

## THE ORIGIN OF MID VOWELS IN SIWI

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Recent documentation has established that the Siwi language of western Egypt, unlike most other Berber languages, has two phonemic mid vowels appearing not only in Arabic loanwords but also in inherited vocabulary: /e/ and /o/. This article examines their origin. Proto-Berber originally had a single mid vowel \*e, which appears to have been retained in Siwi only before word-final /n/. In all other environments the contrast between \*i and \*e has been neutralized, although word-finally this contrast seems to have survived into the 19th century. Instances of /e/ in other environments are phonetically conditioned, deriving variously from \*i, \*āy, or \*ā in appropriate contexts. The few attestations of /o/ are irregular, but occur in environments paralleling those in which /e/ is attested synchronically. Modern Siwi mid vowels are thus mostly secondary developments; except in final /-en/, they provide no direct evidence for the reconstruction of mid vowels in earlier intermediate stages of Berber.

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### 1. Introduction

Most Berber languages have a vowel system consisting of /a/, /i/, /u/ plus /ə/. Some varieties, however, additionally display mid vowels /e/ and/or /o/. Insofar as these vowels appear in inherited vocabulary, their origin poses difficulties: Are they inherited from proto-Berber, or do they derive from later secondary developments? Students of Berber have traditionally assumed the three vowel plus schwa system to be original. However, Prasse (1990) has argued that /e/ existed in proto-Berber and has been preserved as such in Tuareg and in Ghadames, while /o/ did not. Recent documentation of Ghomara Berber (El Hannouche 2008, Mourigh forthcoming) has opened up the possibility that the reflexes of \*e (> a) and \*i also remain distinct there, strengthening the case for its antiquity.

In Siwi, the Berber language of Siwa in western Egypt, both /e/ and /o/ are phonemically distinct from /i/ and /u/, as first observed by Vycichl (1981:176, 2005:180) and established by Naumann (2012: 272-273, 303-307). They occur in inherited vocabulary as well as loans. Naumann suggests, “The mid vowels /e, o/ seem to have acquired phonological status only recently in Siwi”, noting that they are “most typically found in final CVC syllables”, but makes no attempt to explain their emergence (2012:272-273). Vycichl (2005:189) proposes derivations for two morphemes with /e/, but makes no attempt to establish regular correspondences involving this vowel. Souag (2013:35) suggests diphthong coalescence and vowel harmony as sources for Siwi

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mid vowels, but does not demonstrate this or work out the details. The origin of Siwi mid vowels therefore remains an open question. This paper will show that Siwi has preserved the *\*e* reflected in Tuareg and Ghadames only before word-final *n*; otherwise, it has innovated /e/ and /o/ through a “conspiracy” of several distinct sound changes.

Unless otherwise stated, all Siwi data cited here derives from Souag (ms), a draft lexicon of about 3500 words; forms from Naumann (ms) are specifically cited as such. For other Berber languages, the sources unless otherwise indicated are: Van Putten (2014) and Paradisi (1960a;b) for Awjila; Paradisi (1963) for El-Fogaha; Benamara (2013) for Figuig; Lanfry (1973) for Ghadames; Dallet (1982) for Kabyle; Mourigh (forthcoming) for Ghomara; Oussikoum (2013) for Middle Atlas; Beguinot (1942) for Nefusi; Delheure (1987) for Ouargla; Sarnelli (1924) for Sokna; Prasse et al. (2003) for Tamajeq; Heath (2006) for Tamasheq; Boudot-Lamotte (1964) for Timimoun; Taine-Cheikh (2008) for Zenaga.

**1.1. A note on phonology.** Siwi [e] and [o] occur only word-medially, never word-initially or word-finally. In Arabic loans, they correspond regularly to Classical Arabic word-internal /ay/ and /aw/, typically realized in regional dialects as /ē/ and /ō/. Conversely, the diphthongs conventionally transcribed as [ay]<sup>2</sup> and [aw] occur word-finally but not word-internally (with rare exceptions in Arabic loans). In this position, they reflect Classical Arabic /ay/ and /aw/ just as /e/ and /o/ do word-internally (e.g. *aṭṭaw* ‘light’ < Arabic *ḍaw*). Synchronically, the obvious conclusion is that [ay] and [aw] are allophones of /e/ and /o/ respectively, and this is supported by some alternations (see 2).

However, their history appears to be different: [ay] and [aw] correspond regularly to vowel+y, w in languages that have preserved such combinations, rather than to monophthongs: e.g. Siwi *aṣmay* “sew (palm strips)” = Tamasheq *aṣmāy* “sew (clothing, tent)”; Siwi *adday* “below” = Tamasheq *ádday* “the lowest”; Siwi *iraw* “give birth” = Tamasheq *arəw* “id.”, Siwi *ayraw* ‘half-ripe date’ = Sokna <argâu><sup>3</sup>. Siwi’s non-final allomorphs [e], [o], on the other hand, correspond not only to diphthongs (in particular /āy/) but also to monophthongs (/i/, /u/) in such languages, a phenomenon requiring explanation. This article will therefore focus on the history of non-final /e/ and /o/.

## 2. Mid vowels in Siwi morphology

In Siwi, /e/ never occurs in verbal morphology proper: not in imperatives, not in perfectives, not in imperfectives, not in infinitives, nor in subject or dative agreement affixes. This contrasts with Tuareg, in which *e* notably occurs in parts of the conjugation of the perfectives of former glottal-final verbs (and in the negative perfective, lost in Siwi). As Kossmann (2001) shows, Tuareg and Ghadames have a vowel *e* in the 1sg. and 2sg. forms of \*CC? verbs. Siwi has *-i-* in these forms:

<sup>2</sup> Throughout this paper, in phonetic as well as phonological transcriptions, <y> will be used in place of IPA [j].

<sup>3</sup> Note, however, the less obvious correspondences in Siwi *ajraw* “frog” = Tamasheq *e-jārr* “id.”, Tahaggart *aḡāru* “id.” (Ritter 2009), Siwi *aččaw* “horn” = Tamasheq *isəkk* “id.” The latter seems to be a back-formation from the plural *\*askaw-ān*.

