Explorations in Time:
Rhythm, Meter, and Tempo

Terminology

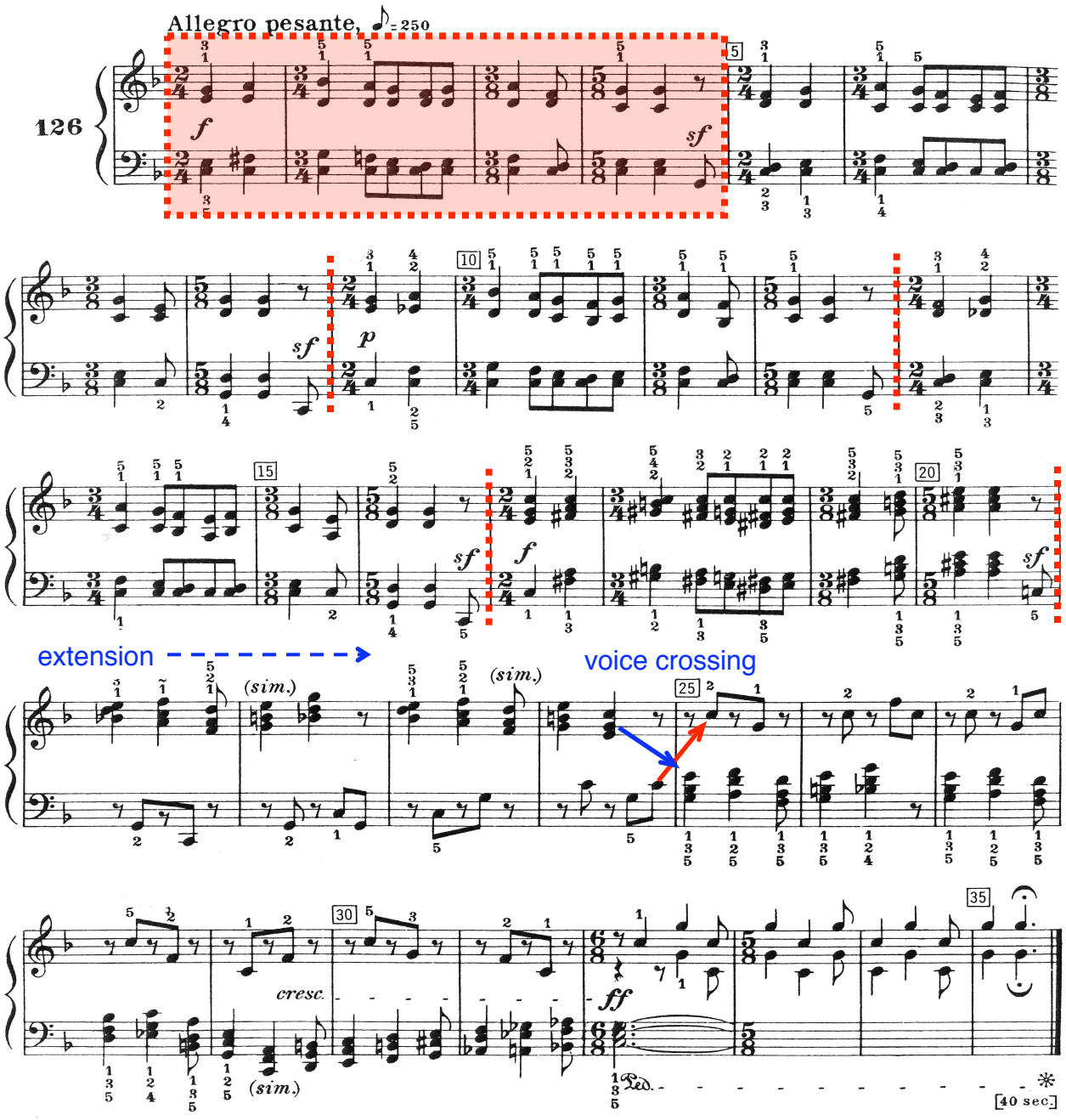
- Beat
- Rhythm
  - Irregular note divisions
  - Syncopation
  - Polyrhythm (cross-rhythms)
- Meter
  - Hemiola
  - Mixed meters
  - Polymeter
- Tempo
  - Temporal (metric) modulation
  - Polytempo

	Binary	Ternary
Simple	$\frac{2}{4}$	$\frac{3}{4}$
Compound	$\frac{6}{8}$	$\frac{9}{8}$

Composite (additive)

$\frac{5}{8}$	2 + 3
	3 + 2
$\frac{7}{8}$	3 + 2 + 2
	2 + 3 + 2
	2 + 2 + 3

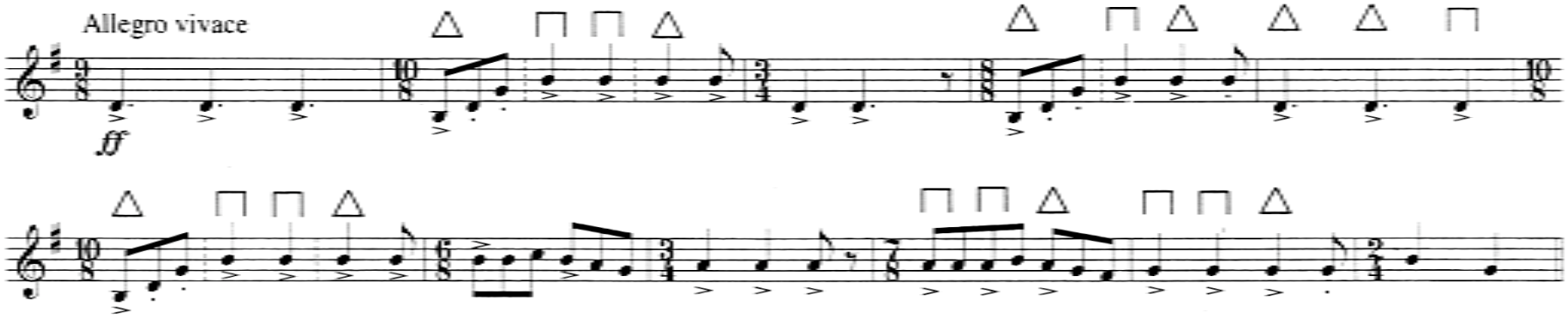
Béla Bartók: “Change of Time” from *Mikrokosmos* (1926-39)



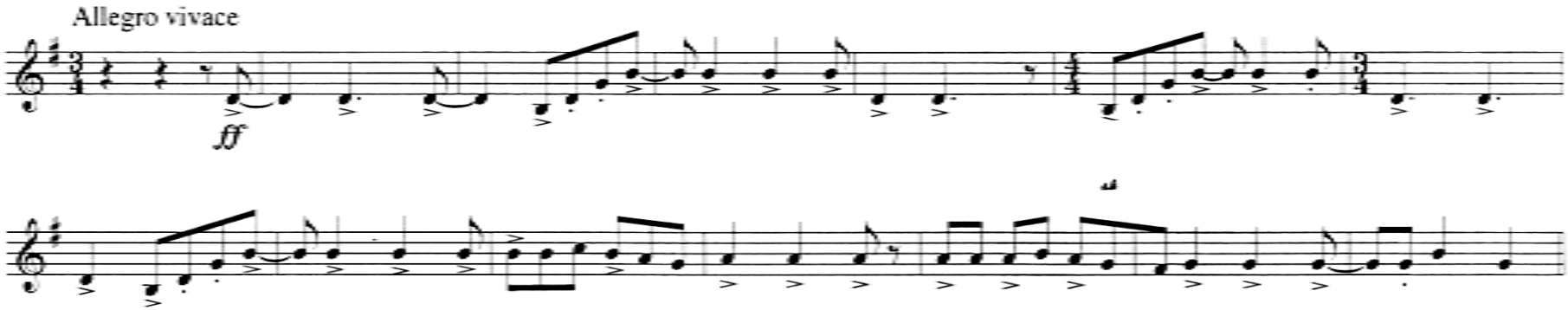
Aaron Copland: *El Salón México* (1938)

Two ways of notating meter:

Metric Notation 1 — using mixed composite meters:

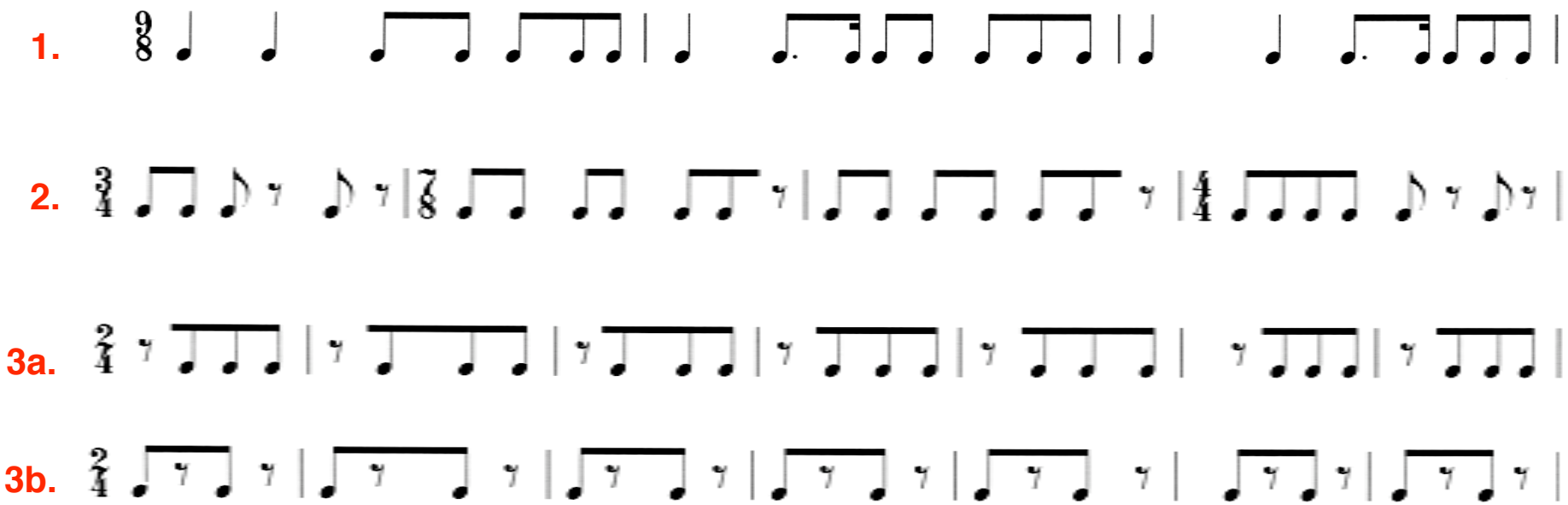


Metric Notation 2 — using simple meters with syncopation:



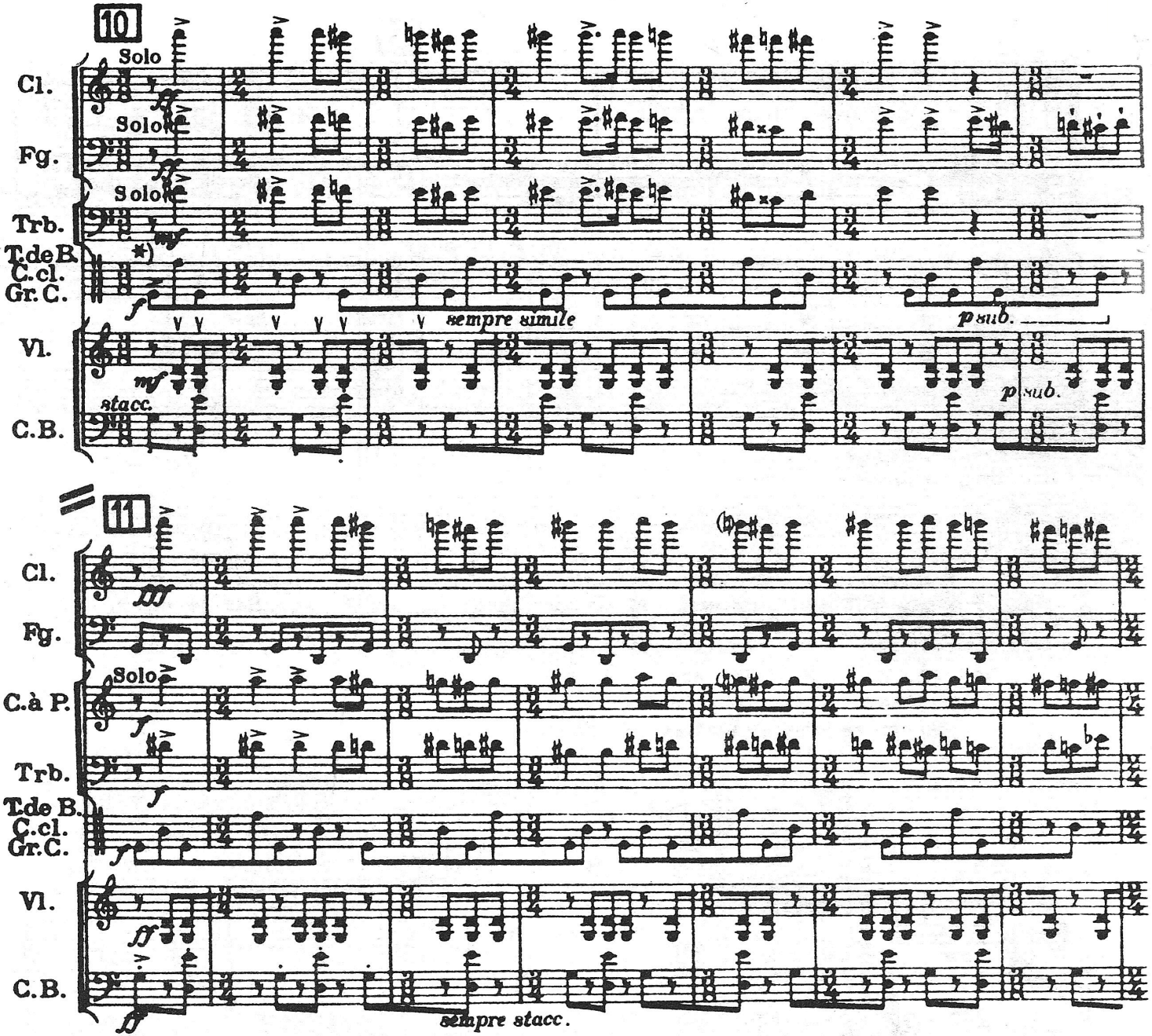
Igor Stravinsky: *L'Histoire du Soldat* (1918)—I. Marche du Soldat

Polymetric Layering

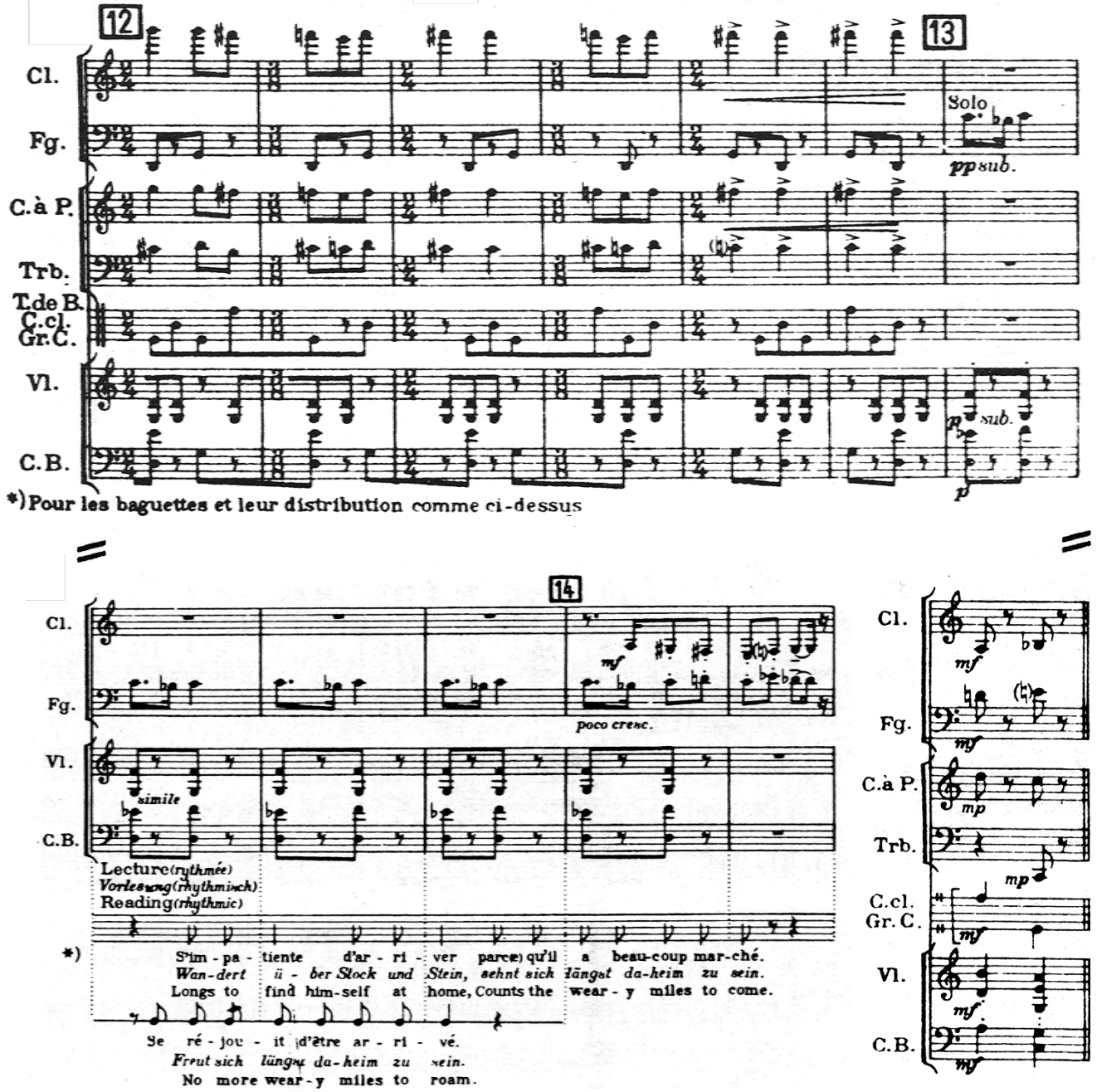


1. clarinet, bassoon, trombone
2. percussion
3. violin (a), contrabass (b)

