

# Navjani: A Systematised Extension of the Mahajani Script

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## Abstract

Mahajani was a mercantile script of northern India, used into the twentieth century for accounts and correspondence in Marwari, Hindi and Punjabi. Unlike many other Indian writing systems, it is not strict in requiring the representation of vowels and occasionally some consonants. It was designed for readers who already knew what the words were by context. Outside Pandey’s encoding proposal [3] there is little accessible documentation of how it was used in practice, so those ambiguities were difficult to resolve with online material.

This document describes Navjani (नवजनी, from *Nav* Mahajani, “new Mahajani”), a script that begins from Mahajani’s letterforms, but modifies and extends the set. It also introduces a novel diacritic system. Every vowel sign occupies a fixed band below its consonant, centred on it, at the sign’s own natural width. The resulting system stands close to one-to-one correspondence with Devanagari’s letters, so Navjani can be typed, stored and rendered as ordinary Devanagari text.

## 1 Introduction

This project began as an attempt to learn a script, not to design one.

Mahajani is a Brahmi-derived writing system that was used across northern India—Rajasthan, Punjab, Haryana—by the *mahajan* merchant and banking castes from whom it takes its name. It recorded

account books, promissory notes and correspondence, and it was used for several languages, among them Marwari, Hindi and Punjabi [3]. The original goal of this project was personal: to write Marwari in a script that had historically been used for it.

That turned out to be harder than expected, as there are a number of special rules and ambiguities in the script (Mahajani is more of an alphabet than the abugidas that are typical for Indian languages). Mahajani was a working script for merchants, and often deviated per merchant family so that account books could be kept secret. Vowels are largely unwritten. Consonants that Devanagari distinguishes are frequently merged. There is no virama, and so no way to write a consonant cluster unambiguously. Words are recoverable from context by a reader who knows the trade, the language and the family.

Since Mahajani is not in active use, finding someone to teach a variant of the rules proved difficult, and there is not much material available online from which to learn how to use the script. Mahajani was in decline by the mid-twentieth century, and the documentation that survives online is thin. Pandey’s proposal to encode the script in ISO/IEC 10646 [3], together with its earlier preliminary version [2], is the substantial accessible source, and it is an encoding document: it establishes a repertoire and its properties so that the script can be represented in Unicode. However, it does not cover how to systematically resolve ambiguities that result from Mahajani’s abbreviated representation of words.

Eventually, this resulted in the project changing to one of script design. Taking the original Mahajani unicode block, I started modifying and extending it to take away the ambiguities and introduce some design changes that I thought might make it easier to learn. The result is Navjani—नवजनी, contracted

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from *Nav* Mahajani, “new Mahajani”—it keeps Mahajani’s letterforms as its starting point, but overhauls the diacritics system, resolves ambiguous letters, adds missing letters, and modifies some existing letters. A vowel sign is placed the same way under every consonant. A consonant modifier goes in its own reserved zone. The result is a script whose spelling is determined rather than inferred, and which could easily be extended to include tonal marking.

Because the diacritic system was rebuilt to cover every vowel and every modifier rather than the subset Mahajani wrote, Navjani ends up in correspondence with the whole Devanagari repertoire (or, in case of any remaining gap, it can easily cover such a gap). That correspondence is what makes it quickly usable: the font maps onto the Devanagari block, so existing text renders in Navjani directly and a standard Hindi keyboard types it.

## 2 What Could Be Established About Mahajani

### 2.1 The source situation

Pandey’s proposal [3] provides the source material that Navjani builds upon: Mahajani was encoded in Unicode 7.0 in the block U+11150–U+1117F [4] largely on its basis. For someone trying to *use* the script, however, there are more rules that need to be understood to actually write with the script.

What is not readily available is the layer underneath: how a writer chose to spell a given word, which distinctions were maintained in careful writing versus collapsed in fast writing, whether a given ambiguity was resolved by convention or simply tolerated. That knowledge lived with a community of practice that has largely disappeared, and there are not many samples available online.

### 2.2 The structural gaps

Three properties of Mahajani make it difficult to adopt as-is for general writing.

**Vowels are largely unwritten.** Mahajani has independent vowel letters, but no developed system of dependent vowel signs, and the vowels it does have do not actually cover all vowels used in spoken languages like Marwari (i.e., a vowel character can represent a few similar types of vowels, and context is supposed to indicate to the reader which variant it is)—and, sometimes, the vowel was skipped altogether. This can work well given enough context (since abjads exist), but it does make reconstruction of phonetics more difficult.

**Consonants are under-differentiated.** Distinctions that Devanagari marks—voiced against voiceless, aspirated against unaspirated—are not consistently maintained. A reader disambiguates from context. Again this is a reasonable trade for a script used inside a known domain, and an obstacle outside one.

**There is no cluster mechanism.** Mahajani has no virama and no conjunct formation. Consonant clusters, which are common in Indian languages, have no unambiguous written form.

### 2.3 The consequence

These issues made the script difficult to learn, despite attempts at finding people who still knew how to use the script.