**Table 1.** 1sg. and 2sg. forms of \*CC? verbs

	Siwi	Tuareg	Ghadames
I wore	<i>əlsix</i>	<i>əlsej</i>	<i>əlseε</i>
you sg. wore	<i>əlsit</i>	<i>tālsed</i>	<i>tālsēt</i>

There are two marginal exceptions. The *a* of the irrealis prefix *ga-* becomes *e* when directly followed by the 3rd person subject marker *y*; and the *-ay* of verbs ending in *-ay* becomes *-e-* before a pronominal object suffix, e.g. *əšše-t* “take it (m.)!” < *əššay* “take!”, and before the imperative plural suffix *-wət* (cp. Naumann 2012:305, who finds this alternation for non-emphatic contexts only, and analyses the resulting surface [e:] as /ay/). However, the latter ending is reduced to *-y-* before a subject or dative agreement marker, eg *əššy-ən* / *əšši-n* “they took”. The distribution observed in this context can be explained without reference to specific morphemes: stem-final *-ay* becomes > *e* / \_C, but > *y* / \_V.

Third person pronominal direct objects directly following a verb stem ending in a consonant or featuring an alternating vowel (originally \*?) are marked by the verbal suffixes 3MSg *-a*, 3FSg *-et*, 3Pl *-en* (Souag 2013:46-47). These correspond in distribution as well as in form to Figuig *-i*, *-it*, *-in*, and in form to Tuareg *-e*, *-et*, *-en*, which however appear only after verb stems with alternating vowels (Brugnatelli 1993, Kossmann 1997). Note that 3MSg *-a* irregularly becomes *-i-* when the resultative suffix *-a* is added: *yə-zɾ-a* (3MSg-sec-3MSgDO) “he saw it” > *yə-zɾ-iyɿ-a* (3MSg-sec-3MSgDO-RES) “he has seen it”.

A similar series is used for 2nd person pronominal direct objects in all circumstances except following 1Sg subject agreement: 2MSg *-ek*, 2FSg *-em*, 2Pl *-ewən*. The corresponding forms in other Berber languages often show analogical reshaping, but insofar as they do correspond, show /i/ rather than /e/: Tamasheq and Tamajeq use *-i-k*, *-i-m*, *-i-wān* after verbs ending in a vowel (Heath 2005:604, Kossmann 2011:79).

The regular feminine plural ending for nouns is *-en*, corresponding to *-in* in most Berber languages, but to Tuareg and Ghadames *-en* and Ghomara *-an*:

**Table 2.** Feminine singular and plural reflexes of “white”.

	singular	plural	
Kabyle	<i>taməllalt</i>	<i>timəllalin</i>	“white (f.); egg”
Tamasheq	<i>taməllalt</i>	<i>timəllalen</i>	“white one (f.)”
Ghadames	<i>taməllilt</i>	<i>təllilen</i>	“dune sand”
Ghomara	<i>taməllult</i>	<i>timəllulan</i>	“white person (f.)”
Siwi	<i>taməllalt</i>	<i>timəllalen</i>	“white (f.)”

One noun, *əmmə* “my mother”, irregularly becomes *əmmē-* when the possessive suffixes are added: *əmmē-s* “his/her mother”. Contrast *amṃma* “my brother”, *amṃma-s* “his/her brother”. A similar differentiation at the lexical level, though not within the respective paradigms, is found in El-Fogaha and in Nefusi (Paradisi 1963, Beguinot 1942).

**Table 3.** Possessed reflexes of “mother”, “brother”.

	my mother	his mother	my brother	his brother
Siwi	<i>aṃma</i>	<i>aṃmes</i>	<i>aṃma</i>	<i>aṃmas</i>
El-Fogaha	<i>émmi</i>	<i>émmis</i>	<i>ammâi</i>	<i>ammâs</i>
Nefusi	<i>émmi</i>		<i>rûmmu</i>	

This differentiation is hard to explain, since “brother” across Berber derives historically from “son of mother (*ma*)”; nevertheless, it appears clearly in these varieties.

Medial demonstratives in Siwi agree in number and gender with the addressee as well as, separately, with the referent (see Souag 2014). This demonstrative addressee agreement uses the suffixes 2MSg *-ok*, 2FSg *-om*, 2Pl *-erwən*; these derive irregularly from *-a-γur-* > *-o-* and *-a-γur-ə-* > *-e-* (Souag 2009).

An /e/ also occurs in the characteristic noun template *a-CəCCeCi*, which applies to Arabic and Berber roots alike: for the latter, eg *adiyyezi* “singer”, *ajəllewi* “person prone to swearing”, *akəkkewi* “sniffy”, *aruwweli* “cowardly”, *asiweli* “talkative”. Souag (2009) derives this template from Arabic CaCCāCī, so it will not be discussed here.

### 3. Lexical items containing mid vowels

**3.1. Vocabulary with /e/.** While /e/ is not particularly common in inherited Siwi vocabulary, at least sixteen non-Arabic Siwi words with /e/ have known Berber cognates. In six cases, these correspond to reflexes of *\*i* or *\*e* elsewhere:

*\*e*:

- (1) *asen* “tooth; stone used to block water flow” (Naumann id. “tooth”): Ghomara *asan* “tooth”; Tamasheq *e-sen* / *e-sāyn* “id.”, Sokna <*isin*> “id.”, El-Fogaha <*isîn*> “id.”, Ghadames *asén* “id.”, Nefusi <*sīn*> “id.”
- (2) *agnen* “type of basket”; cp. Ghadames *tažnent* “wicker basket”, Awjila *agənnîn* “a small cushion one wears on the head to carry loads”, El-Fogaha <*tegnî*> “recipient made of palm fibers”, Nefusi <*ugnîn*> “small wicker basket” (Provasi 1973), Tashlhiyt *agʷnin* “basket made of alfalfa grass”, etc. (Kossmann 1999: {415})

*\*i*:

- (3) *ayel* “upper arm”: Ghomara *aγil* (*ya-*) “mountain/hill”, Ghadames *ayil* “arm”, Tamasheq *ayil* “elbow span”, Sokna <*gīl*> “arm”, El-Fogaha <*aγil*, *ağēll*> “id.”