Igor Stravinsky: *L'Histoire du Soldat* (1918)—I. Marche du Soldat

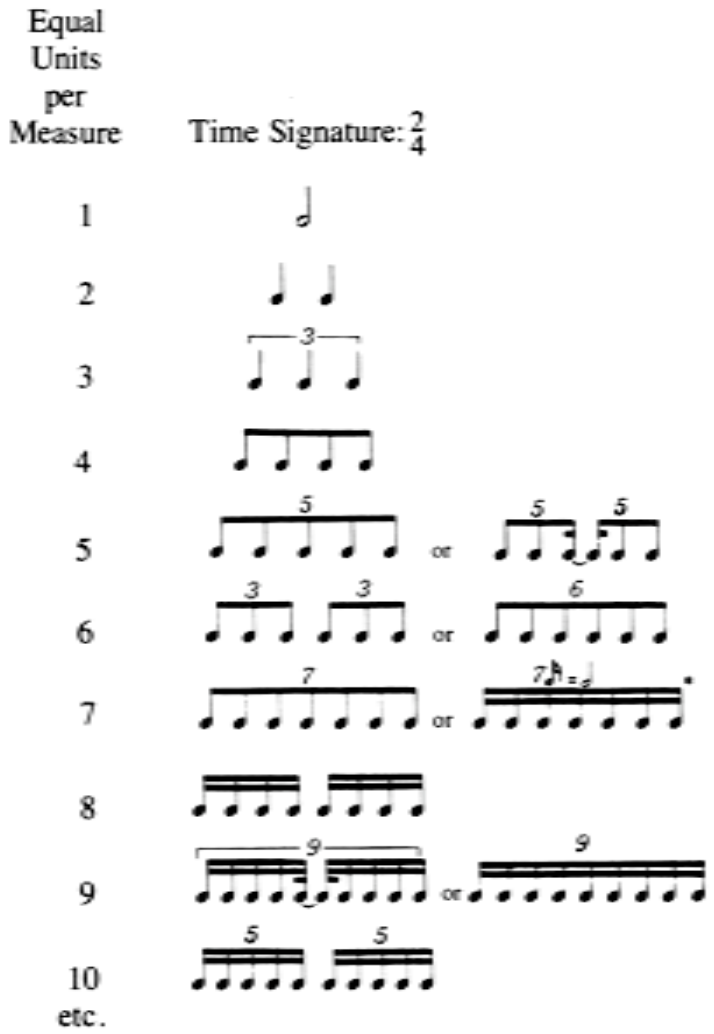


Igor Stravinsky: *L'Histoire du Soldat* (1918)—I. Marche du Soldat

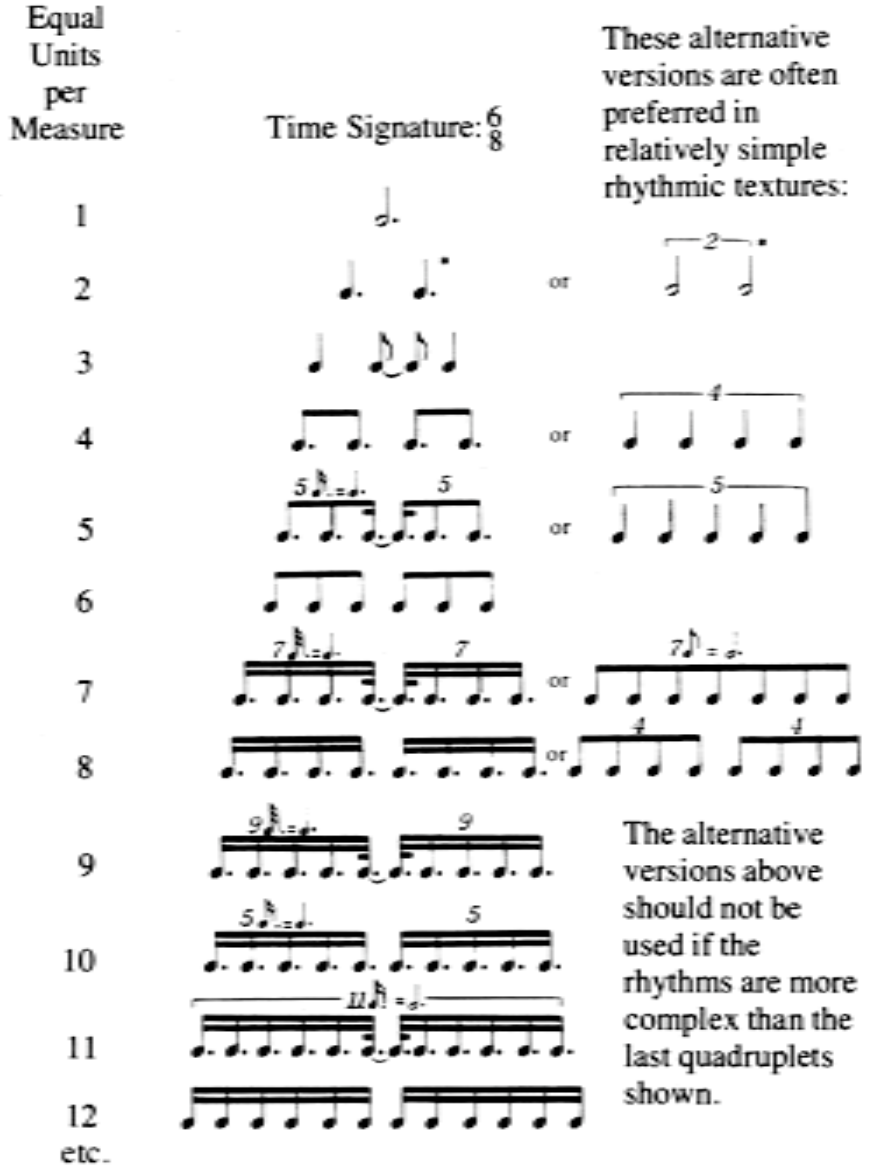


Subdivisions of Simple and Compound Beat Units

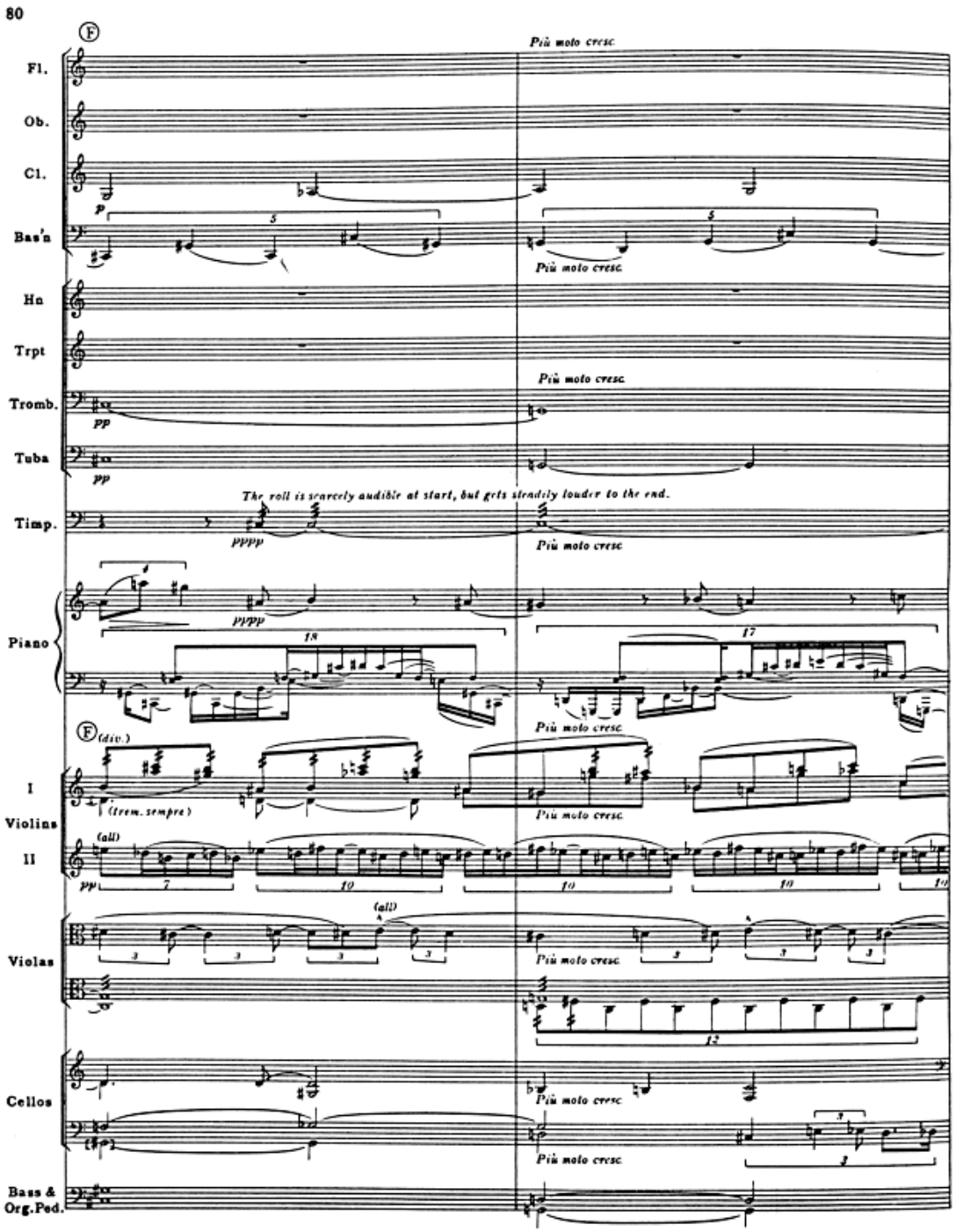
Simple Meter



Compound Meter



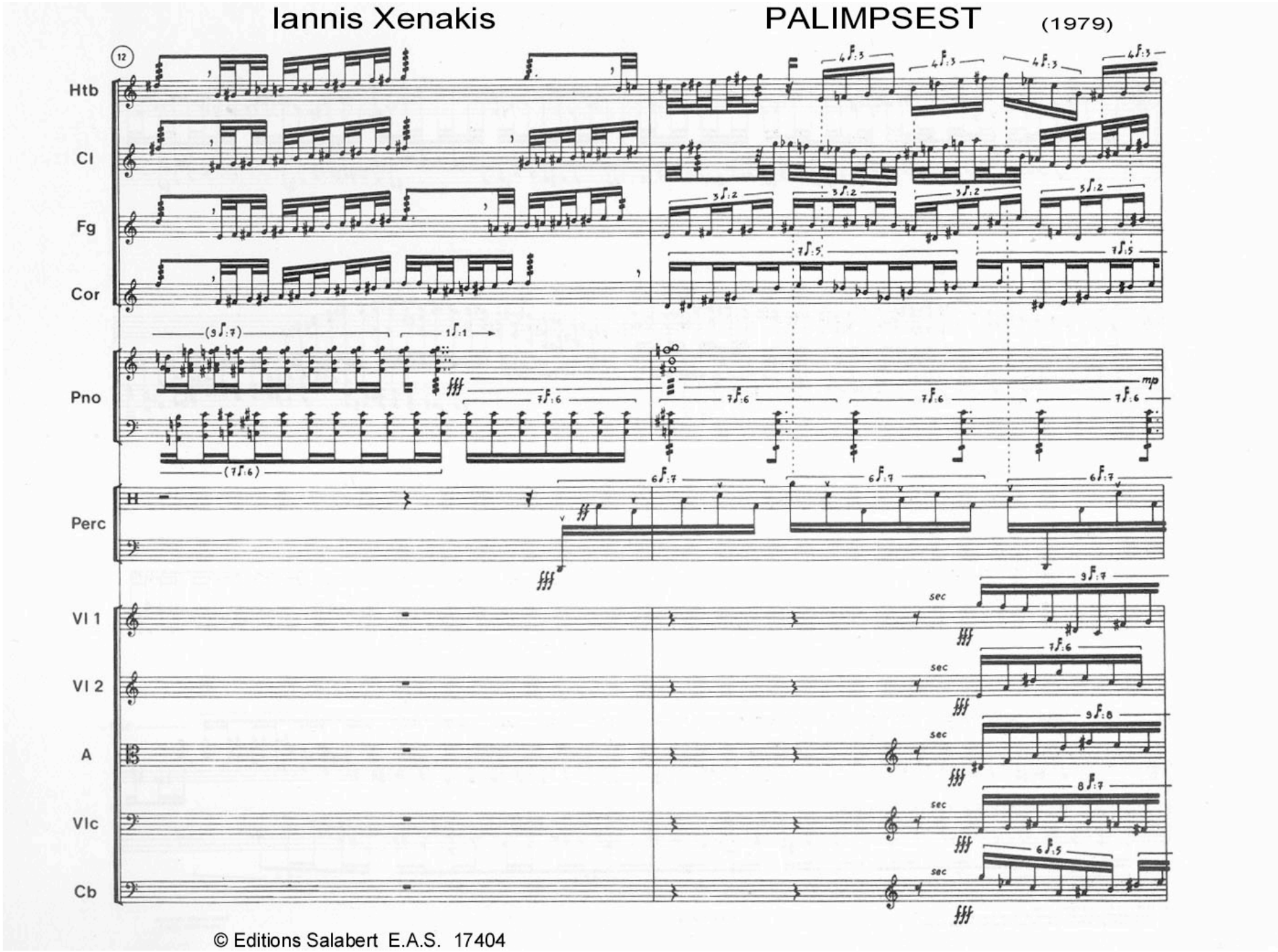
