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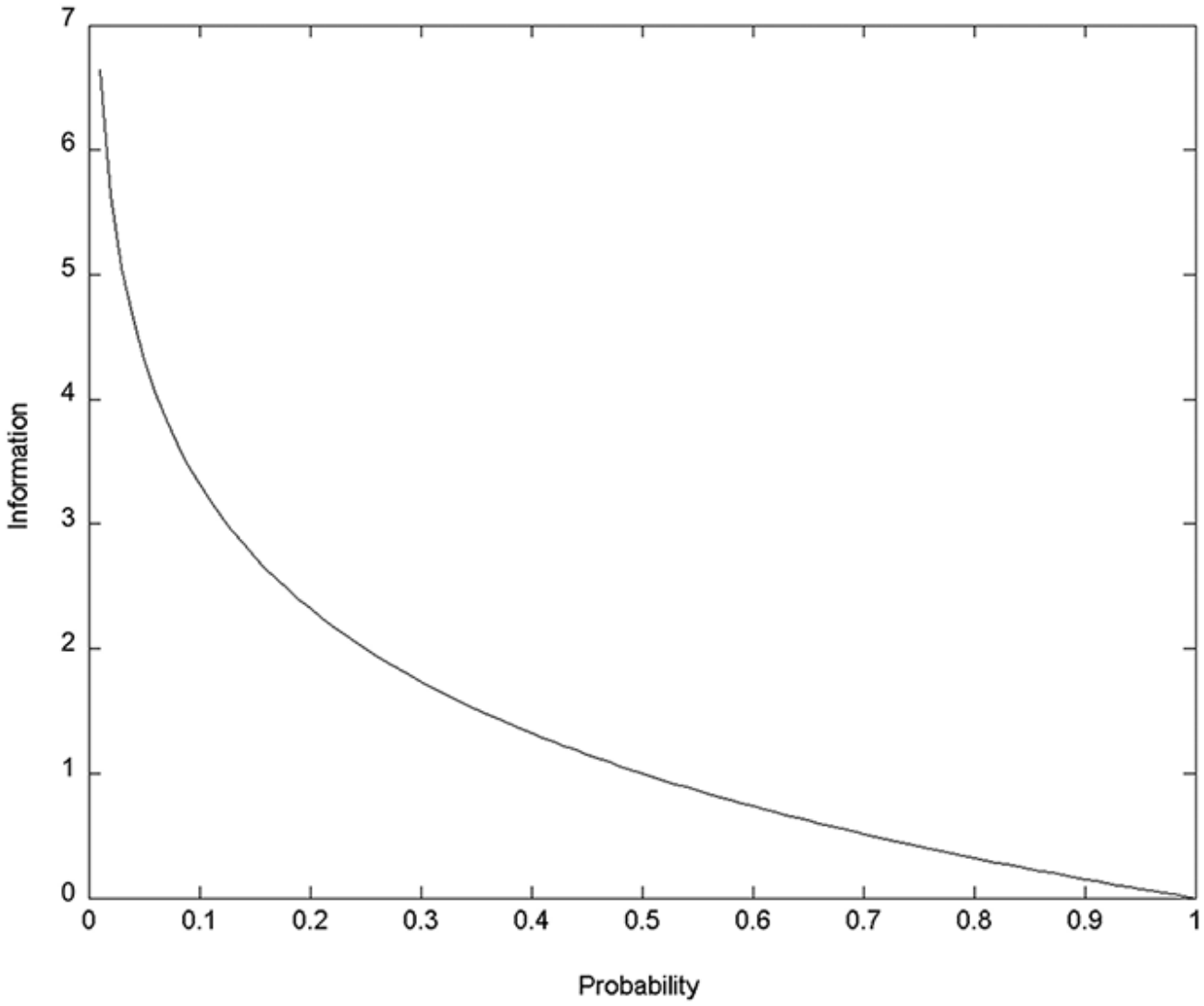
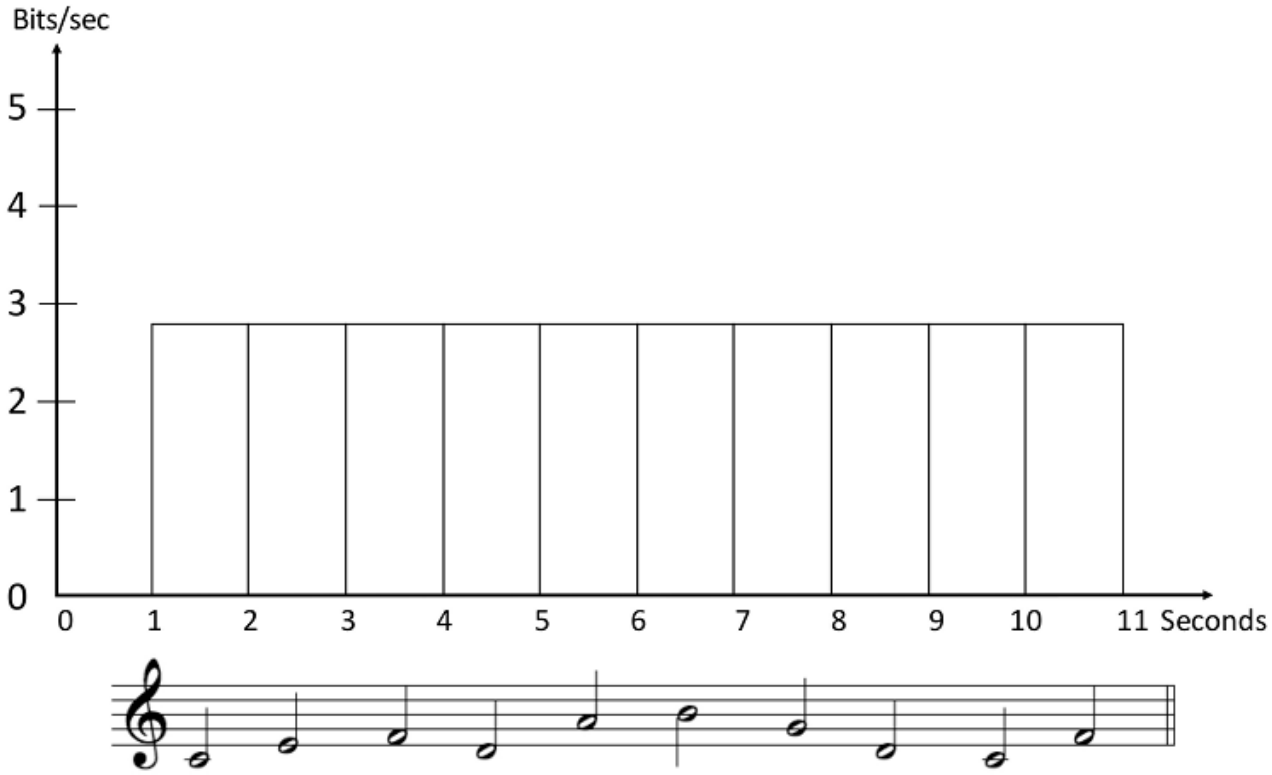
MTO 25.2 Examples: Temperley, Uniform Information Density in Music