Either *\*i* or *\*e*:

- (4) *ayez* “necklace” (Naumann id.): Awjila *aγíz* ‘id.’
- (5) *aṭteg* “best sort of date, best dates in a bunch” (Naumann *aṭteg* “half-ripe date”): cp. Ouargli *uṭtig* “type of date, half ripe date”

- (6) *teda* “unfertilized dates”: Tuareg *teda* “date without a core” (Prasse 1974:347, Sigwarth n.d.:15), Ghadames *tidi* “unfertilized date”

In another five cases, they correspond to reflexes of \**āy* (although “come!” is somewhat irregular):

- (7) *hed* “come!” (Naumann id.): Sokna <*āit*> “id.”, El-Fogaha <*nāid*> “id.”, Tamasheq *iyāw* “id.”, Tamajeq (W Y) *āyāw* “id.”, Awjila *yid* “id.”
- (8) *teni* “dates” (Naumann *tini* “date(s) of Saidi variety”): Tamasheq *te-hāyne* “id.”, Zenaga *tāynih* “id.”; Ghadames *aβena* “date”
- (9) *tiset* “large bowl made from palm leaves, used for rolling couscous” (Naumann id. “table mat”): Tamasheq *tesāyt* “winnowing van”, Tamajeq *tesāyt* “id.”
- (10) *tiyeda* “female goats” (Naumann id.), sg. *tyatt*: Ouargla *tiyāydāt/tiyādt* pl. *tiyāydad/tiyāydad* “female goat, goat kid”, Tamasheq *teyāydātt* pl. *tiyāydaten* “female goat kid”
- (11) (Naumann *iyed* “male goat”): Ghadames *ašid* “goat kid”, Ouargla *iyid*, *iyāyd* “billy goat, goat kid”, Tamasheq *e-yāyd* “male goat kid”

To this list we may tentatively add a masculine pluralis tantum (the masculine plural ending is normally *-ən*) corresponding to a verb with a root-final *y*:

- (12) *išəršen* “urine” (Naumann id.) < *šərš* “urinate” (int. *šərša/šəršay*): cp. Sokna <*išəršin*> “urine”, <*šərši*> “urinate”, El-Fogaha <*išəršēn*, *išəršēn*> “urine”, <*šərši*> “urinate”. This root is attested as such only in Siwa, Sokna, and El-Fogaha, according to Nait-Zerrad (1999:243).

In two cases, Siwi *e* corresponds in other languages to reflexes of \**ā*. In both, the vowel is adjacent to *č/j*<sup>4</sup>.

- (13) *aččer* “fingernail” (Naumann: id.): Sokna <*iššēr*> “id.”; Ouargla *aššar* “id.”; Ghadames *aškar* (Ghadames uses the plural stem in the sg.) “id.”; Tamasheq *eskār*, Tamajeq *eškār* “id.”, Zng. *əškār* “id.”
- (14) *ajmej* “slave” (Naumann id.): Figuig *išmāž* “id.”, Ouargla *ismāž* “id.”

For fuller discussion of this correspondence, see section 5.4.

None of the remaining words with /*e*/ are useful. Of the three with plausible Berber etymologies, one’s relevant vowel remains unknown:

- (15) *azureg* “adolescent (15-18 years old)”: Tamajeq *zurəg* “to be completely free, be independent”

The other two seem to have had their vowel pattern reformed to fit an Arabic diminutive template (CC*ē*C):

<sup>4</sup> Note that Siwi /*j*/ is variously realized as [ž] or [dž], two allomorphs of the same phoneme often found in free variation (cp. Naumann 2012:152).

- (16) *afred* “stone mortar (for crushing date seeds, salt)” (Naumann *afred* “small mortar”): cp. Figuig *afardu* “mortar”, Nait-Zerrad (2002, s.v. FRD 2).  
 (17) *agbez* “cowrie”; cp. Tamasheq *ašbəḡ* ‘man’s bracelet’, Middle Atlas *azbəy* ‘id.’ (with metathesis)

Four are probably dialectal Arabic loanwords, despite being unattested as such in Arabic dictionaries:

- (18) *ambej* “pocket” (Naumann id.): cp. Arabic *jayb*, southern Arabic article *am-* (Souag 2013:79, Laoust 1932:280)  
 (19) *anneb* “large piece of meat” (Naumann id. “piece of meat”): cp. Arabic *nayyaba* “sink one’s (canine) teeth into (an animal)”, *nāb* “canine tooth”  
 (20) *aqərqwēč* “cartilage” (Naumann id. “upper rim of ear”): cp. Egyptian Arabic *qarqaš* “crunch” (Hinds & Badawi 1986:696)  
 (21) *abərgeṅ* “round hole with manure inside” (Naumann id. “hole dug in the ground to put in a young plant”); cp. Kabyle *abruḡ* “hole”, derived by Dallet (1982) from Arabic

One more is certainly an early loan, cognate with English “Saracen” (Vycichl 2005:192), from Greek or Coptic *sarakēnos*:

- (22) *asəryen*<sup>5</sup> “Bedouin” (Naumann: *ašəryen*, Vycichl: *ašeryên*): cp. Awjila *ašəryin* “id.”

The remaining five have no clear Berber or Arabic cognates, although some tentative comparisons may be suggested:

- (23) *agzen* “bird species; term of endearment used to children”; ?cp. Ghadames *əgzen* “pup”  
 (24) *agəzwer* “little piece of wood” (Naumann *agəzwar* “splinter”); ?cp. Ghadames *əgzər* “cut bunches of dates”  
 (25) *aγərbej* “dates that have dried up before ripening”, ?cp. Kabyle *agərbuž* “an object of little value, junk” (Omar Mouffok, p.c.)  
 (26) *iṭərgeṅ* “diarrhea excrement” (probably with a root-final *y*, cp. *išəršen* “urine” above)  
 (27) *akules* “dark soil (loam?)”

A special case, much better attested with /i/ but apparently showing variation (perhaps to be explained by question prosody, which in Siwi often affects the last syllable’s vowel), is:

- (28) *əmnit/əmnēt* “how much, how many” (Naumann: *mnit*): Tamasheq *man-iket* “id.”, Ouargla *mənnəšt* “id.”, Zraoua *mənyət* “id.” (Souag, field notes), Sokna <menit> “id.”

In the case of (8) *teni* ‘date’, Souag and Naumann disagree on whether the vowel in question is /i/ or /e/; this may reflect dialectal/idiolectal variation.

<sup>5</sup> Transcribed in Souag (2013) as *asəryin*, but now re-checked against audio; the *y* makes it difficult to distinguish *i* from *e*, but the vowel is clearly lowered.

**3.2. Vocabulary with /o/.** Excluding Arabic borrowings as before, the vowel /o/ is much rarer in Siwi even than /e/. The only unambiguous examples of /o/ in Berber vocabulary occur in two words, both of the shape aCCoC:

- (29) *allon* “window” (Naumann id.): Ghadames *allun* “hole”, Ouargli *allun* “bird coop, dog house, niche”  
 (30) *agroʒ* “palm heart”: El-Fogaha <agrûz> “id.”, Ouargli *agruz* “id.”, Gh. *aǧaruz*<sup>6</sup> “id.”, Sokna *agruz*<sup>7</sup> “id.”

In the latter, it is unclear whether the final consonant was originally emphatic, which could have influenced the /o/.