From Kurt Stone, *Music Notation in the Twentieth Century*, p. 121.



Charles Ives:
Three Places in New England
(1903-14)

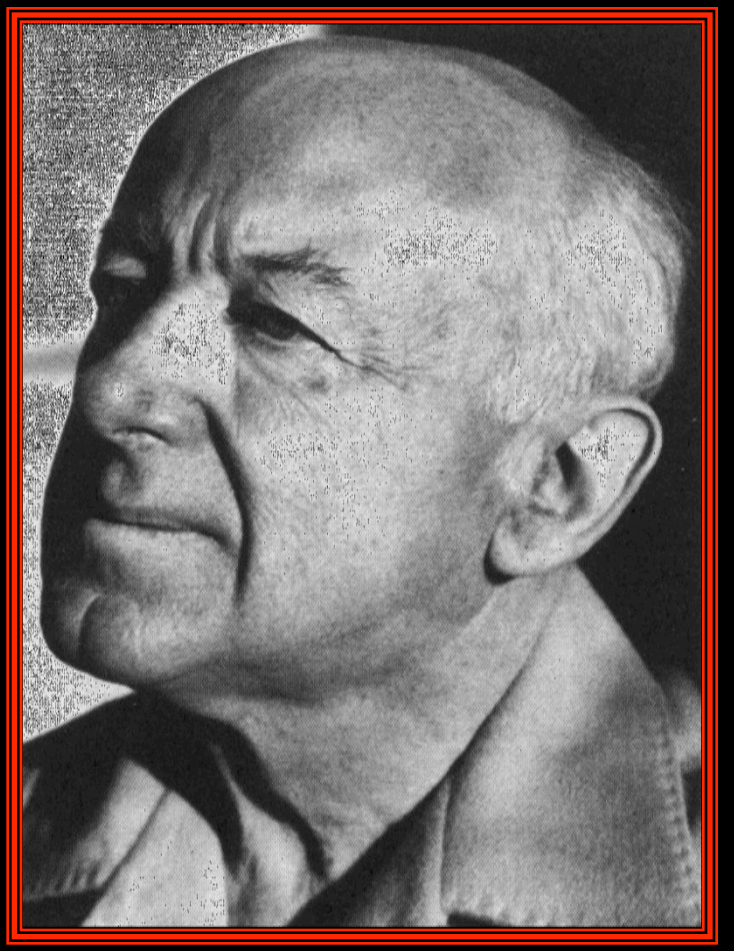
III. “The Housatonic at Stockbridge”

Multiple temporal streams created by polyrhythms



Iannis Xenakis: *Palimpsest* (1979)

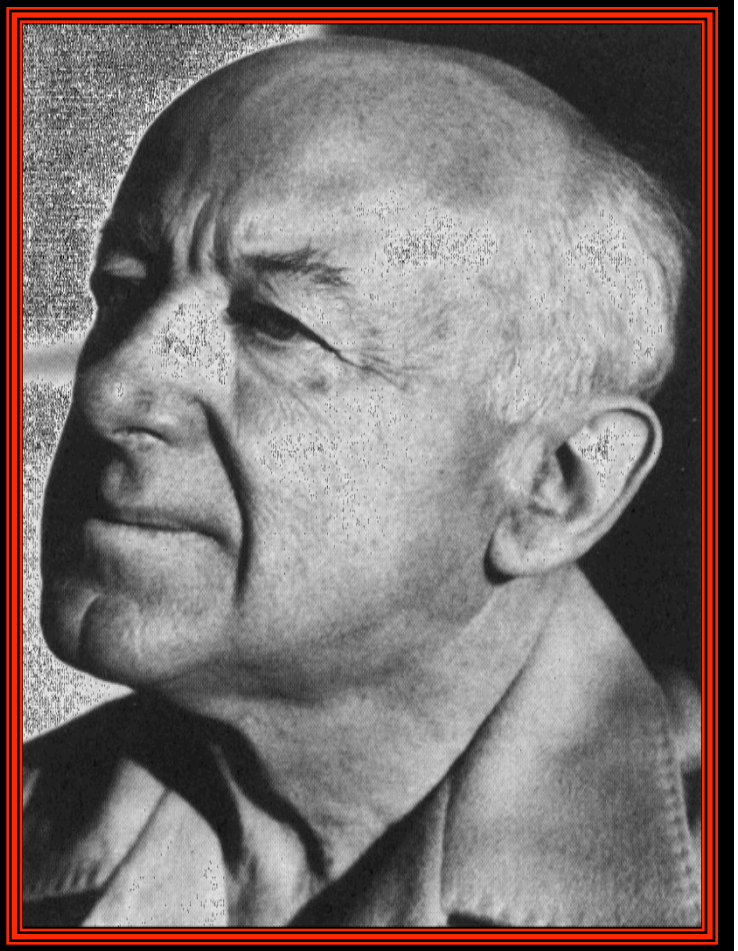
Henry Cowell
(1897-1965)