(Note: audio, video, and other interactive examples are only available online)
http://mtosmt.org/issues/mto.19.25.2/mto.19.25.2.temperley.html

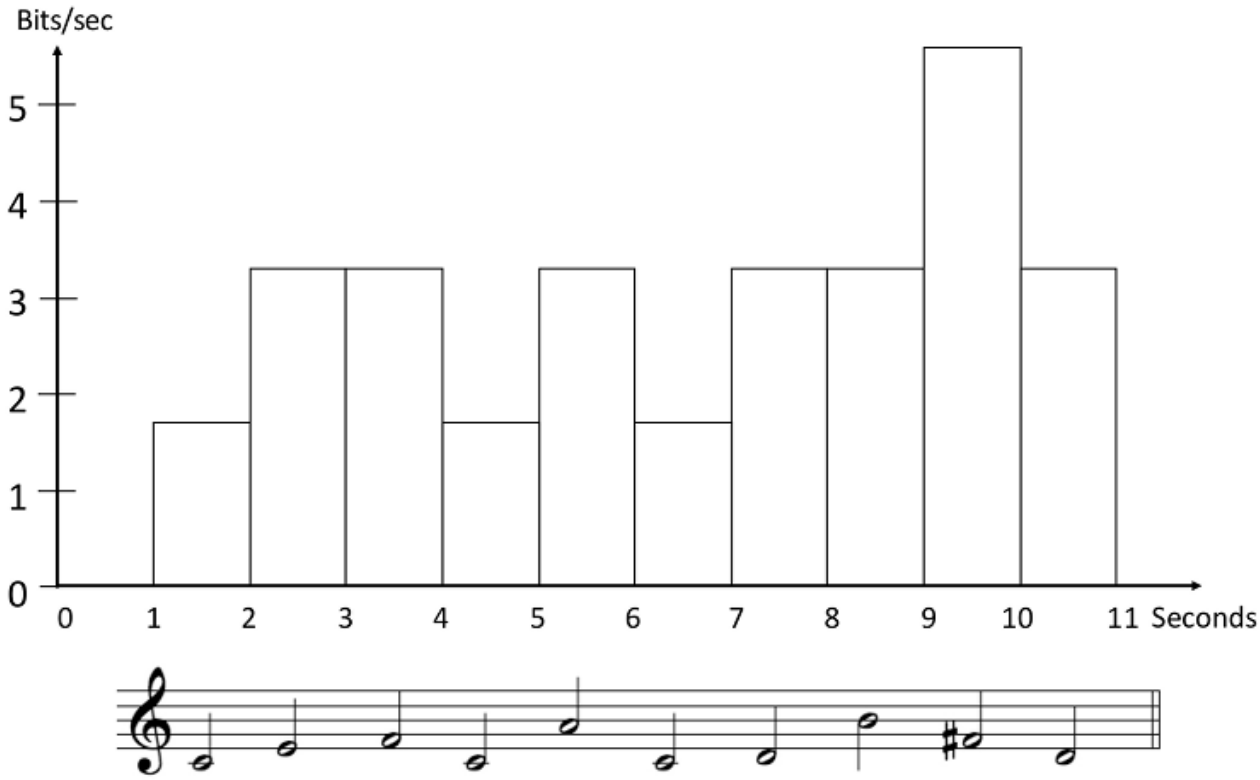
Example 1. The relationship between probability and information