Two other cases have no known cognates, and may be loans:

- (31) *tʃorəbt* “trunk, olive log” (Naumann: *tʃurəbt* “tree trunk”)  
 (32) *koča* “type of olive”

Naumann adds the obviously onomatopoeic:

- (33) *qoqoq* “goose”

In one case, Souag and Naumann disagree on whether the vowel in question is /u/ or /o/; this undoubtedly reflects the difficulty of distinguishing the two in an emphatic context.

#### 4. Regular reflexes of Berber *e* in Siwa

Siwi /e/ sometimes corresponds to *e* in Tuareg and Ghadames. At first sight, these look like retentions of original \**e*, but this is problematic, since Siwi more often has /i/ for \**e*.

**4.1. Reflexes of \**e* in the nominal prefix.** The prefix *e-/te-* of Tuareg, corresponding to the weak *i-/ti-* in Moroccan-Algerian Berber, is regularly *i-/ti-* in Siwi (Van Putten forthcoming):

- (34) *ifəff* “breast”, cp. Tamasheq *e-fəff* “id.”  
 (35) *iyed* “billy goat”, cp. Tamasheq *e-ɣäyd* “id.”  
 (36) *illi* “millet”, cp. Tamasheq *e-näle* “id.”  
 (37) *iləm* “skin (thin)”, cp. Tamasheq *e-lām* “(human or living animal) skin”  
 (38) *inir* “lamp”, Tahaggart *e-ner* “oil lamp” (Ritter 2009), Ghadames *énér* “id.”  
 (39) *tizəgnət* “needle”, cp. Kabyle *ti-ssəgnit* ‘id.’

<sup>6</sup> While Lanfry transcribes this with a non-emphatic *z*, the Facebook page *Awal n edeməs*, apparently by a native speaker, specifically states that this word has an emphatic *z*, after transcribing it as <’jrwz> (<https://www.facebook.com/134561076656556/photos/a.134596359986361.25645.134561076656556/366869620092366/?type=1>, viewed 16 December 2014).

<sup>7</sup> No. 96 in Seid n Yunes’ 2010 vocabulary of Sokna Berber (<http://www.tawalt.com/?p=5390>, viewed 16 December 2014.)

- (40) *izəm* “gazelle, ibex”, cp. Tahaggart *e-hām* “id.”, Tamasheq *e-šām* “id.”, Tamajeq *e-zām* “oryx”, Zenaga *āžəmmi* “Gazella rufifrons (Hassaniya *dāmi*)”
- (41) *tizmər* “ewe”, cp. Kabyle *i-zimər* “lamb”, Figuig *izmər* “id.”, Tamasheq *e-zemər* “id.”
- (42) *ikərkər* / *əlkərkər* “chest”, cp. Tamasheq *e-ğārğār* “upper torso (front and back, down to ribs)”; Zenaga *ägərgur* “chest”<sup>8</sup>

In front of original CC, *i* regularly shortens to *ə*:<sup>9</sup>

- (43) *təmsi* “fire”, cp. Tuareg *te-mse*, *t-emse*, *tā-mse* “hell, hellfire”, Figuig *ti-msi* “fever”

In a few cases the prefix *e-/te-* has been replaced by the more common *a-/ta-*:

- (44) *talšət* “louse”, cp. Sokna <tiršít> “id.”, Kabyle *ti-lkit* “id.”
- (45) *tamdi* “large ant”, cp. Tamasheq *te-medhe* “termite”, Timimoun *ti-mdi* “id.”
- (46) *asen* “tooth”, cp. Tamasheq *e-sen* “id.”
- (47) *axfi* “head”, cp. Tamasheq *e-yāf* “id.”

The first three look like good candidates for back-formation from the plural, on semantic grounds; the last also shows an irregular correspondence in the final vowel.

**4.2. Reflexes of \**e* word-internally.** We also find Siwa *i* word-internally in several places where it corresponds to \**e*, as well as the 1sg and 2sg reflexes of CC? verbs *-ix*, *-it*, as discussed above:

- (48) *abdir* “pigeon”, cp. Tamasheq *e-dāber* “id.”; Ghadames *adaber* /*adāber*? “id.”
- (49) *aglim* “skin”, cp. Tamasheq *ağlem* “prayer skin”
- (50) *inir* “lamp”, cp. Ghadames *ener* “id.”, Tahaggart *e-ner* “oil lamp” (Ritter 2009)
- (51) *iziṭ* “donkey”, cp. Tamasheq *e-šed* “id.”, Ghadames *ažéd* “id.”<sup>10</sup>

Like other /i/s (and /e/s), it is regularly shortened to /ə/ before two consonants:

- (52) *tabdər* “female pigeon”

Another example of the *i* reflex of \**e* might be found in the word for ‘navel’. The *i* has been regularly shortened in the singular in front of CC, but shows up again in the plural. However, the root-final consonant’s fluctuation across languages proves that analogy has been at work, which makes it difficult to take the vowel *i* as necessarily etymological here.

<sup>8</sup> The correspondence Siwa *k* - Tamasheq *ğ* is irregular.

<sup>9</sup> When a vowel formerly used to separate the two consonants, the prefix is not shortened, e.g. *illi* ‘millet’ (cp. Tuareg *e-nāle*), *ijdi* ‘dust’ (cp. Tuareg *e-ğede* ‘dune’).

<sup>10</sup> The initial *i-* which appears to correspond to *e-* probably cannot be seen as evidence of *i-* corresponding to *e-* word initially. The *e-* found in Tuareg is likely the result of the sequence *a-y*, cp. Ahaggar *eyhed* “donkey”. Initial *ay* regularly becomes *ey* in Ahaggar and *e* in Tamasheq, cp. Kabyle *aydi* “dog”, Ahaggar *eydi* “id.” Tamasheq *edi* “id.”. Initial *ay* regularly yields *i* in Siwi (see section 5.1). For further discussion, see Kossman (1999: 229-32)

- (53) *timətt* pl. *timiten* “navel”, cp. Ghadames *tamet* pl. *tmedén* “id.”, Tamasheq *te-meṭt* “umbilical cord” pl. *ti-meḍen* “placenta”

In nearly as many words, however, as well as in the 3Fsg and 3Pl pronominal direct object suffixes *-et*, *-en* and the FPl nominal suffix *-en*, \**e* corresponds to /e/ rather than to /i/, as seen above:

- (54) *asen* “tooth; stone used to block water flow” (Naumann id. “tooth”): Ghomara *asan* “tooth”; Tamasheq *e-sen* / *e-sāyn* “id.”, Ghadames *asen* “id.”
- (55) *agnen* “type of basket”; cp. Ghadames *tažnent* ‘wicker basket’ etc. (Kossmann 1999: {415})
- (56) *teda* “unfertilized dates”: Tahaggart *teda* “date without a core” (Prasse 1974:347), but Ghadames *tiḍi* “unfertilized date”

In CeC(C)e stems, it corresponds to zero, due to a sound shift also affecting other Zenati languages (see Kossmann 1999: 140, footnote 7):

- (57) *amdi* “large ant”, cp. Tamasheq *te-medhe* “termite”, Timimoun *ti-mdi* “id.”
- (58) *ijdi* “dust”, cp. Tamahaq *e-ǧede* “dune”, Ouargla *iždi* “sand” (this word shows *i/e* variation in Tuareg: contrast Tamajaq Y *ǧedi*, W *agidi*. cp. Ritter (2009:161.) In view of the rarity of final *-e* in nouns, the forms with *-i* are probably secondary.)