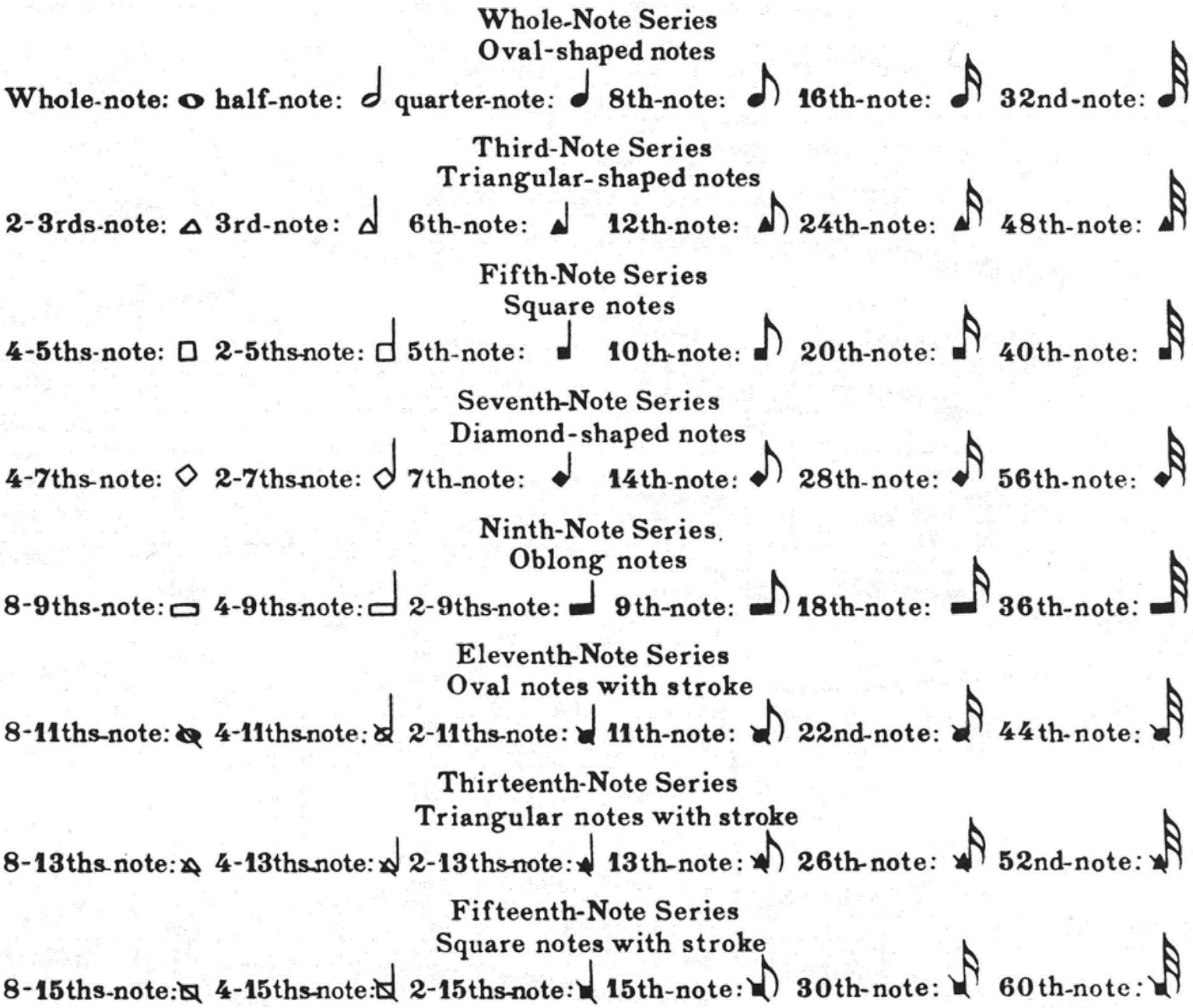
Background

- Born and raised in Northern California.
- Irish heritage has an important influence—both musical and extra-musical—on his composition.
- Self-taught musician who composed and performed his first solo piano works as a teenager
- Proposed a number of rhythmic, timbral, and harmonic innovations including inside piano techniques and tone clusters.
- A key figure among a group of "ultra-modernist" American (and international) composers in the 1920s and 1930s.
- Influential to many composers, including Béla Bartók, Conlon Nancarrow, and John Cage.
- Organized New Music Society (1925); co-founded Pan-American Association of Composers (1928); published *New Musical Resources* (1930).
- His music turned strikingly conservative beginning in the 1940s.

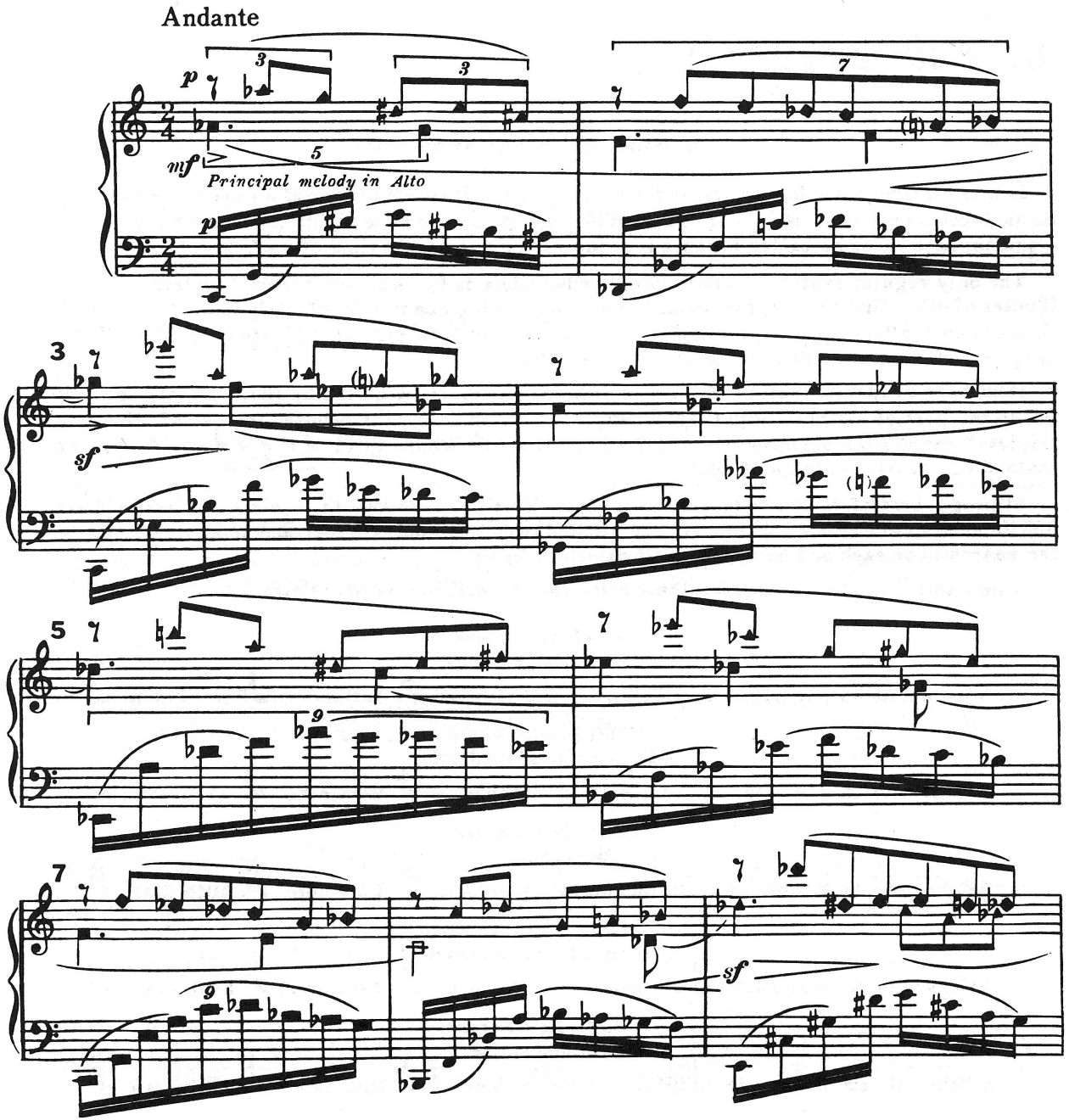
Henry Cowell
(1897-1965)



Henry Cowell: Proposed Rhythmic Notation (1930)



Henry Cowell: *Fabric* (c.1917)