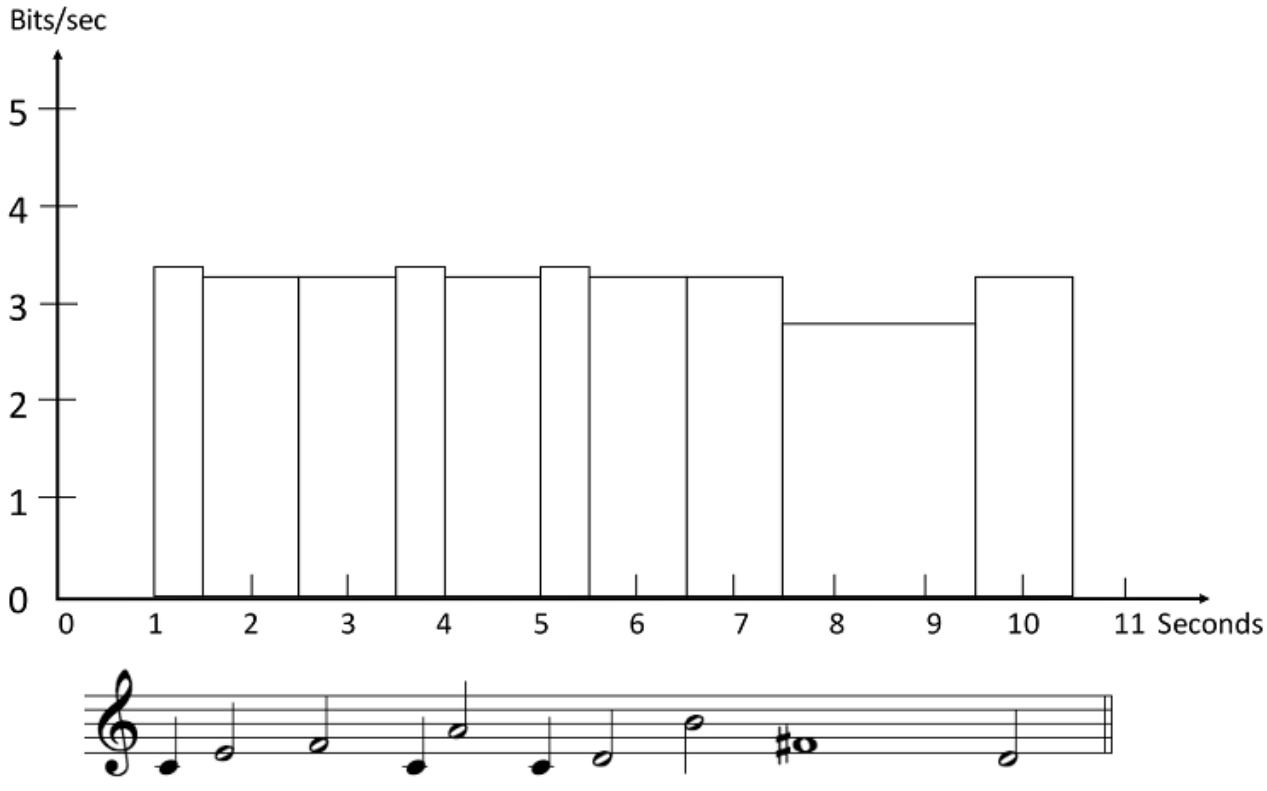
Example 2. A 10-note melody, showing the information density (bits per second) of each note, assuming that the seven notes of the C major scale in the octave above middle C each have a probability of 1/7



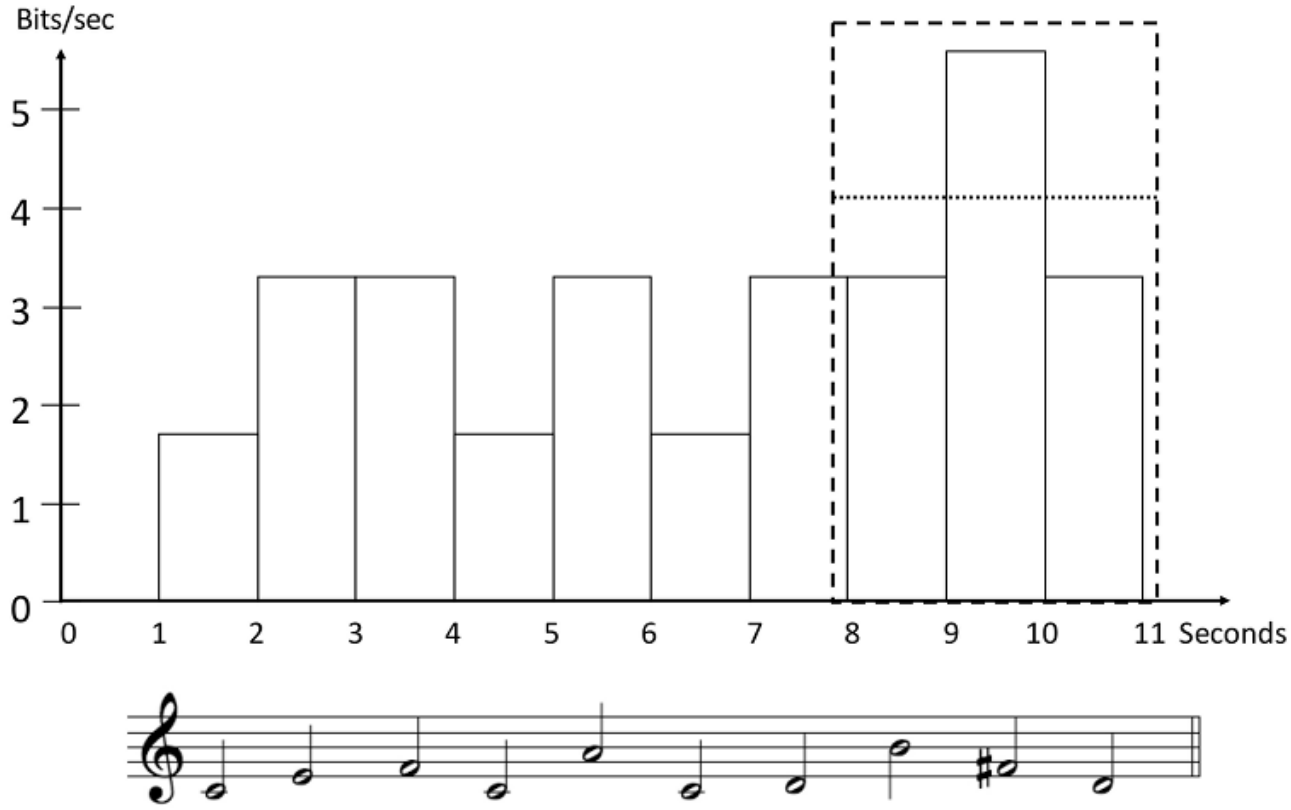
Example 3. A 10-note melody, showing the information density of each note, assuming P(C) = .3, P(D) = P(E) = P(F) = P(G) = P(A) = P(B) = .1, and P(C♯/D♭) = P(D♯/E♭) = P(F♯/G♭) = P(G♯/A♭) = P(A♯/B♭) = .02