A similar shift in stems of the form eCe is discussed in the next section.

**4.3. Reflexes of \**e* word-finally.** Final *-e* regularly becomes *-i*, as illustrated by the following cases (and by the verbal noun formation discussed below, if the comparison to Tuareg is accepted):

- (59) *illi* “millet”, cp. Tamasheq *e-nāle* “id.”
- (60) *ijdi* “dust”, cp. Tamahaq *e-ǧede* “dune” (this word shows *i/e* variation in Tuareg, as seen in 4.2.)
- (61) *təmsi* “fire”, cp. Tamasheq *te-mse*, *t-emse*, *tā-mse* “hell, hellfire”, Figuig *ti-msi* “fever”
- (62) *tifri* “ringworm (skin disease)”, cp. Tamasheq *tā-fore* ‘small skin sore on head or body’
- (63) *takəčči* “worm”, cp. Tamasheq *ta-wəkke* “earthworm”, Sokna <tagəčči> “id.”
- (64) *tamdi* “large ant”, cp. Tamasheq *te-medhe* “termite”, Timimoun *ti-mdi* “id.”
- (65) *tṃəryi* “locust”, cp. Ghadames *tomarše* “id.”
- (66) *teni* “dates”, cp. Tamasheq *te-hāyne* “id.”

However, words of the form *t-eCe* (cp. Prasse 1974:346) become *t-Ca*:

- (67) *tla* ‘shadow’, cp. Tamasheq *t-ele* ‘shade’
- (68) *tza* ‘udder’, cp. Tamasheq *t-eze* ‘udder’

The same correspondence between Tuareg *e* and Siwi *a* is observed in the 3SgM pronominal direct object suffix *-a* (as seen above), whose history is harder to reconstruct.

Internal *-e* before the feminine ending *-t* (< *-tt*?) is shortened to *a*, as is *i* in the same context:

(69) *tisət* ‘mirror’ cp. Tamasheq *t-isett* ‘id.’

Early 19th century sources suggest that this merger of *\*-e* with *\*-i* may be relatively recent; the former is often transcribed as [a], while the latter consistently appears as [i]. Consider:

**Table 3:** Early transcriptions of reflexes of *\*-e* and *\*-i* in Siwi.

		Hornemann	Scholtz	Caillaud	Minutoli	Müller (Pacho)	St. John
<i>*e:</i>							
	now	1802	1822	1826	1827	1827	1849
date (8)	teni	tena		tenna	tyny	tena	teenah
fire (42)	tamsi			temsa	tmsy	temsa	timseeh
millet (35)	illi				’yl’		
<i>*e/i:</i>							
dust (51)	ijdi	itjeda	itjeda	egidie		Ejdan	giddee
<i>*i:</i>							
star	iri			eirie	’yry		jeree
moon	taziri			tazèrie	t’zyry		
thorn	tadri			tadrie			
cream					’tlsy		

Later sources consistently transcribe both sets with [i], and Minutoli’s informant transcribes both with <y> (with the sole exception of “millet”). It is easier to imagine that “date”, at least, was still pronounced with a lower vowel ([tene]?) than to suppose that French, German, and English speakers all independently misheard [teni] as [tena].

**4.4. Reflexes of *\*e* in verbal nouns.** In Siwi, *ti-...-i* is the regular VN formation for CCV stems with the imperfective *təCCaC*, which are the regular outcome of *\*CC* stems, and for VCC, VCV and CVC stems.

(70) *tifli* VN of *fəl* impf. *təffal* “go away”

(71) *tigli* VN of *ugəl* “hang”

(72) *tifi* VN of *if* “find”

(73) *tifiti* VN of *fat* “yawn”

It is not the regular VN formation of CCV stems with the imperfective *CəCC*, which are the regular outcome of *\*CC?* stems.

- (74) *anəyya* VN of *nəy* impf. *nəyy* “kill”  
 (75) *aṛəzza* VN of *ṛəz* impf. *ṛəzz* “break”

It is tempting to compare this to the *te-CăCe/te-CăCCe* verbal noun formation in Tuareg (and elsewhere), but this is distributionally problematic. This formation is primarily found for \*CC? stems, which is exactly where it does not occur in Siwi, e.g.

- (76) Tamasheq *te-năye* VN of *ăn̄y* “to kill”  
 (77) Tamasheq *te-ṛăzze* VN of *ăṛz̄* “to break”

However, it sometimes occurs with other root types; e.g. *əbdəd* ‘to stand, stop’ has the verbal noun *te-hădde*.<sup>11</sup>

The Siwi formation looks like the general Berber formation, but it is unclear why Siwi uses it specifically for non-\*CC? stems while other Berber languages use it almost exclusively for \*CC? stems.

## 5. The origins of Siwi /e/

We have now seen that, notwithstanding the examples in 3.1, etymological \**e* is commonly reflected as *i* in Siwi in initial, medial, and final position. Conversely, etymological \**i* is reflected as *e* in Siwi in *ayel* “arm” (#3) and (arguably) in the 2nd person pronominal direct object suffixes *-ek*, *-em*, *-ewən*. This puts into question whether there is ever any direct historical connection between Siwi *e* and etymological \**e*. To address this, it is necessary to view the external correspondences of Siwi /e/ all together.