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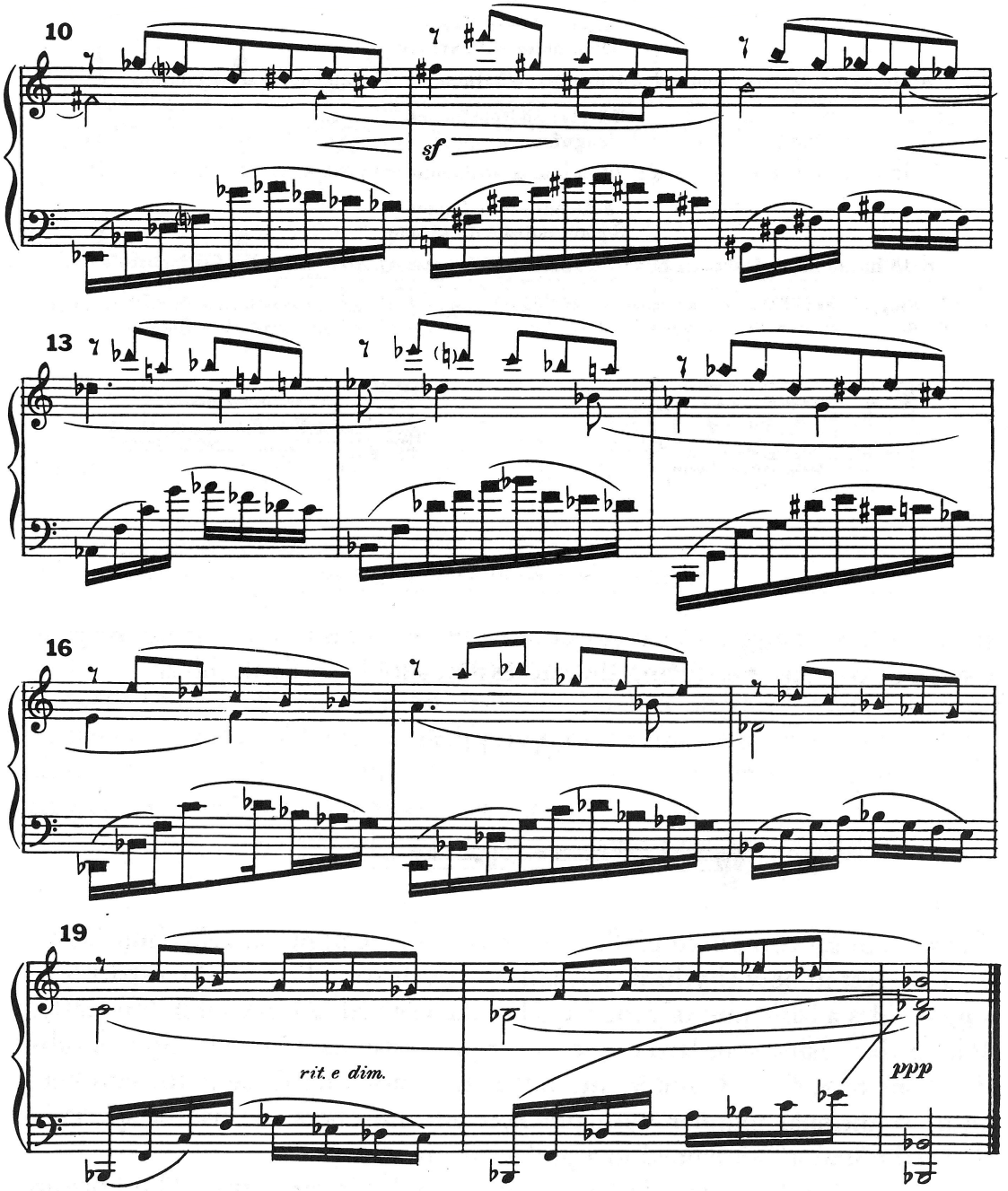
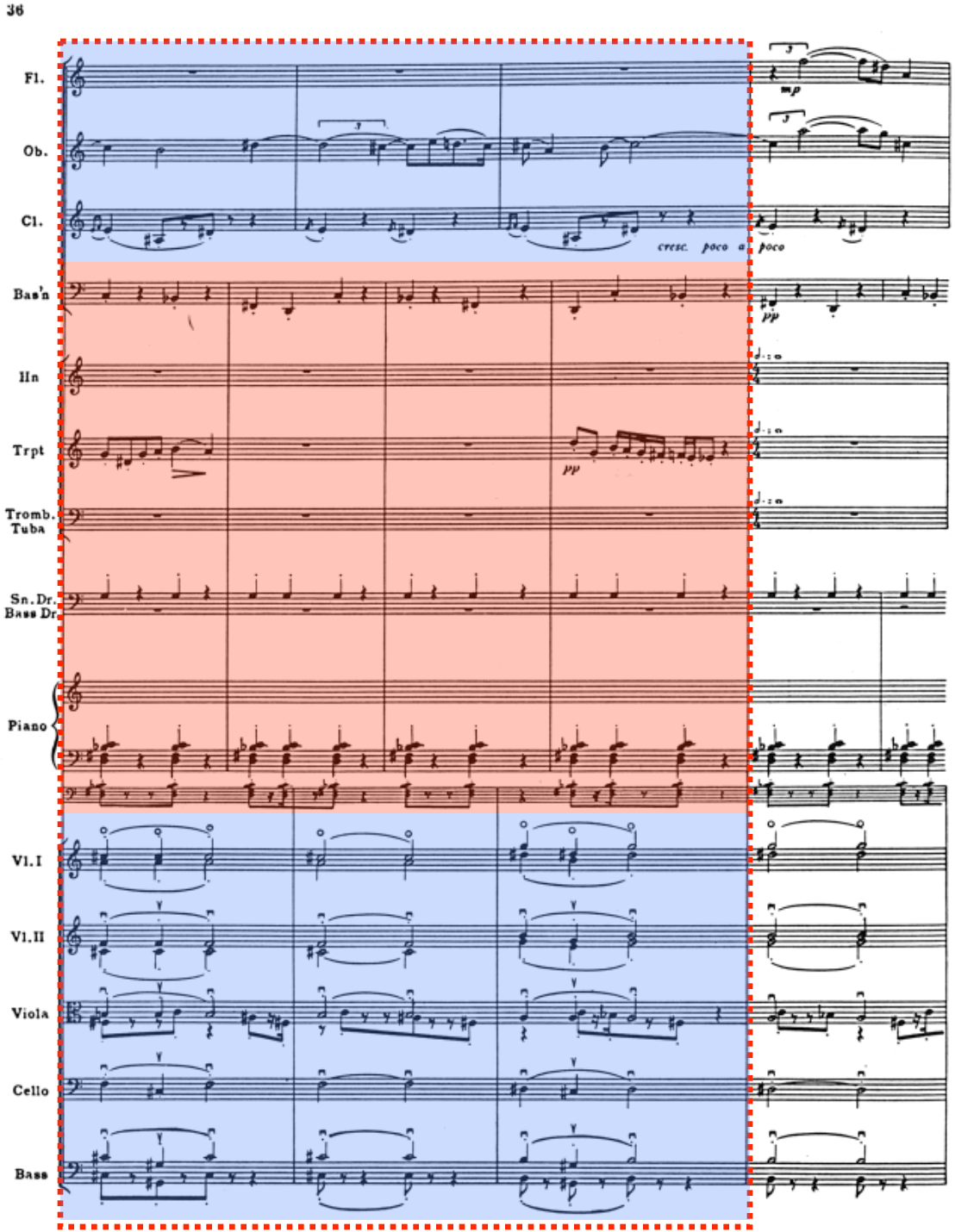
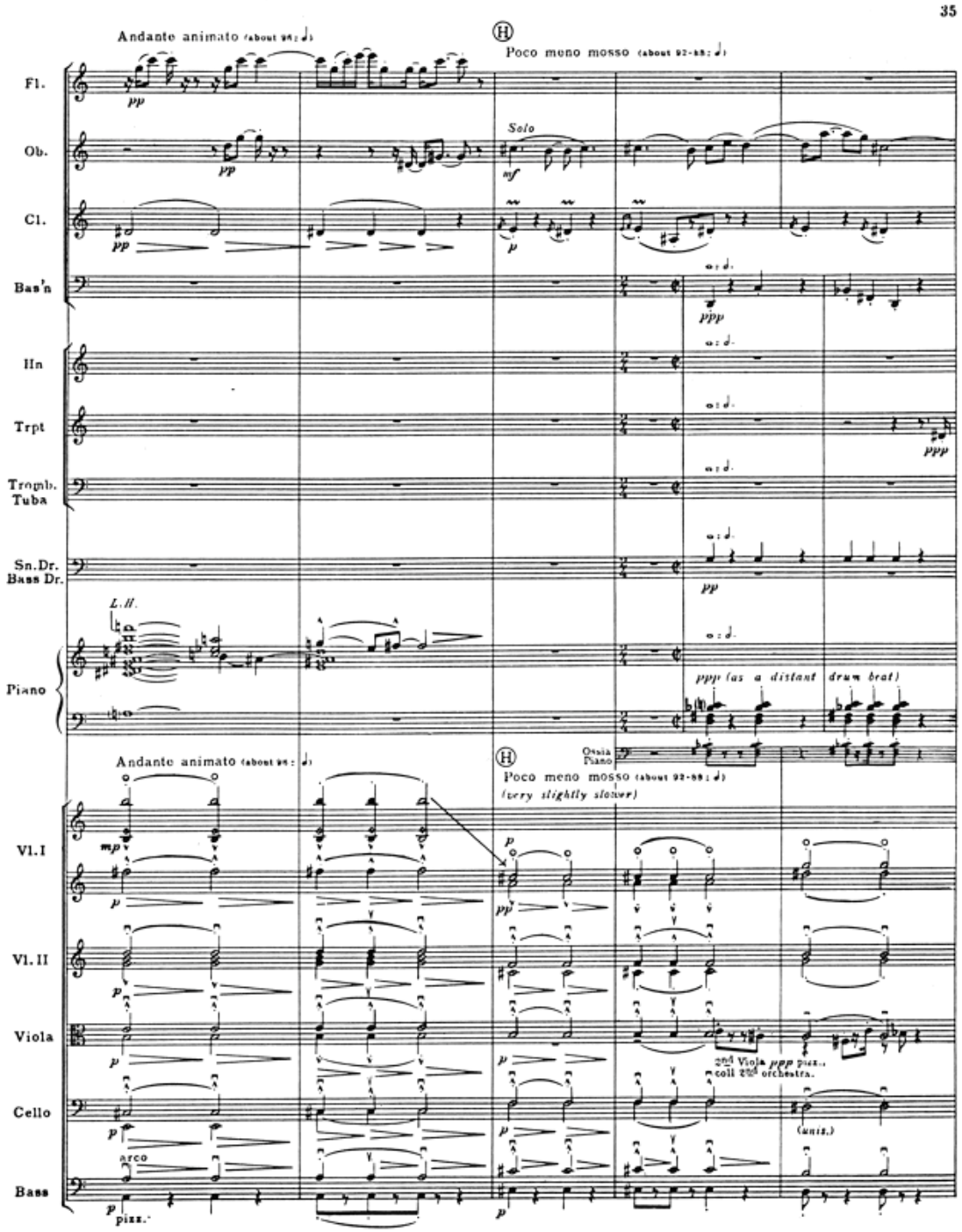




