Two Scales That Are Not Scales

Do harmonic and melodic minor exist independently, or are harmonic and melodic minor two descriptions of the residue left by the first change?

Companion study to A Cadence of Change: The Rise and Fall of the Ionian-ization of Minor

Terms

This study uses the terms defined in the parent paper (§2): **final cadence**, **cadential tonic**, **cadential pre-tonic**, **cadential pre-pre-tonic**, **modal**, **extra-modal**, **minor-destination modes**, and **change** — with the three changes named as there: the **Dominant-ization** — the raised seventh at the cadential pre-tonic, together with the raised sixth beside the raised seventh; the **Major-ization** — the Picardy third at the cadential tonic; and the **Fortification** — the augmented sixth at the cadential pre-pre-tonic. Coined terms are hyphenated (Ionian-ization, Dominant-ization, Major-ization) so that the coinage stays visible on the page; Fortification, an established word, is not.

The question

Pedagogy teaches minor as a scale with three forms: natural (Aeolian), harmonic (raised seventh), and melodic (raised sixth and seventh ascending, natural descending). If the parent paper's account is right, these are not three scales but one mode plus two descriptions of the residue left by the first change (Dominant-ization) — harmonic minor the vertical description, melodic minor the horizontal.

The two putative scales make sharply different predictions, and both are testable in the corpora.

	If a genuine scale	**If a description of the Dominant-ization's residue**
Harmonic minor	Harmonic minor's defining interval — the augmented second between the flat sixth and the raised seventh — occurs melodically, because a scale is a melodic object and the augmented second is one of harmonic minor's steps	The augmented second is avoided, because the raised seventh and the flat sixth belong to different chords and never meet in a line
Melodic minor	The raised sixth is conditioned on **direction**: raised in ascent, natural in descent	The raised sixth is conditioned on **proximity to the raised seventh**, in either direction — direction merely correlating, since raised sevenths are usually approached from below

Test 1 — Harmonic minor's defining interval does not occur

Melodic occurrences of the augmented second between the flat sixth and the raised seventh, in Aeolian and Phrygian pieces:

Corpus	**Events**	**Notes**	**Rate**
JRP, c. 1420–1550	**1**	341,005	0.03 per 10,000
Palestrina, c. 1554–94	**0**	153,963	0.00
Tasso, 1571–1649	**7**	76,445	0.92

One event in a third of a million notes; none whatever in Palestrina. The interval that defines harmonic minor — the feature that distinguishes harmonic minor from every other scale and gives harmonic minor

a characteristic sound — essentially never occurs as a melodic step in the repertory that harmonic minor is supposed to describe.

A scale is a melodic object: an ordered succession of steps a line may traverse. In the vocal repertories sampled here the characteristic step is essentially never traversed, so within those repertories harmonic minor does not operate as a scale. The measurement covers Renaissance and early-Baroque vocal corpora only, and does not settle what harmonic minor is in later composition, in instrumental writing, in pedagogy, or as a theoretical construct. Harmonic minor is a vertical description: raise the seventh inside the cadential pre-tonic, leave the sixth alone in the subdominant chord, then write the contents of both chords on a single staff as though the contents formed a line. The augmented second is not a step. The augmented second is the gap between two chords, which is why the corpora show the augmented second all but uncrossed.

Test 2 — Melodic minor's rule names the wrong variable

For every sixth-degree note in Aeolian and Phrygian pieces — the two minor-destination modes whose modal sixth degree is flat, so that raising the sixth is an extra-modal alteration — the raised-sixth rate, split by (a) whether the line continues upward or downward and (b) whether a raised seventh occurs within two notes in the same voice.

Corpus	ASC, near ♯7	ASC, far	DESC, near ♯7	DESC, far
JRP c. 1420–1550	**87.4%** (n=223)	4.0% (n=15,147)	— (n=20)	0.6% (n=29,902)
Palestrina c. 1554–94	**93.9%** (n=507)	18.0% (n=5,932)	**77.4%** (n=328)	10.3% (n=12,922)
Tasso 1571–1649	**79.7%** (n=128)	22.1% (n=2,686)	**37.0%** (n=73)	4.7% (n=6,205)
Bach chorales c. 1720–50	**87.5%** (n=272)	33.1% (n=1,306)	28.8% (n=80)	13.2% (n=2,665)

Proximity multiplies the raised-sixth rate within each direction in every corpus. The two comparisons that isolate each variable:

Holding direction constant (ascending), proximity to a raised seventh multiplies the rate by 22×, 5.2×, 3.6× and 2.6× across the four corpora. Holding proximity constant (near a raised seventh), direction moves the rate far less — and in Palestrina, descending-near-♯7 (77.4%) exceeds ascending-far (18.0%) more than fourfold.

That last comparison is the decisive one, and it is carried by two of the four corpora. The rule says descending lines take the natural sixth. In Palestrina and Tasso they do not, when a raised seventh is adjacent (77.4% and 37.0%, against 18.0% and 22.1% for far-from-the-seventh ascending lines); in the Bach chorales the descending-near cell stays below ascending-far (28.8% against 33.1%), and the JRP descending-near cells are too small to evaluate — so the cross-comparison rests on Palestrina and Tasso, while the within-direction multipliers hold everywhere. Direction is not the governing variable; adjacency to the raised seventh is. "Governing" here is predictive: the cells establish association and predictive superiority over the direction rule, not the cognitive or historical mechanism behind the association.