**5.1. Correspondence of /e/ to \*ăy.** Word-internally, Siwi does not normally allow diphthongs. It thus seems reasonable to assume that /e/ is in fact the regular reflex of word-internal \*ăy in Siwi, as in the five examples given in 3.1 and probably also in *išəršen* (#12) and *iṭərgen* (#26). Word-finally, we have seen that this diphthong becomes [ay]; there are no clear examples of it word-initially, but initial \*ăy- seems to become *i-*:

- (78) *itma* “my brothers”, cp. Middle Atlas *aytma* “id.”; Tashlhiyt *aytma* “id.”; Kabyle *atma* “id.”; Petit Kabyle *aytma* “id.”; Tamasheq *ayətma* “id.”; Figuig *ayətma* “id.”; Nefusi <āītmā> “id.” (Kossmann 1999: {606})  
 (79) *inir* “forehead”, cp. Ghadames *enar* “id.”; Kabyle *anyir* “id.”; Medieval Tashlhiyt *aynər* “id.”, Figuig *tanyərt* “id.”, Middle Atlas *ayənyir*, *ayənri* (Izd). (< \*taynərt ?? Kossmann 1999: {604})

However, the shift \*ăy- > -e- leaves the majority of instances of /e/ unaccounted for.

**5.2. Correspondence of /e/ to \*e before /n/.** We have now seen that Siwi *e* unambiguously corresponds to original \**e* only in two nouns, *asen* “tooth” (#1) and *agnen* “type of basket” (#2), as well as in the feminine plural *-en* and the 3rd person pronominal direct object suffixes 3FSg *-et*

<sup>11</sup> Cognates are widespread, e.g. Middle Atlas *bədd* “to stand”, *t-iddi* “height”; Figuig *bədd* “to stand”, *t-iddi* “height”.

and 3Pl *-en*. (We exclude *əmnit/əmnet* ‘how much, how many’, since the better attested variant has *i*; its correspondences are also problematic, due to the irregular loss of *k*). Of these, *asen*, *agnen*, FPl *-en*, and 3Pl *-en* all end in the nasal *n* - as do the more etymologically problematic forms *asəryen* (#22), *abərgen* (#21), *agzen* (#23), and *itərgen* (#26). This might suggest that in Siwi *n* originally conditioned a lowering of preceding *i*. However, three inherited demonstrative morphemes feature final *-in*, making a conditioning explanation unlikely:

-in:

- (80) *widin* “those” (pl. distal demonstrative); cp. Kabyle *wid* “those who”, *wihid* “those”  
 (81) *wihin* “whatchamacallit” (*wih* “that (m. sg. distal demonstrative)”)  
 (82) *bəttin* “who?” (*bətta* ‘what?’)

-din:

- (83) *sradin* “this morning” (*sra* “morning”)  
 (84) *luqəddin* “back then, a little while ago” (Ar. *al-waqt* “time”)  
 (85) *nhaḍdin* “in the old days, back then” (Ar. *nahār* “day”)  
 (86) *ənnijdin* (proper name of a place in Siwa) < *ənnij* “above”?  
 (87) *sləttin* “yesterday” < \**səl-it-din* “other.than-night-deictic”. Cp. Tamasheq *sāl* “other than..., except...”, (*āsəl wen*) *sāl ašəkka* “day after tomorrow”; Kable *səll-iḍalli* “day before yesterday”, *səll-azəkka* “day after tomorrow”

-əllin:

- (88) *itəllin* “last night” (*ita* “tonight”); cp. Sokna <ḍəllin> “yesterday”, El-Fogaha <aḍəllin> “id.” vs. Kabyle *iḍalli* “id.” (*iḍ* “night”); Tashlhiyt *-lli* (anaphoric deictic suffix)

This makes an alternative hypothesis preferable: that an original /e/-/i/ distinction was preserved only before *n* (in this case, *-et* would have been restored by analogy with *-en*). Final \**e* was probably preserved well into the 19th century, and Siwi vowel-final words are often pronounced with an epenthetic final [ŋ] (cp. Naumann 2012:291), so the environments *\_#* and *\_n#* are even more similar than they appear.

**5.3. Correspondence of /e/ to \*i after ɣ.** The cases of *aɣel* (#3), *aɣez* (#4), and *asəryen* (#22) might suggest that *ɣ* lowers an immediately following *i* to *e*. A search of the Siwi lexicon reveals that *ɣi* occurs word-internally in inherited vocabulary only before *yy* - a context in which the *i* is to be analyzed as underlying *ə* - so this explanation appears plausible. Even in Arabic loans, it is limited to *aryif* “bread” (which Naumann transcribes with an *e*) and *ɣiwəl* “hurry”, so it may be tenable as a synchronic phonological rule rather than just a diachronic one. Despite their irregular history, /e/ and /o/ in demonstrative addressee agreement suffixes also reflect the historic presence of a preceding /ɣ/.

**5.4. Correspondence of /e/ to \*ǎ next to post-alveolars.** As seen in section 3.1 there are two Siwi nouns which have *e* in the position of a short vowel in other Berber varieties, namely: *aččer*

“finger nail” (#13) and *ajmej* “slave” (#14). This sound shift is not found in other words of the shape aCCəC: contrast *adyən* “rug”, *afqəd* “eggs cooked with flour and oil”, *agbən* “house”, *agzəb* “lower part of palm frond”, *ayrəm* “large seed”, *akbər* “robe”, etc.

In both words, the *e* is adjacent to a post-alveolar consonant (cp. Souag 2013:23). In fact, ə is attested next to post-alveolars only in verbs - eg *ənjəf* “marry”, *rəj* “dream”, *čəxčəx* “sprinkle water” - and in nouns with the countable feminine suffix *-ət* (from *\*-itt*), eg *taməččət* “fig tree”, *tarjət* “ember”. In other contexts, the only occurrences of ə next to a post-alveolar are *ušək* “date sp.” and the presumably onomatopoeic form *čərčər* “duck”, neither of which have any known Berber cognates. In verbs, the ə may have been restored analogically (more recent changes, such as *-əy* > *-ay*, are less consistently applied to verbs than to nouns, presumably for that reason). So the absence of ə next to {čj} in final syllables apart from such cases makes it plausible to postulate a sound change CəC# > CeC# / {čj} in final syllables.