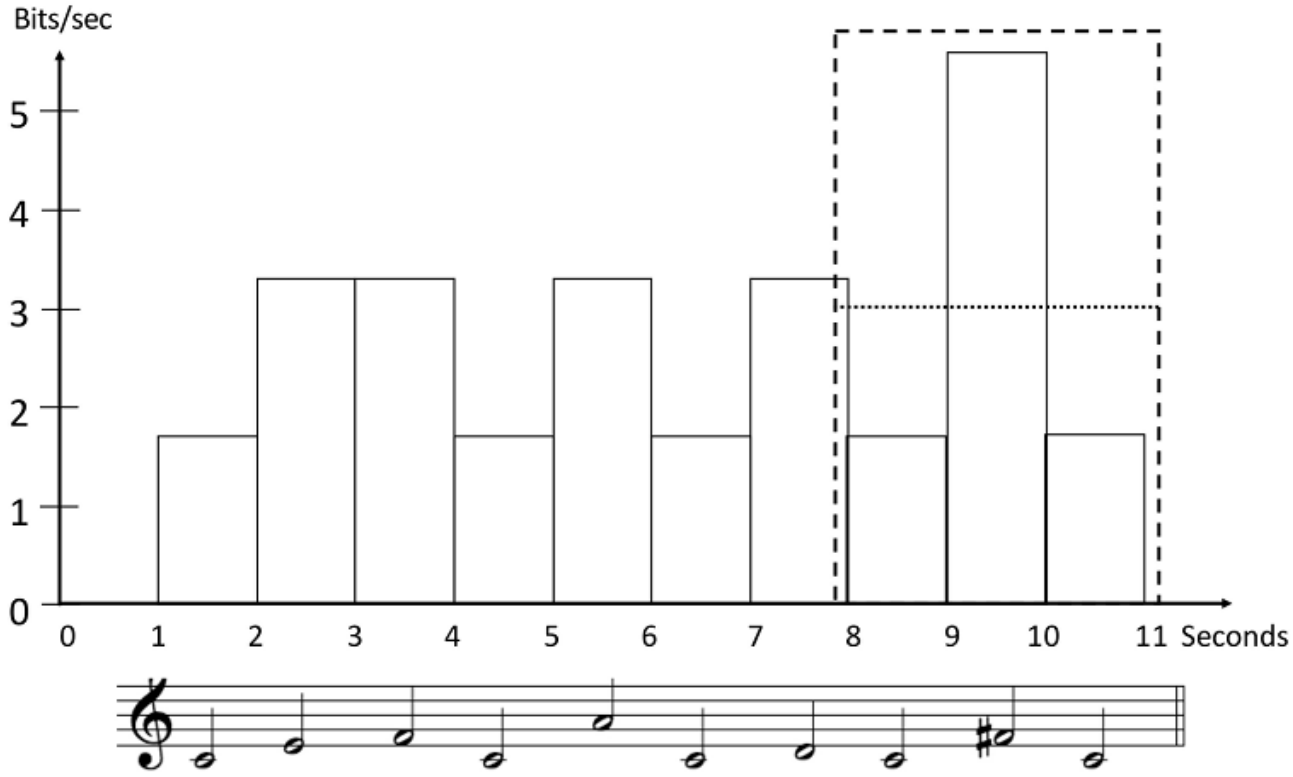
Example 4. The melody in Example 3, with the durations of notes adjusted to create a more uniform information density



Example 5. The dashed rectangle shows a window of three events within which information density is calculated; the dotted line shows the resulting value (the melody is the same as in Example 3)

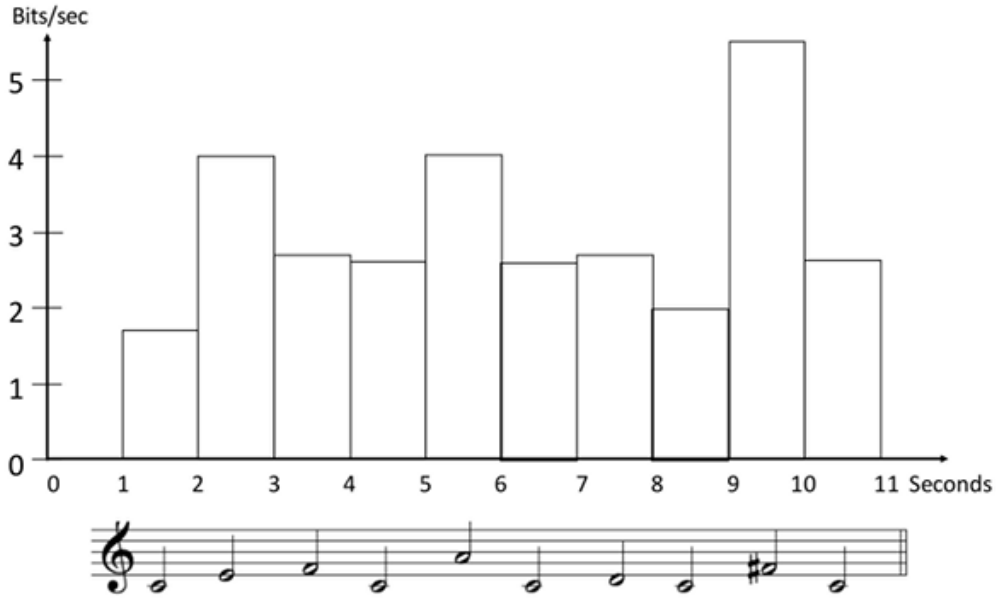


Example 6. The melody is the same as in Examples 3 and 5, except the 8th and 10th notes are altered, reducing the information density of the last three notes; the dotted line shows the resulting value



Example 7. The melody is the same as in Example 6, but now the probability of each note is calculated as the average of its scale-degree probability, SDP (calculated as before), and its interval probability, IntP, where P(step) = .2 and P(leap or repetition) = .025. Calculations are shown in the table above the graph

SDP	.3	.1	.1	.3	.1	.3	.1	.3	.02	.3
IntP	–	.025	.2	.025	.025	.025	.2	.2	.025	.025
Avg.	.3	.062	.15	.162	.062	.162	.15	.25	.022	.162
–log(Avg.)	1.7	4.0	2.7	2.6	4.0	2.6	2.7	2.0	5.5	2.6