Charles Ives:
Three Places in New England
(1903-14)

II. “Putnam’s Camp”

4:3 polytempo
(MM 120 against MM 90)



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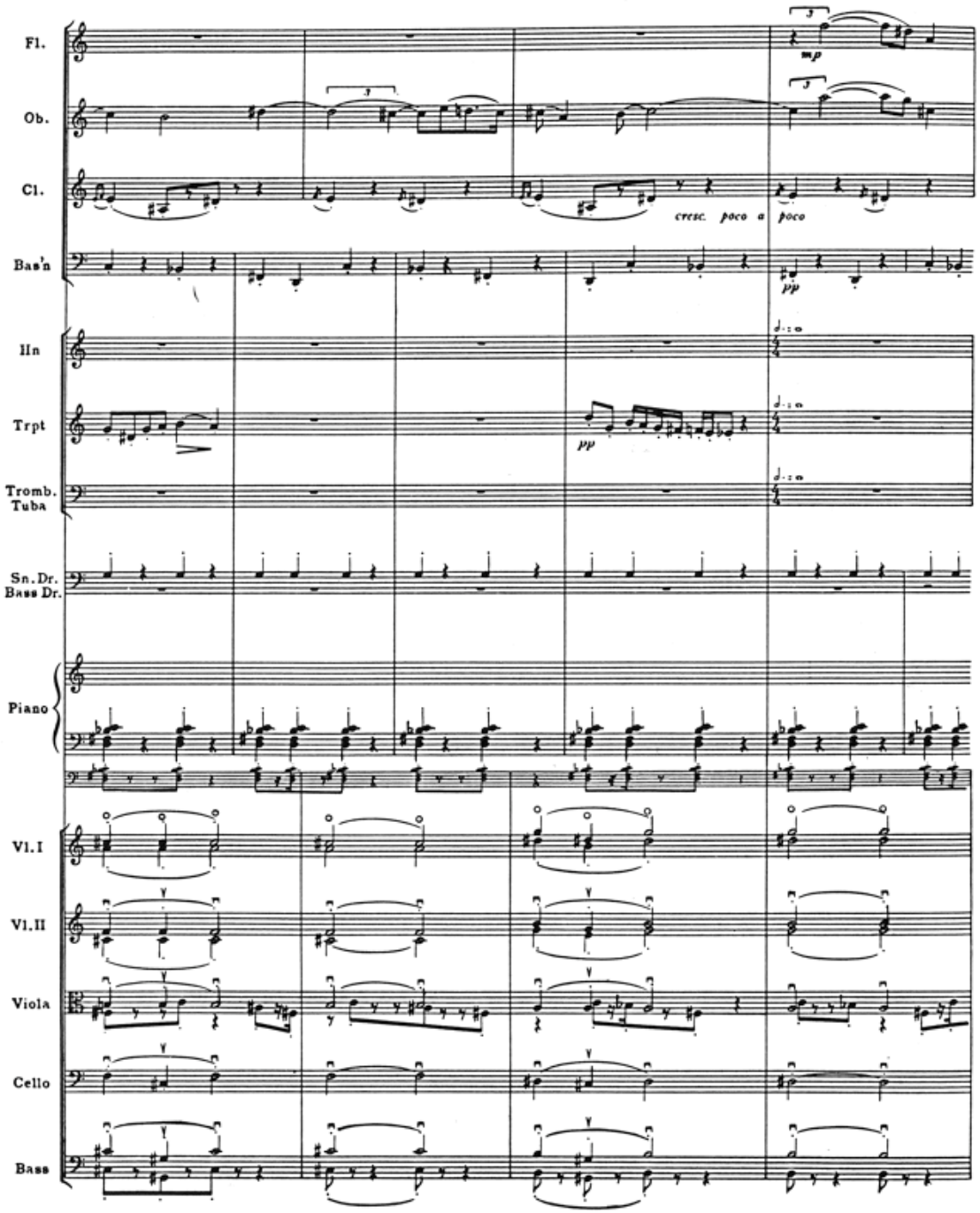

Charles Ives:
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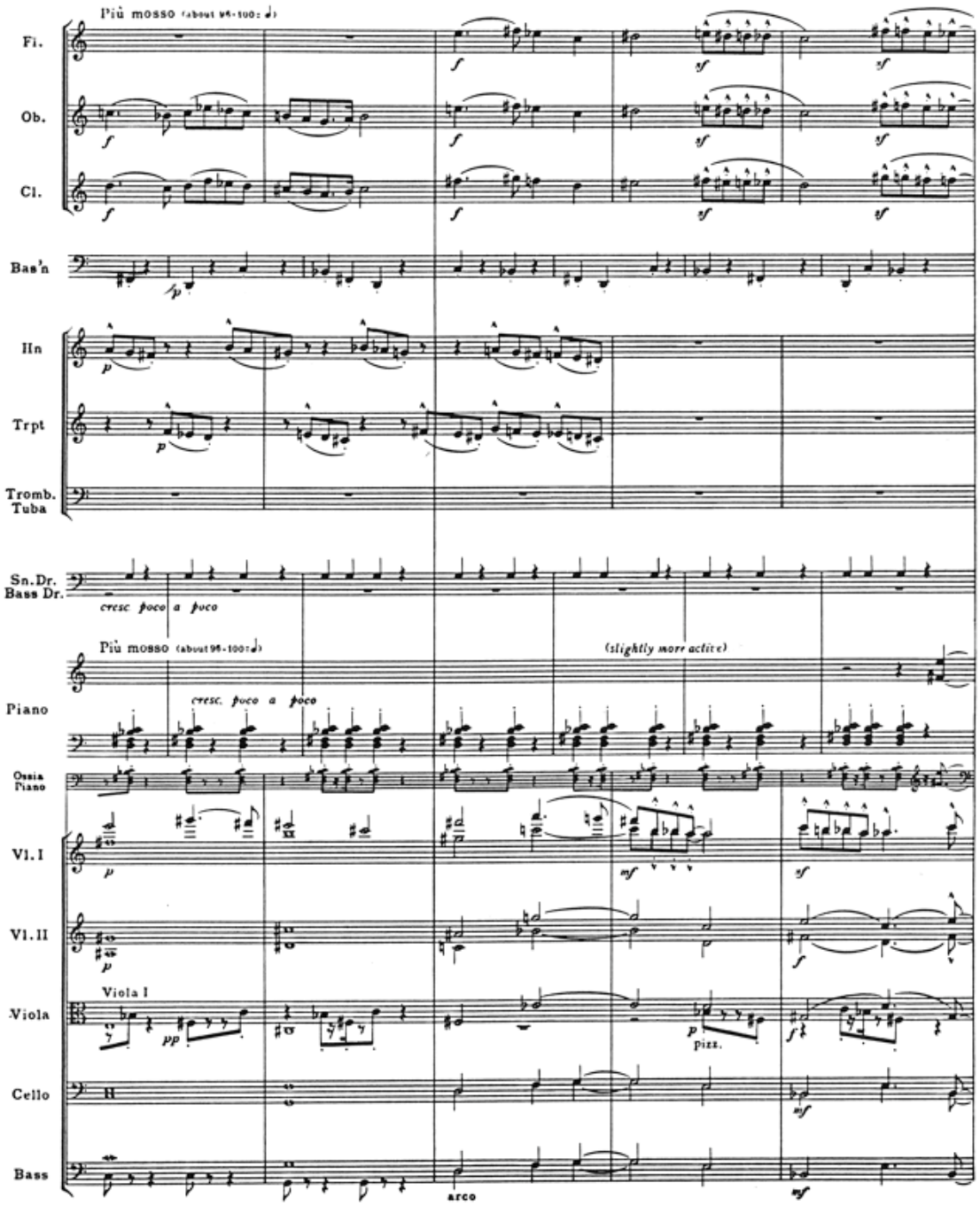