As it stands, however, such a rule would predict that proto-Berber *\*amǵər* “sickle” (#78) should have become unattested *\*amjer* in Siwi, rather than attested *amjir* (*\*ǵ* being the only regular source of Siwi *j*). It is not possible to postulate a shift *i* > *e* conditioned by post-alveolars; *i* regularly occurs next to post-alveolars, eg *amjir* “sickle”, *jij* “peg in wall”, *ənnij* “above”. Rather, the problem can be resolved by supposing that the change predates the merger of proto-Berber *\*ǵ* with *\*ǵ* in Siwi: *\*CəC#* > *CiC#* / {čj}, but *\*CǵC#* > *CeC#* / {čj}.<sup>12</sup> Thus:

with *\*ə*:

- (89) *ənnij* “above”, cp. Ghadames *innəž*, *yənnəž* “id.”, Tamasheq *dənnəg* “id.”, El-Fogaha <inniž> “id.”
- (90) *amjir* “sickle”, cp. Middle Atlas *a-mǵər* “id.”, Kabyle *a-mǵər* “id.”, Figuig *a-mžər* “id.”, Tashlhiyt *i-mgr* “id.”<sup>13</sup>

with *\*ǵ*:

- (91) *aččər* “fingernail” (Naumann: id.): Sokna <iššér> “id.”, Kabyle *iššər* “id.”, Tuareg *eskār* “id.”, Ouargla *aššar* “id.”, Zenaga *əskār* “id.”, Ghadames *aškar* “id.”<sup>14</sup>
- (92) *ajmej* “slave” (Naumann id.): Figuig *išməš* “id.”, Ouargla *isməž* “id.”<sup>15</sup>

**5.5. Remaining anomalies.** None of the proposed shifts can explain the following items known to be of Berber origin: the pronominal 3FSgDO *-et*, and the 2nd person direct object pronominal

<sup>12</sup> For another potential example, *niš* “I”, it is unclear whether to reconstruct *\*ǵ* or *\*ə*; Tuareg has *nākk* but Zenaga has *niʔK*. The Siwi reflex fits the latter, but irregularly lacks final gemination, and is frequently pronounced *nəš* phrase-internally.

<sup>13</sup> This word has no cognates in languages retaining the short vowel contrast. However, the fact that the form is aCCəC in all languages but Tashlhiyt (Kossmann 1999: {317}) suggests that the vocalism contained ə-vowels in the stem (Van Putten forthcoming).

<sup>14</sup> The Ouargla and Ghadames forms are backformations of the plural stem *\*askar* (Kossmann 1999: {515}).

<sup>15</sup> This word is reconstructed as *\*e-sāmǵ* based on the presence of the prefix *i-* in all its cognates but Siwi and Timimoun (Kossmann 1999: {626}). The prefix *i-* is conditioned by the presence of the vowel *ǵ*. Other *i*-CCəC nouns, such as Figuig *i-yzər* ‘valley’ can be shown to come from *\*e-CāCāC* (Van Putten forthcoming).

suffixes; the unexpected /e/ in *əmmē-s* “his mother” (Table 3); and the words *teda* (6), *aṭṭeg* (5), *azureg* (15). The pronominal direct object suffixes can be adequately explained by analogy; the unetymological /e/ in the 2nd person forms must reflect paradigmatic levelling based on 3PIDO -*en*, making the same explanation more plausible for 3FSgDO. For *əmmē-s*, only two clear cognates are known, making reconstruction difficult.

Of the remaining three words, *teda* (#6) may feature irregular retention of word-internal *e*, judging by the Tuareg cognate *teda*; however, the Ghadames cognate *tiḍi*, corresponding irregularly to both the others, complicates the etymology. The original vocalism of *azureg* (#15) is unreconstructible, and, like *aṭṭeg* (#15), it has only one known cognate. It thus seems advisable to leave all three as mysteries for further work to resolve. However, two of these problems could be avoided by noting that Siwi has no known words ending in -*ig* (and no inherited ones ending in -*ik*); nothing, therefore, prevents us from postulating a shift *\*i > e / \_g#* (or */ \_[+velar]*), although no direct evidence confirms this either. The latter would even provide an alternative explanation for 2MSgDO -*ek*.

Among the words of unknown but potentially Berber origin, retention before final *n* could potentially explain *agzen* (#23) and *iṭarḡen* (#26), as well as *abərḡen* (#21), while the affricate shift could explain *aṣərḡej* (#25). That leaves two problematic words:

(93) *agəzwer* “little piece of wood” (Naumann *agəzwar* “splinter”)

(94) *akules* “dark soil (loam?)”

The hypothesis above cannot be extended to account for either of these; *talis* ‘reservoir’ ends in -*is*, and many words (including several cited above) end in -*ir*. However, nothing stops us from postulating that these are loans from an unknown source, and doing so is certainly preferable to postulating an extra sound change on such slim evidence.

The existence of these exceptions (at least 3 words, dropping to 1 if we postulate the velar shift; up to 5 if both the problematic etymologies turn out to be Berber) is obviously unsatisfactory. Nevertheless, these are relatively minor in comparison to what we can account for: 16 words - or 18 with the velar shift - and, accepting the analogical explanation, all the morphemes except *əmmē-es* (Table 3).

## 6. The origins of Siwi /o/

**6.1. The irrelevance of /n/.** Given the frequency of *e / \_n*, it might seem tempting to explain the /o/ in *allon* “window” (#29) as caused by the following *n*. However, /un/ not only emerges regularly via affixation in the 3pl of *u*-final verbs, eg *yəbdun* “they began”, but is also attested in at least three non-Arabic words, with no deictic connection:

(95) *akərčun* “donkey foal”: Nefusi <akeršūn> “id.”

(96) *armun* “pomegranate”; Nefusi <armūn> “id.”

(97) *ašəkkun* “bunch of grapes”

We must therefore discard the hypothesis that *\*u > o / \_n*.

If the *e/i* distinction was preserved before *n*, we might likewise be tempted to extend the same explanation to this case. However, there seems to be no independent evidence for reconstructing

\**o* for proto-Berber, in the word “window” or anywhere else - note that the Ghadames and Tuareg cognates of this word use *u*, while Siwi’s closest relatives do not have a *u/o* distinction at all. It is extremely unlikely that an original *u/o* distinction could have been lost everywhere else in Berber except in Siwi before /*n*/.

**6.2. The impossibility of identifying a regular source for /*o*/.** The two clearcut examples of inherited /*o*/ - *allon* (#29), *agroʒ* (#30) - have in common the presence of a liquid before the *o* in a final syllable, and a coronal after it. But so do other words, such as:

- (98) *akərrus* “knot”  
 (99) *drus* “few”  
 (100) *azəmlul* “fiber from which rope is made”

The immediate context is thus not adequate to explain the shift. Nor is it the case that all words of the shape \**aCCuC* become *aCCoC*: to the contrary, counterexamples are more frequent than examples, e.g.,

- (101) *aksum* “meat”, cp. Kabyle *aḵsum* “id.”  
 (102) *aşrum* “intestine”; cp. Middle Atlas *aşərm* “id.”  
 (103) *anšuš* “buttock”; cp. Kabyle *aməššaš* “fesses”  
 (104) *armun* “pomegranate”; cp. Nefusi <armûn> “melagrano”

Pending further data, the most that can be said is that words of the shape *aCCuC* show a sporadic tendency to become *aCCoC*, perhaps especially in lowering contexts such as before a nasal or an emphatic.<sup>16</sup>

## 7. Dating the changes

Documentation of Siwi begins from the early 19th century. Despite many shortcomings, this early material is sufficient to prove that the emergence of /*e*/ and /*o*/ in Siwi predates this period; however, it leaves open the possibility that their spread to some specific words may be more recent.