Example 8. From Gauldin 1985, 38

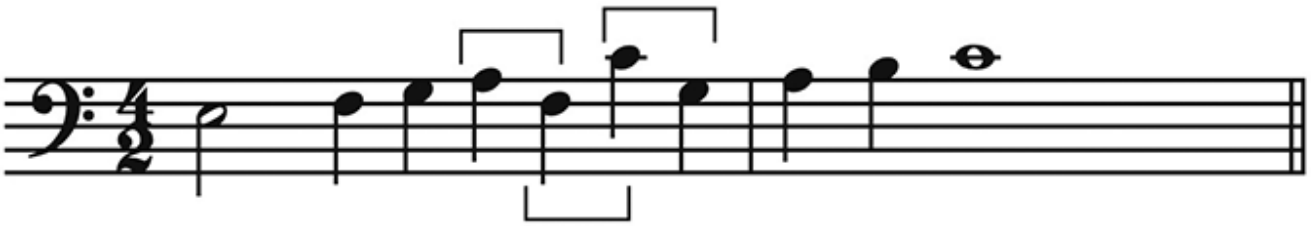
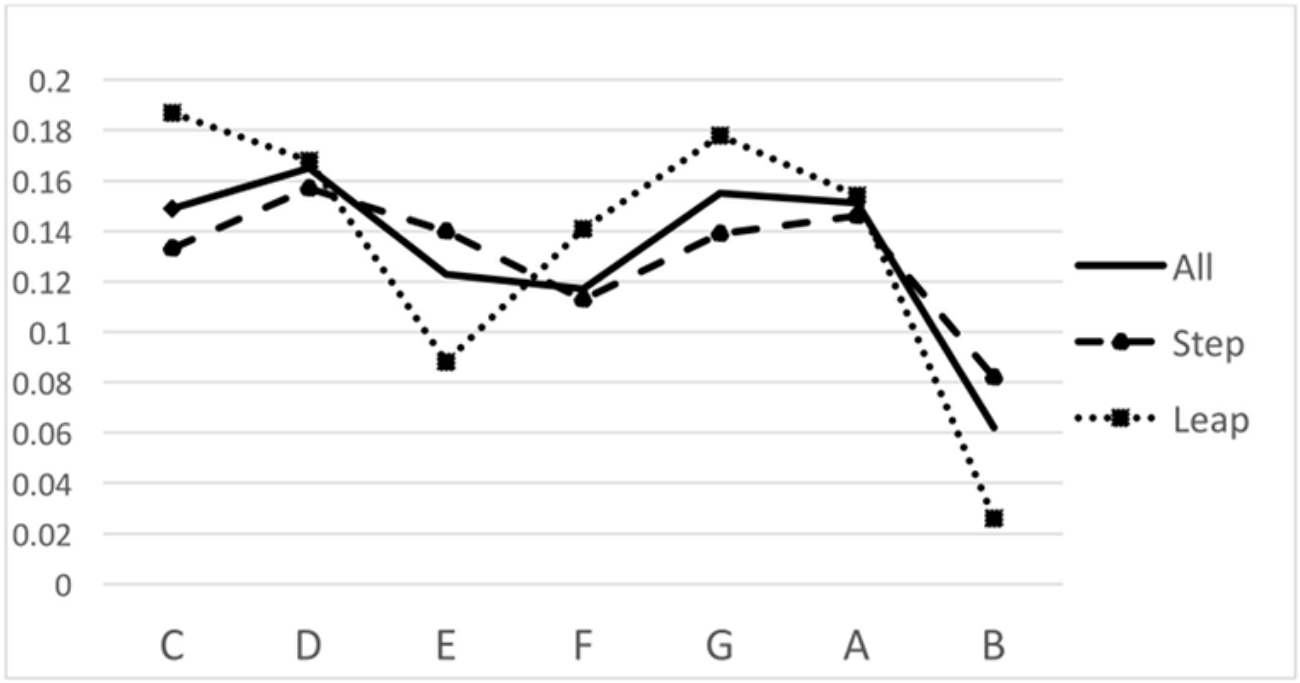


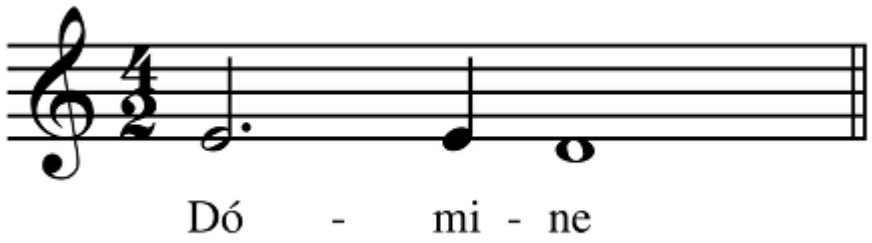
Table 1. Pre-Leap and Post-Leap Lengthening in Palestrina

	Post-leap (% of notes of each rhythmic value approached by leap)	Pre-leap (% of notes of each rhythmic value left by leap)
𝅘𝅥𝅯	0.1	1.1
𝅘𝅥	6.7	5.8
𝅗𝅥	21.8	29.1
𝅝	27.9	26.6
𝅜	28.0	39.6

