See also §### about the transliteration of vowel supports. [↑](#footnote-ref-83)
84. See in particular the remark about the Roman graph |Y| in note 62 to that section. [↑](#footnote-ref-84)
85. An explicitly transliterated virāma can be tagged in XML, for instance as unclear, restored or supplied. [↑](#footnote-ref-85)
86. In future projects, similar exceptions may be made for other languages and writing systems as deemed necessary, such as the writing system of the Bhaṭṭiprōḷu inscriptions (Salomon 1998, 35). [↑](#footnote-ref-86)
87. We suspect two evolutionary processes here, which may have worked synergistically. On the graphetic side, certain independent vowel graphs in Indic writing systems serve as bases from which graphs for related vowels are derived by the addition of a stroke similar or identical to the corresponding dependent vowel graph. Thus, in many specific systems, the graph for <Ā> is derived from that for <A>, <Ai> from <E> and <Au> from <O>; in some, such as modern Devanagari, <O> is also derived from <A>. In yet others, this generalisation has been carried to the extreme, whereby all independent vowel graphs are derived in this manner from the basic graph for the neutral vowel. On the linguistic side, some languages which adopted an Indic writing system had a minimal consonant phoneme for which the original writing system had no provision, and therefore adapted the writing system to accommodate that phoneme. [↑](#footnote-ref-87)
88. According to Ida Bagus Komang Sudarma (personal communication, 16 Aug. 2019), in Sasak writing ᬅ can be combined with a pasangan consonant, e.g. ᬅ᭄ᬳᬶ qhi and ᬅ᭄ᬳᬸ qhu, but cannot itself become a pasangan, while in Balinese writing neither possibility exists. [↑](#footnote-ref-88)
89. The example is taken from Modern Khmer. The digraph ae is not included in the DHARMA system because it does not exist in Old Khmer, but can function analogously to ui (§4.3.2.1). [↑](#footnote-ref-89)
90. The graph |o| is of course composed of elements which, in themselves, correspond to the graphs |e| and |ā|; cf. §**Hiba! A hivatkozási forrás nem található.**. [↑](#footnote-ref-90)
91. Unlike the case of |o|, the |ā| marker is used here to indicate length, treated as per §4.6.1.1. [↑](#footnote-ref-91)
92. ISO-15919 already caters for a number of diacritically modified Indic graphemes, for instance Bengali |য়| → ẏ; Devanagari |ज़| → z. Wherever available, Romanisation compliant with ISO-15919 should be preferred. [↑](#footnote-ref-92)
93. This appears to be a straightforward generalisation of the phenomenon that in most Indic writing systems the graph for independent <Ā> is distinguished from that for independent <A> by the addition of a stroke similar or identical to that which normally represents dependent <ā>, as in Devanagari |आ| comprised of the elements |अ| and |ा|. [↑](#footnote-ref-93)
94. In the loose transliteration of this example, ṁ and ṁṅ are both represented by ṅ (since both express the phoneme /ŋ/). Simultaneously, n: (theoretically denoting /nn/) is simplified to n, and ṁṅ (theoretically /ṅṅ/) is simplified to ṅ, because consonant gemination is not considered to be a phonemic feature of the language, but rather an orthographic peculiarity. [↑](#footnote-ref-94)
95. In the loose transliteration of this example, anusvāra has been normalised to ṅ. [↑](#footnote-ref-95)
96. Throughout this guide, the term ‘Arabic numeral’ refers to the modern international numeral signs. [↑](#footnote-ref-96)
97. Place-value notation, also called positional notation, is where a digit’s position in the sequence of numbers functions as a multiplier to the digit’s default value. This is distinguished from sign-value notation, where each numeral sign has a fixed value regardless of its position. [↑](#footnote-ref-97)
98. This does not apply to Tamil number notation, where multiplier glyphs can be placed before glyphs for powers of 10, as in Figure 5.3.A/5, but these are visually separate. [↑](#footnote-ref-98)
99. Thus, diacritical marks and diacritic-like signs (§4.6.1) that modify the signification of alphabetic graphemes are excluded. [↑](#footnote-ref-99)
100. If you have doubts concerning the function of a symbol, encode it as an abstract symbol rather than a functional one. [↑](#footnote-ref-100)
101. Note that while some editions of Sanskrit epigraphic texts employ an = sign (double hyphen) to indicate that the end of one transliterated word and the beginning of the next belong to a single source akṣara, we always use a space in such a situation. The fact that the letters separated by a space comprise one akṣara is indicated by their lowercase spelling (§8.2), while the = sign is used to highlight instances where certain source graphemes comprise a single akṣara even though they should not by the standard graphotactic convention of the writing system in question (§4.6.3). [↑](#footnote-ref-101)