Control: in Dorian, whose major sixth is modal, the same measure reads high (roughly 59–81%) and unconditioned in every period (denominators in the bundled scale analysis, not reprinted here). Where the raised sixth is the scale's own degree the measure saturates; where the raised sixth is extra-modal the measure tracks the raised seventh. The instrument distinguishes a mode's own degrees from the Dominant-ization's residue.

This is a quantification of something practitioners have partly noticed: the ascending/descending rule is often described as a simplification. What the corpora add is the actual conditioning variable, measured, in four repertories across three centuries. Why a direction-based rule remains serviceable in pedagogy:

raised sevenths are usually approached from below, so "near a raised seventh" and "ascending" correlate heavily, and a rule stated in terms of direction reproduces most of the observed behaviour. Whether the pedagogical rule arose by mistaking the correlate for the cause is a claim about transmission, and no documentary evidence for that transmission is presented here.

Test 3 — The conditional rate stays high

The conditional rate — raise the sixth, given a raised seventh adjacent, ascending — reads 87.4%, 93.9%, 79.7% and 87.5% across corpora spanning 1420 to 1750, accidentals counted as printed. The conditional rate is high in every corpus across three hundred years, with no monotone trend, while every raw raised-sixth rate across the same span rises, by roughly 1.5-fold to fivefold depending on the denominator chosen. The dependence survives the removal of editorially supplied accidentals: in purely scribal notation the rule still fires at 74.1% in the Josquin corpus against a far-from-the-seventh baseline of 0.5%, and at 56.1% in Tasso against 18.4% — though under that scribal-only accounting the rule's measured strength is lower, and within the Tasso periods it rises (26.3% to 61.0% to 66.7%), a rise the evidence cannot apportion between notational practice and sung practice (the parent paper's Appendix D, Tables D3–D4).

Both facts together admit one reading. The rule's dependence on the raised seventh holds in every corpus and under every editorial-accidental policy; what grew was the frequency of the rule's trigger. How early the rule reached full strength is an open dating question — the scribal-only series above is compatible with the rule strengthening across the Tasso decades, or with the sixth's notation catching up to a practice already in force — and only newly sourced manuscripts could close it. The sixteenth-century rise in raised sixths is the Dominant-ization's spread, observed through the Dominant-ization's own melodic repair. One qualification belongs here, developed in the parent paper's Appendix E: in the Josquin corpus roughly 95 percent of raised sevenths are accidentals supplied by modern editors rather than written by scribes, so part of what the raw series tracks is the passage of these inflections into notation rather than into practice.

The raised sixth is therefore best read not as an independent change but as the Dominant-ization's melodic consequence — dependence the conditional tables support strongly, short of the dated within-corpus proof named in Limitations — the measurement on which the parent paper's count of three changes rests.

The answer

Neither operates as a scale in the repertories sampled here. Both describe the same thing from two angles: the region around the raised seventh.

Harmonic minor is the Dominant-ization described vertically — the cadential pre-tonic's raised seventh and the subdominant's flat sixth, flattened onto one staff. Harmonic minor's defining interval is melodically absent from the vocal repertories sampled here (1 event in 341,005 notes), which is decisive within those repertories: an object whose characteristic step is not sung is not functioning there as a scale. The conclusion is bounded by the sample — Renaissance and early-Baroque vocal corpora — and is not a claim about later composition, instrumental writing, pedagogy, or theory.

Melodic minor is the Dominant-ization described horizontally — the melodic repair applied wherever a line passes beside the raised seventh. Melodic minor's rule names the wrong variable: proximity governs, direction correlates, and descending lines beside a raised seventh take the raised sixth up to 77% of the time.

Nineteenth-century pedagogy inherited a repertory saturated with extra-modal raised sixths and sevenths. Pedagogy needed to teach that repertory, and scales are what pedagogy teaches. So — on this account, offered as interpretation rather than documented transmission — pedagogy produced two: one scale for the harmony, one for the melody. In the repertories sampled here neither operates as a scale, and harmonic minor contains a step those repertories forbid. The three-forms taxonomy is not a description of a system. The three-forms taxonomy is a filing scheme laid over an accumulation, and the filing scheme files one change twice.

Limitations

The proximity window is ±2 notes in the same voice; the parent paper's Appendix D reports ±1 and ±3, where the within-direction proximity multipliers hold in every corpus. The cross-comparison — descending-near exceeding ascending-far — holds in Palestrina at every window and in Tasso at this one, does not hold in the Bach chorales, and is unevaluable in JRP; a wider or narrower window moves the absolute rates. Mode assignment is declared in Palestrina and inferred from final and signature in JRP and Tasso; the Bach chorale minor-key identification uses the kern key designation. The JRP descending-near cell has n=20 and is not interpreted. Editorial accidentals affect raised-degree counts wherever editorial accidentals are unmarked; the corpora that mark editorial accidentals (JRP, Tasso) separate scribe from editor, and the Test 1 result is robust in the conservative direction — an editor supplying accidentals tends to create augmented seconds rather than suppress augmented seconds, and the observed count is near zero regardless. The Test 3 inference — that the flat conditional rate makes the raised sixth dependent rather than independent — rests on four corpus-level point estimates rather than a within-corpus time series, and should be read as strong support pending a properly dated test.