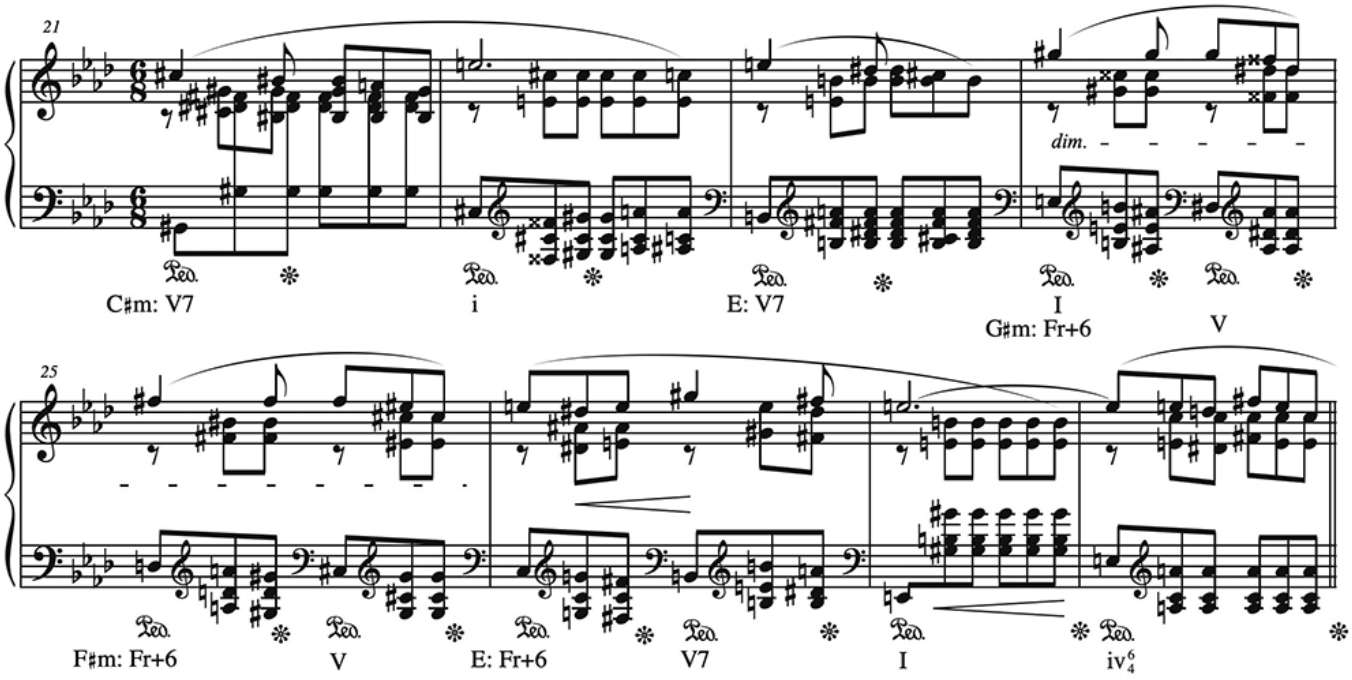
Example 9. Pitch classes approached by step and leap in Palestrina masses