## 3 The Design of Navjani

Navjani builds upon Mahajani’s letterforms as a base layer, but significantly extends and modifies them.

### 3.1 Zones

The vertical space around a consonant is divided into reserved zones, each capable of holding a type of diacritic mark.

**The vowel zone** sits immediately below the consonant and spans the full depth of the descender space. All dependent vowel signs live here.

|   | अ  | आ  | इ  | ई  | उ  | ऊ  | ए  | ऐ  | ओ  | औ  | अं | अः | ्  |
|---|----|----|----|----|----|----|----|----|----|----|----|----|----|
|   | ॐ  | ॐ  | ॐ  | ॐ  | ॐ  | ॐ  | ॐ  | ॐ  | ॐ  | ॐ  | ॐ  | ॐ  | ॐ  |
| क | ३  | ३  | ३  | ३  | ३  | ३  | ३  | ३  | ३  | ३  | ३  | ३  | ३  |
| ख | ५  | ५  | ५  | ५  | ५  | ५  | ५  | ५  | ५  | ५  | ५  | ५  | ५  |
| ग | ७  | ७  | ७  | ७  | ७  | ७  | ७  | ७  | ७  | ७  | ७  | ७  | ७  |
| घ | ९  | ९  | ९  | ९  | ९  | ९  | ९  | ९  | ९  | ९  | ९  | ९  | ९  |
| ङ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ |
| च | १३ | १३ | १३ | १३ | १३ | १३ | १३ | १३ | १३ | १३ | १३ | १३ | १३ |
| छ | १५ | १५ | १५ | १५ | १५ | १५ | १५ | १५ | १५ | १५ | १५ | १५ | १५ |
| ज | १७ | १७ | १७ | १७ | १७ | १७ | १७ | १७ | १७ | १७ | १७ | १७ | १७ |
| झ | १९ | १९ | १९ | १९ | १९ | १९ | १९ | १९ | १९ | १९ | १९ | १९ | १९ |
| ञ | २१ | २१ | २१ | २१ | २१ | २१ | २१ | २१ | २१ | २१ | २१ | २१ | २१ |
| ट | २३ | २३ | २३ | २३ | २३ | २३ | २३ | २३ | २३ | २३ | २३ | २३ | २३ |
| ठ | २५ | २५ | २५ | २५ | २५ | २५ | २५ | २५ | २५ | २५ | २५ | २५ | २५ |
| ड | २७ | २७ | २७ | २७ | २७ | २७ | २७ | २७ | २७ | २७ | २७ | २७ | २७ |
| ढ | २९ | २९ | २९ | २९ | २९ | २९ | २९ | २९ | २९ | २९ | २९ | २९ | २९ |
| ण | ३१ | ३१ | ३१ | ३१ | ३१ | ३१ | ३१ | ३१ | ३१ | ३१ | ३१ | ३१ | ३१ |
| त | ३३ | ३३ | ३३ | ३३ | ३३ | ३३ | ३३ | ३३ | ३३ | ३३ | ३३ | ३३ | ३३ |
| थ | ३५ | ३५ | ३५ | ३५ | ३५ | ३५ | ३५ | ३५ | ३५ | ३५ | ३५ | ३५ | ३५ |
| द | ३७ | ३७ | ३७ | ३७ | ३७ | ३७ | ३७ | ३७ | ३७ | ३७ | ३७ | ३७ | ३७ |
| ध | ३९ | ३९ | ३९ | ३९ | ३९ | ३९ | ३९ | ३९ | ३९ | ३९ | ३९ | ३९ | ३९ |
| न | ४१ | ४१ | ४१ | ४१ | ४१ | ४१ | ४१ | ४१ | ४१ | ४१ | ४१ | ४१ | ४१ |
| प | ४३ | ४३ | ४३ | ४३ | ४३ | ४३ | ४३ | ४३ | ४३ | ४३ | ४३ | ४३ | ४३ |
| फ | ४५ | ४५ | ४५ | ४५ | ४५ | ४५ | ४५ | ४५ | ४५ | ४५ | ४५ | ४५ | ४५ |
| ब | ४७ | ४७ | ४७ | ४७ | ४७ | ४७ | ४७ | ४७ | ४७ | ४७ | ४७ | ४७ | ४७ |
| भ | ४९ | ४९ | ४९ | ४९ | ४९ | ४९ | ४९ | ४९ | ४९ | ४९ | ४९ | ४९ | ४९ |
| म | ५१ | ५१ | ५१ | ५१ | ५१ | ५१ | ५१ | ५१ | ५१ | ५१ | ५१ | ५१ | ५१ |
| य | ५३ | ५३ | ५३ | ५३ | ५३ | ५३ | ५३ | ५३ | ५३ | ५३ | ५३ | ५३ | ५३ |
| र | ५५ | ५५ | ५५ | ५५ | ५५ | ५५ | ५५ | ५५ | ५५ | ५५ | ५५ | ५५ | ५५ |
| ल | ५७ | ५७ | ५७ | ५७ | ५७ | ५७ | ५७ | ५७ | ५७ | ५७ | ५७ | ५७ | ५७ |
| ळ | ५९ | ५९ | ५९ | ५९ | ५९ | ५९ | ५९ | ५९ | ५९ | ५९ | ५९ | ५९ | ५९ |
| ळ | ६१ | ६१ | ६१ | ६१ | ६१ | ६१ | ६१ | ६१ | ६१ | ६१ | ६१ | ६१ | ६१ |
| व | ६३ | ६३ | ६३ | ६३ | ६३ | ६३ | ६३ | ६३ | ६३ | ६३ | ६३ | ६३ | ६३ |
| श | ६५ | ६५ | ६५ | ६५ | ६५ | ६५ | ६५ | ६५ | ६५ | ६५ | ६५ | ६५ | ६५ |
| ष | ६७ | ६७ | ६७ | ६७ | ६७ | ६७ | ६७ | ६७ | ६७ | ६७ | ६७ | ६७ | ६७ |
| स | ६९ | ६९ | ६९ | ६९ | ६९ | ६९ | ६९ | ६९ | ६९ | ६९ | ६९ | ६९ | ६९ |
| ह | ७१ | ७१ | ७१ | ७१ | ७१ | ७१ | ७१ | ७१ | ७१ | ७१ | ७१ | ७१ | ७१ |