Three relatively extensive sources describe the Siwi of the early twentieth century. Stanley (1912) clearly distinguishes what he heard as [i] (<ee>, <y>, <i>) from [e] (<ei>). In final non-emphatic closed syllables, Walker’s (1921) eccentric transcription too seems to distinguish [i] (<êê(a)>, <i>, <î>) from [e] (<e>, <è>). In Laoust (1936), the transcription is rather close to usual academic standards, but the author, likely influenced by his experience of Moroccan Berber, shows a very strong tendency to transcribe [e] as /*i*/, betrayed not only by external comparison but by text-internal variation with <ai>. All three authors thus reveal the presence of /*e*/ - but all three also often write [i] where we expect /*e*/.

<sup>16</sup> We thank an anonymous reviewer for suggesting the latter part of this sentence.

**Table 4.** Words with /e/ reflected in at least one source.

		Stanley	Walker	Laoust
	modern	1912	1921	1936
tooth (#1)	asen	asein	âsen pl. eesenûn	asen, as <sup>a</sup> in
f. pl.	-en	-ein	-èn	- <sup>a</sup> in
come (#7)	hed	hait	hairrd	ħaid-
3F/PIDO	-en/-et	-ein/-it		-(a)in/-(a)it
2M/FSgDO	-ek/-em	-uk	-ik/-am	-(a)ik/-(a)im
his mother (Table 3)	em̄m-es			umma-is
necklace (#4)	aʏez		âghess pl. yeeghêsun	aʏiz
urine (#12)	išəršen	shirshein		išəršin
winnowing van (#9)	tiset			tisait

**Table 5.** Words with /e/ consistently transcribed as a vowel other than [e] in multiple sources.

		Stanley	Walker	Laoust
	modern	1912	1921	1936
date (#8)	teni		teeanêê	tîyni
finger nail (#13)	aččer		echêêr pl. echeerrûn	ačir
goat (#11)	iʏed	yrid		iʏid
pocket (#18)	ambej	ambydj		anbiž
male slave (#14)	ajmej	ydjimidj	ajmêêj	ažmæž[sic!]
2PIDO	-ewən	-oowin	-ówin	-îwən

Minutoli (1827) and Bricchetti-Robetti (1889), written in Arabic characters by native speakers, both transcribe “slave” as <’jmyj>, confirming that Laoust’s transcription with ə is a Moroccanism.

Caillaud (1826) consistently transcribes words with /e/ as French [ɛ]/[e], never [i] (<echerchaine> “urine” (#12) = *išəršen*, <tenna> “dates” (#8) = *teni*, <aguête> “arm” (#3) = *ayel*, *egaite* “goat” (#11) = *iʏed*, <-enne> “f.pl.” = *-en*); the only exception is <tcharenne> “fingernails” (#13, *ččerən*).<sup>17</sup> However, the value of this evidence for establishing that /e/ is old is weakened by the fact that, whereas Laoust errs on the side of [i], Caillaud errs on the side of [ɛ]/[e] (<témite> “navel” = *timatt*, <tégourgan> “firewood” = *tigurga*, <tazérie> “moon” = *taziri*). Other early sources are too short to be of much use.

Based on all of this data, we can be confident that /e/ was present in Siwi by the early 20th century, and most probably by the early 19th century, in most of the contexts where it is heard today. While a few words are consistently transcribed by early 20th century sources as having [i], the transcriptions of Caillaud, despite their ambiguity, suggest the presence of [e] in those too (e.g. for *iʏed*, *teni*).

<sup>17</sup> <tcharenne> may be an archaism. In other Berber varieties, the plural has a vowel *a* before the last stem consonant, eg Tamasheq *eskār* pl. *askarān*.

For /o/, the data to be examined is naturally smaller:

**Table 6.** Early transcriptions of words containing /o/ in modern Siwi.

		Minutoli	Caillaud	Stanley	Walker	Laoust
	modern	1827	1826	1912	1921	1936
MSgAddr	-ok	(wiyy)awk		-oak	-ûk	-uk/-ok
FSgAddr	-om				-òm	-om
window (#30)	allon		aloune	alone pl. alonin	allôoun pl. alloounîn	allun pl. əllûnən
much	kom		côme	kôm	kóm	kûm, kôm

Minutoli clearly confirms that /o/ was present in Siwi demonstratives by the early 19th century. However, its spread to “window” may be later; Caillaud’s distinction between <aloune> and the Arabic loanword <côme> is suggestive.

## 8. Conclusion

In Siwi, proto-Berber \**e* has shown an overwhelming tendency to disappear from the phonological system by merging with other vowels: in almost all contexts, it has regularly become /i/, while words of the shape \**t-eCe* have become *t-Ca*. This tendency, however, has proceeded unevenly, with \**e* surviving longest in final syllables. Word-finally the reflexes of \**e* and \**i* may have remained distinct as late as the late 19th century, and before word-final *n* the distinction seems to have been maintained up to the present. Outside of the latter context, and excluding loanwords, modern Siwi /e/ derives from three sound changes, completed almost certainly by 1900 and probably before 1820:

- word-internal monophthongization of the diphthong \**ǎy*
- \**ǎ* in final CVC syllables adjacent to a post-alveolar (a change apparently shared with El-Fogaha)
- lowering of /i/ after /y/

Another possible context for lowering, before final velars, is not supported by sufficient examples.

The Siwi vowel /o/ derives from Proto-Berber \**u*, irregularly in the demonstratives and sporadically in words of the shape *aCCuC*. The extreme rarity of the latter change (only two certain examples are attested within inherited vocabulary) makes it impossible to determine its causes more precisely, and it may well postdate the 19th century.

Modern Siwi mid vowels are thus mostly secondary developments; except for final *-en*, they provide no direct evidence for the reconstruction of mid vowels in earlier intermediate stages of Berber. In this respect, Siwi is more reminiscent of Algerian and Moroccan Berber varieties than of Tuareg or Ghadames.

### Abbreviations

1, 2, 3	first, second, third person	VN	verbal noun
sg	singular	C	consonant
pl	plural	V	vowel
M	masculine	cp	compare
F	feminine	id	idem
DO	direct object	ms	manuscript
RES	resultative	p.c.	personal communication

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