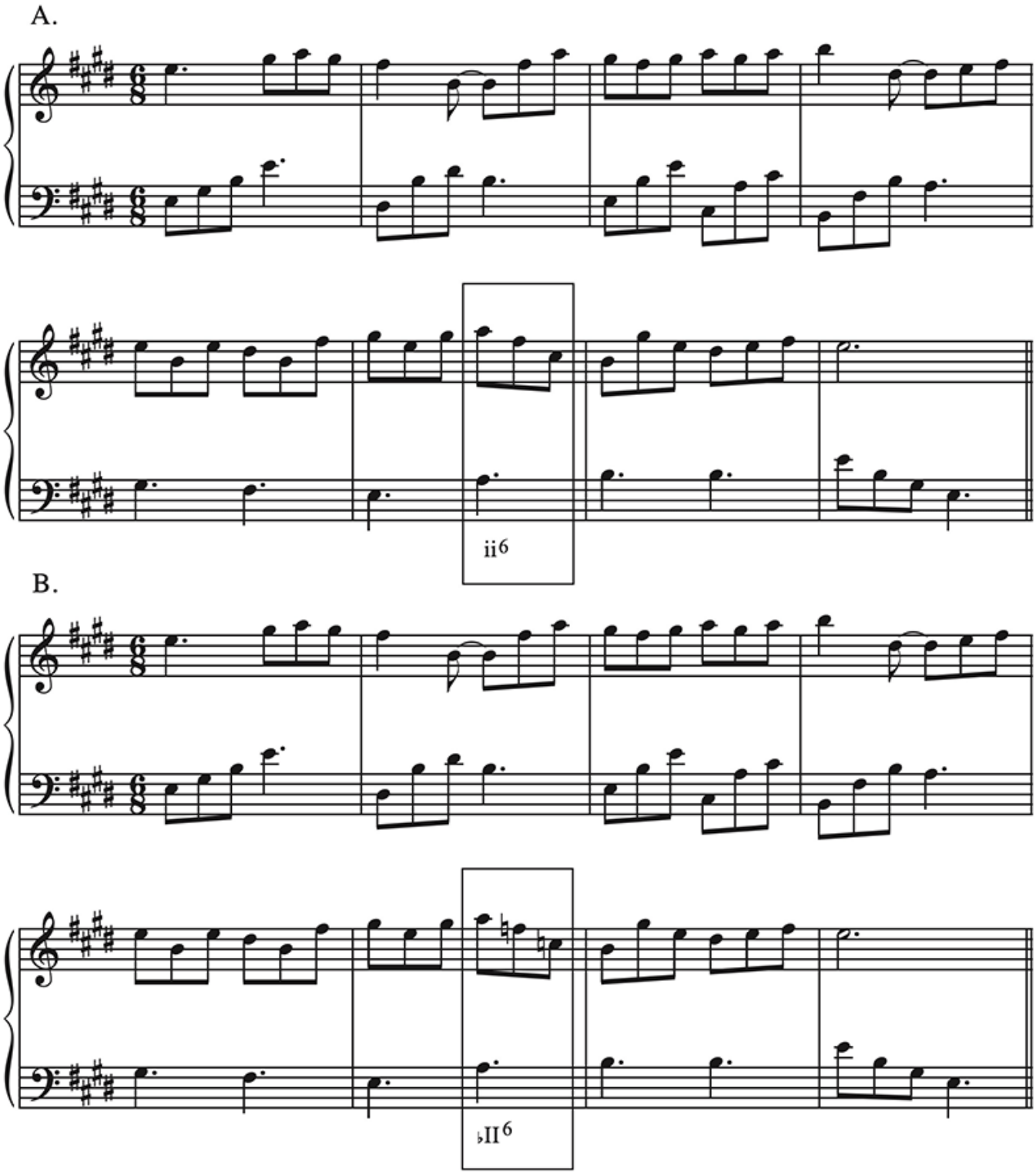
Example 10. From Gauldin 1985, 39



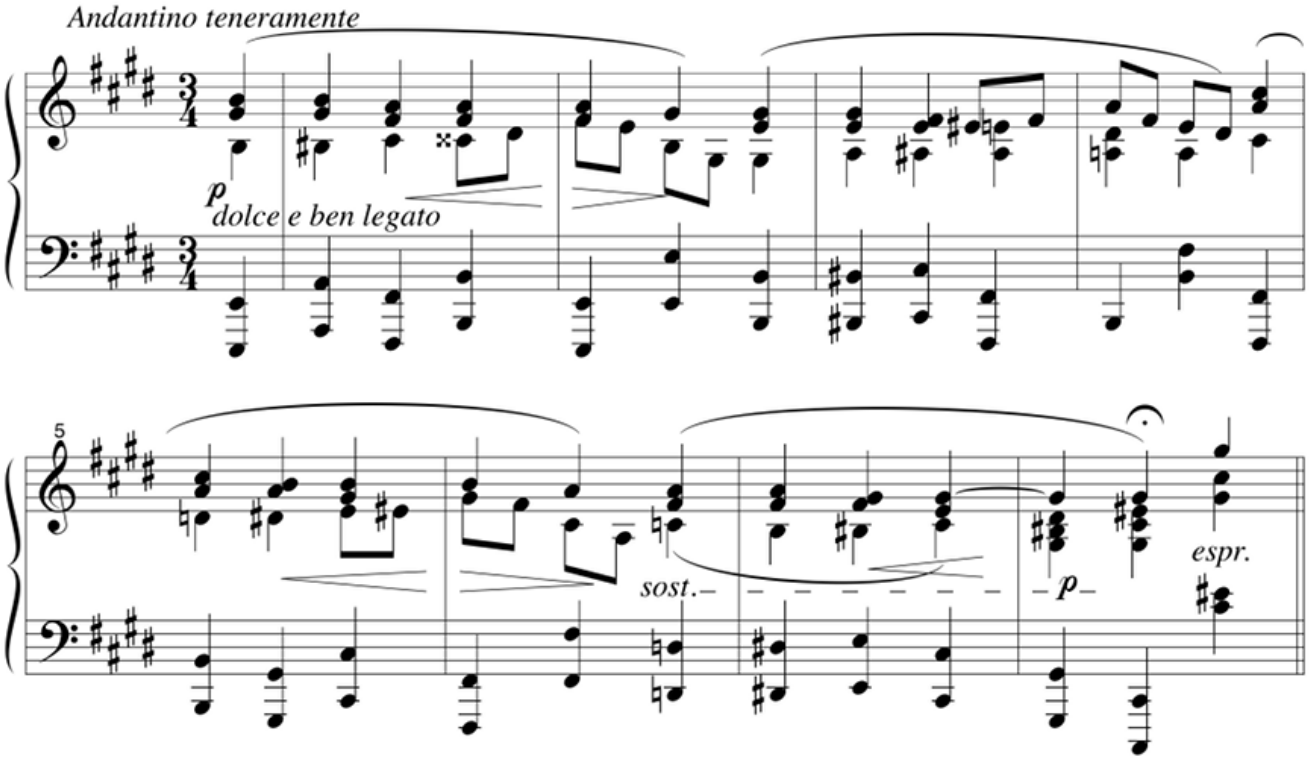
Example 11. Chopin, Prelude op. 28, no. 17, mm. 21–28 (with my harmonic analysis)



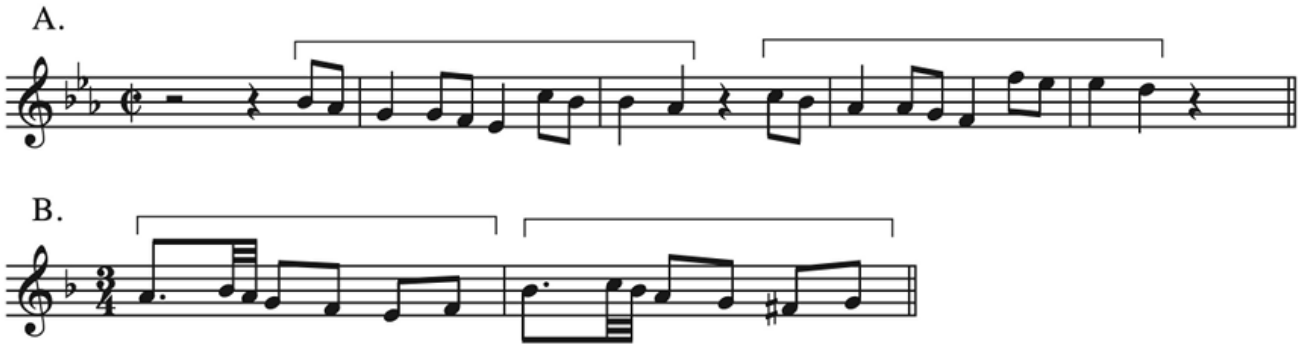
Example 12. A pair of excerpts used in Bartlette's (2007) experiment



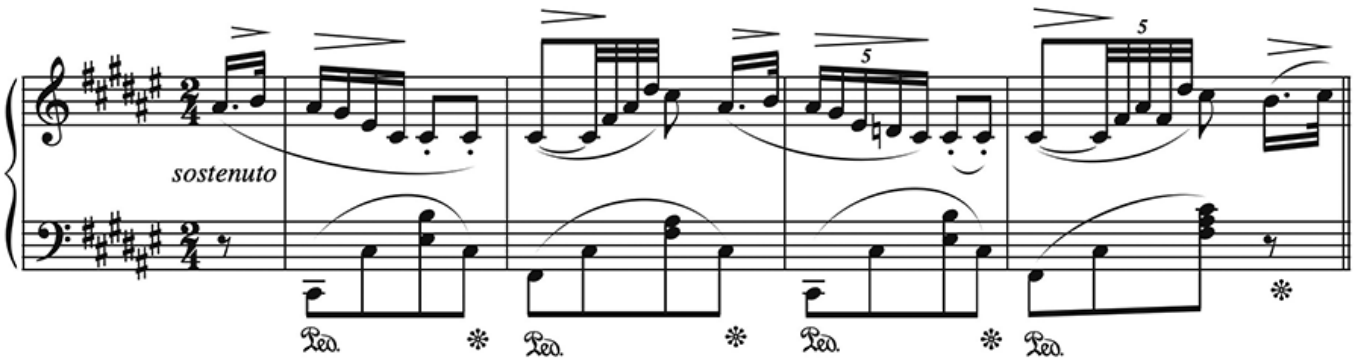
Example 13. Brahms, Intermezzo op. 116, no. 6, mm. 1–8