Figure 1: The Navjani abugida. The correspondence with Devanagari is one-to-one across the letters, which is what allows Navjani to be typed and stored as ordinary Devanagari text (§3.4).

The **modifier zone** is inset within it, shallower and shorter. The consonant modifiers—anusvara and visarga—live here, and are visually distinct from vowel signs by being dots rather than strokes.

**Tonal marking** is reserved a further slot. The languages of the region that carry tone can be written without inventing anything, though the present font does not yet draw these marks. The marks for tones would go immediately above the consonant character.

Putting every vowel sign below the consonant is the single largest departure from Devanagari, where signs are distributed above, below, before and after the base. The reason is uniformity: one zone means one placement rule, and a placement rule with one case is a rule that can be stated exactly.

### 3.2 The placement rule

Within the vowel zone, a sign is placed by three statements:

1. **Vertical position is fixed.** The sign occupies the same band regardless of which consonant it attaches to. It is never raised, lowered or vertically scaled.
2. **Horizontal position is centred.** The sign's centre aligns with the consonant's.
3. **Width is the sign's own, compressed to fit.** Each sign has a natural width. Under a consonant at least that wide, it is drawn at that width. Under a narrower consonant, it is compressed horizontally to the consonant's width, so that it never overhangs its base.

Consonant modifiers follow (1) and (2) within the modifier zone, but not (3): a dot is a dot and is not stretched.

### 3.3 Numerals

Navjani has its own digits, one for each Devanagari numeral (Table 1). They are written on the line, take no vowel signs and never enter the below-base zone, so they are unaffected by everything in §3.2.

|            | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|------------|---|---|---|---|---|---|---|---|---|---|
| Devanagari | ० | १ | २ | ३ | ४ | ५ | ६ | ७ | ८ | ९ |
| Navjani    | ० | १ | २ | ३ | ४ | ५ | ६ | ७ | ८ | ९ |

Table 1: The Navjani numerals against their Devanagari correspondents. Zero is a plain oval, as in Devanagari.

- [3] A. Pandey. Proposal to encode the mahajani script in ISO/IEC 10646. Technical Report L2/11-274, ISO/IEC JTC1/SC2/WG2 N4126, Script Encoding Initiative, Department of Linguistics, University of California, Berkeley, July 2011. <https://www.unicode.org/L2/L2011/11274-n4126-mahajani.pdf>.
- [4] The Unicode Consortium, Mountain View, CA. *The Unicode Standard, Version 7.0.0*, 2014. Mahajani occupies the block U+11150–U+1117F.

### 3.4 Relation to Devanagari

Navjani’s diacritic system is meant to have one-to-one correspondence with Devanagari’s letters (Figure 1). The font therefore maps Navjani onto the Devanagari block. There are a few missing characters at the moment, but most characters are present.

This is a deliberate choice with a practical payoff and a real cost. Navjani can therefore be used as a ‘font’ of Devanagari as of now.

Because Navjani covers the Devanagari letters generally rather than only the subset Mahajani wrote, it is not restricted to the languages Mahajani served. Anything Devanagari can represent phonetically, Navjani can write. Current caveats include a few vowels and consonants in Sanskrit, Limbu, Kashmiri, Sindhi, and Avestan, among a few others.

## 4 Conclusion

This was a fun project I started in grad school that was completely different from the technical projects I was otherwise working on. There’s definitely improvements that could be made to the script, but it is generally usable. At the moment, I am the only one who can read or write in it, however.

## References

- [1] SIL open font license, version 1.1. <https://openfontlicense.org>, 2007.
- [2] A. Pandey. Preliminary proposal to encode the mahajani script in ISO/IEC 10646. Technical Report L2/10-377, ISO/IEC JTC1/SC2/WG2 N3930, Script Encoding Initiative, University of Michigan, Oct. 2010.