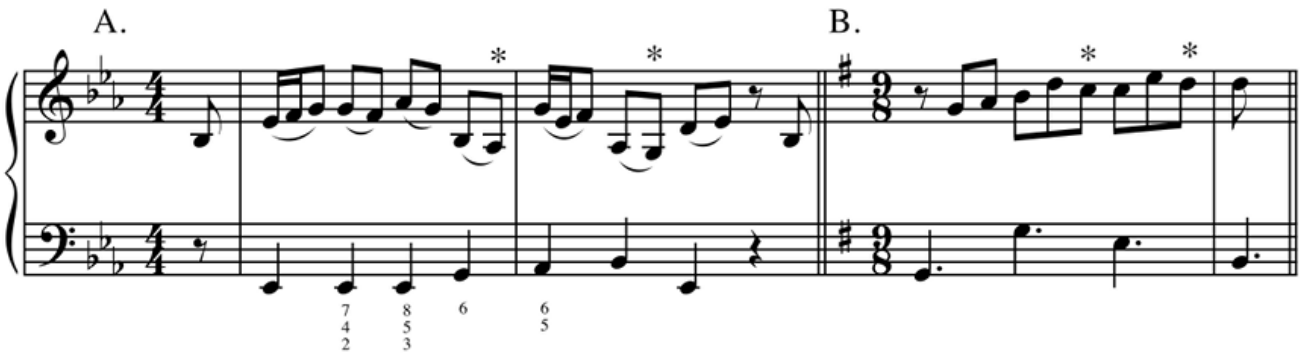
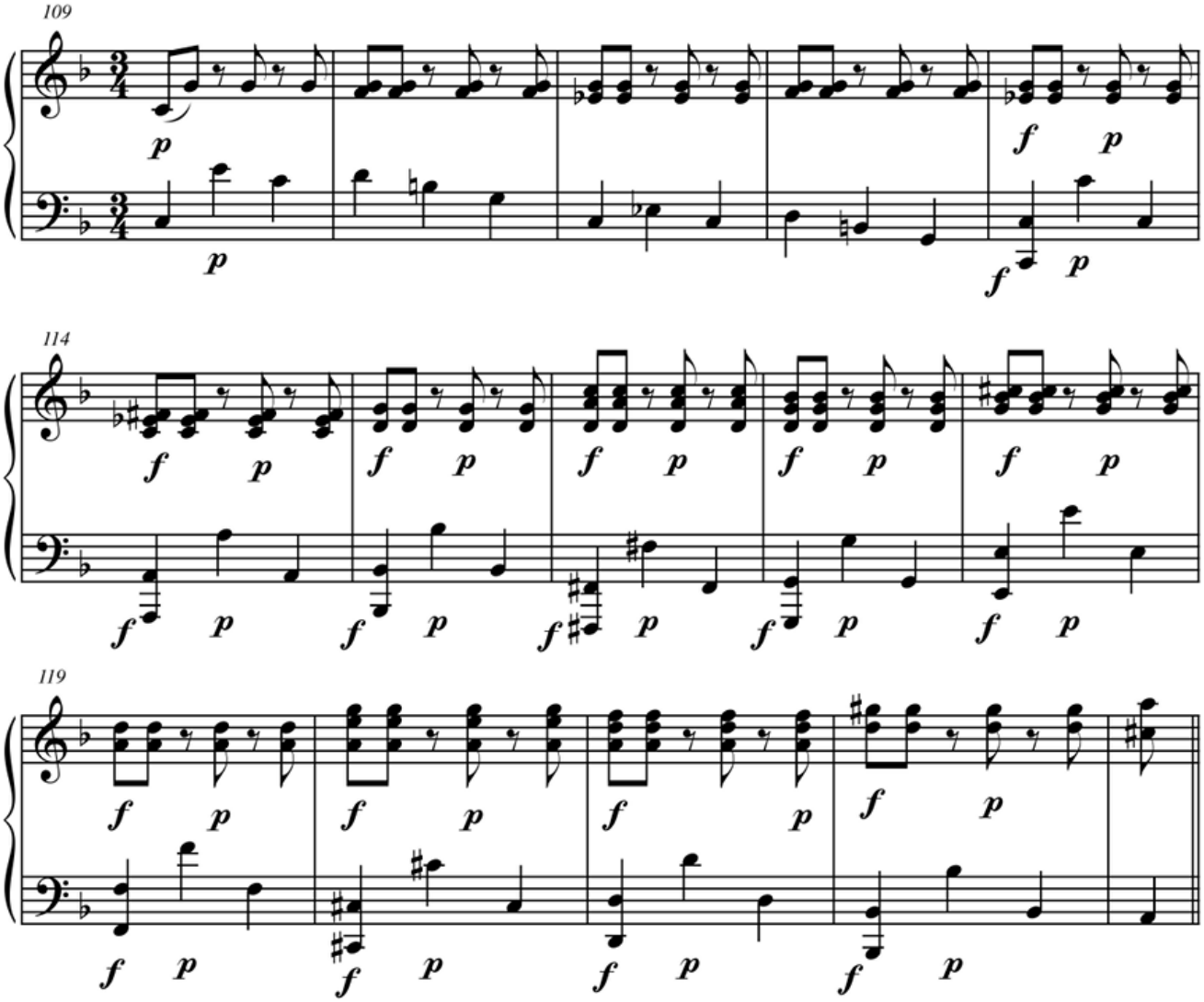
Example 14. (A) Mozart, "Non so piu" from *Le nozze di Figaro*, mm. 1–5; (B) Mozart, Piano Trio K. 548, II, mm. 1–2



Example 15. Chopin, Nocturne op. 15, no. 2, mm. 1–4



Example 16. Rare types of non-chord tone used motivically. (A) Bach, Aria from *Wachet auf ruft uns die Stimme*, mm. 1–2; (B) Bach, Chorale from *Herz und Mund und That und Leben*, mm. 1–2. Asterisks indicate escape tones in (A) and anticipations in (B).



Example 17. Mozart, Sonata K. 332, I, mm. 109–23