Charles Ives:
Three Places in New England
(1903-14)

II. “Putnam’s Camp”

Elliott Carter (b. 1908)

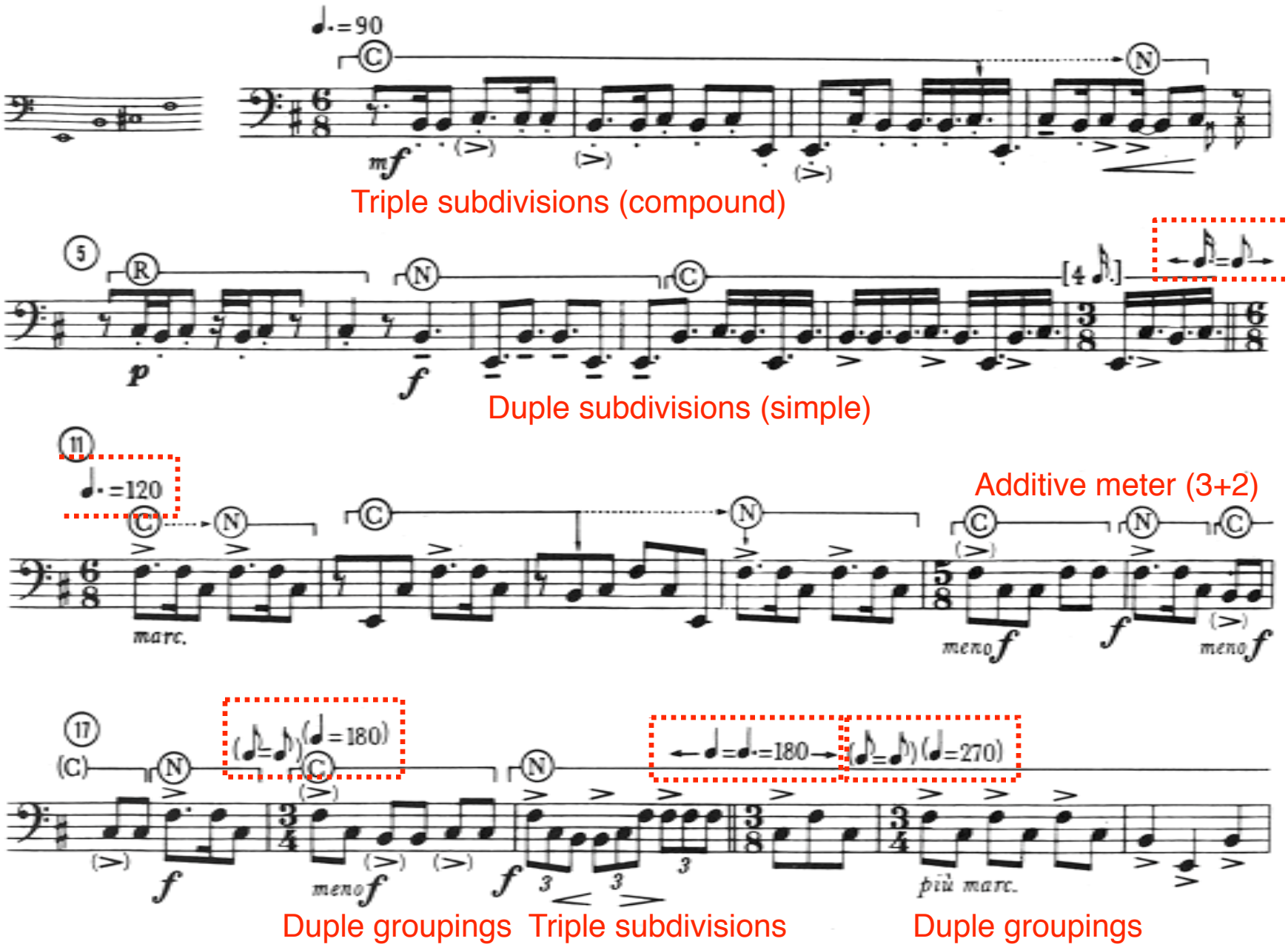
Background

- Born in New York City; as a teenager was encouraged to pursue music by Charles Ives.
- Studied English literature and music at Harvard University; further composition studies with Nadia Boulanger (1932-35).
- Early works influenced by the neoclassicism of Stravinsky and Hindemith.
- Abandoned diatonicism and populist musical aesthetic in the late 1940s, adopting an atonal and more rhythmically sophisticated language.
- Pioneered a technique known as “metric modulation” in the early 1950s.

Elliott Carter (b. 1908)

- Music is characterized by complex and contrapuntally rich textures comprised of multiple polyrhythmic strands.
- Organic use of pitch material, based on pitch-class sets and interval classes.
- Instruments often treated as “characters” within a dramatic construct.
- Two-time recipient of the Pulitzer Prize in Music (1960, 1973)

Elliott Carter: “Canaries,” from *Eight Pieces for Timpani* (1966)



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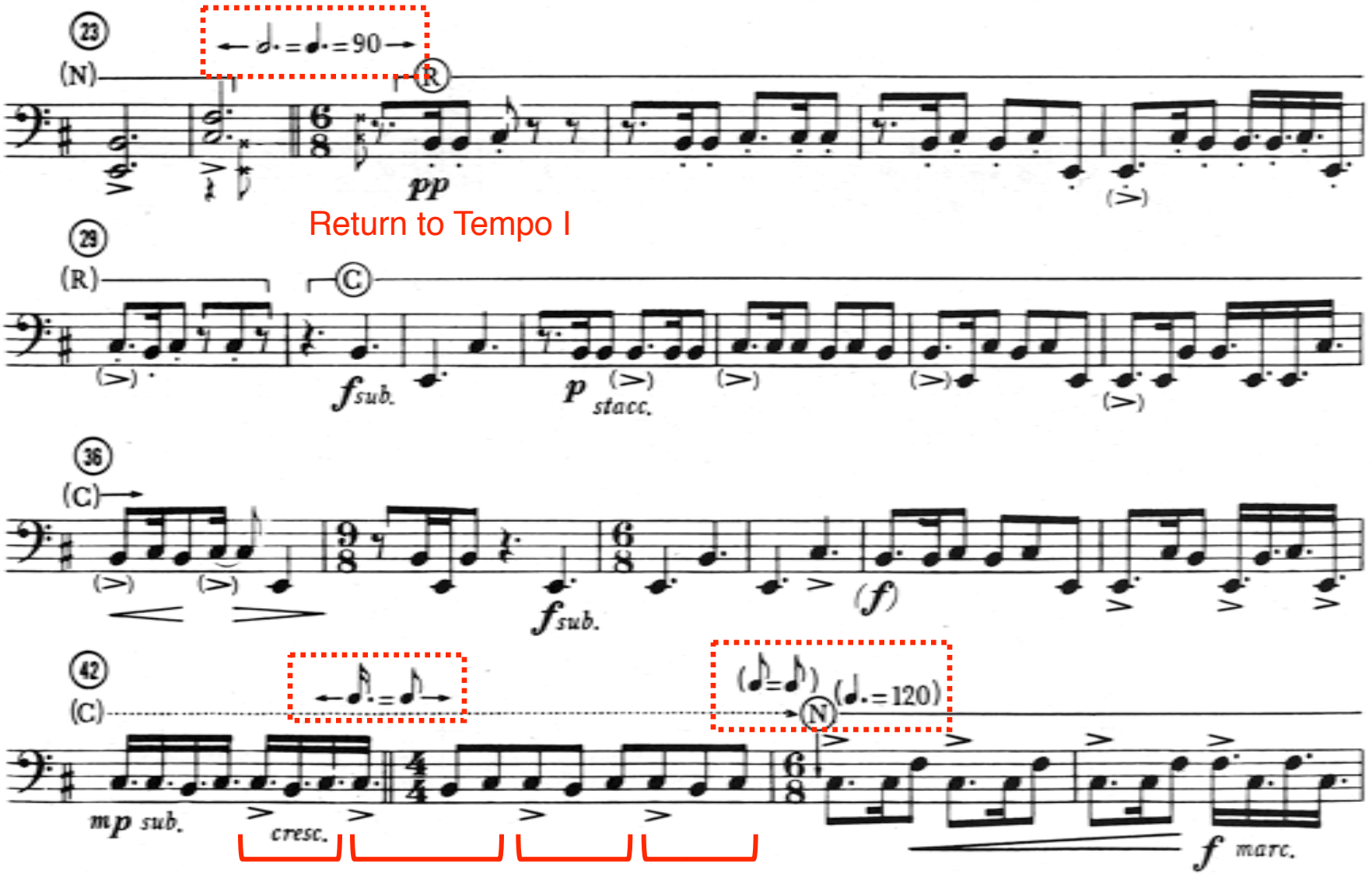

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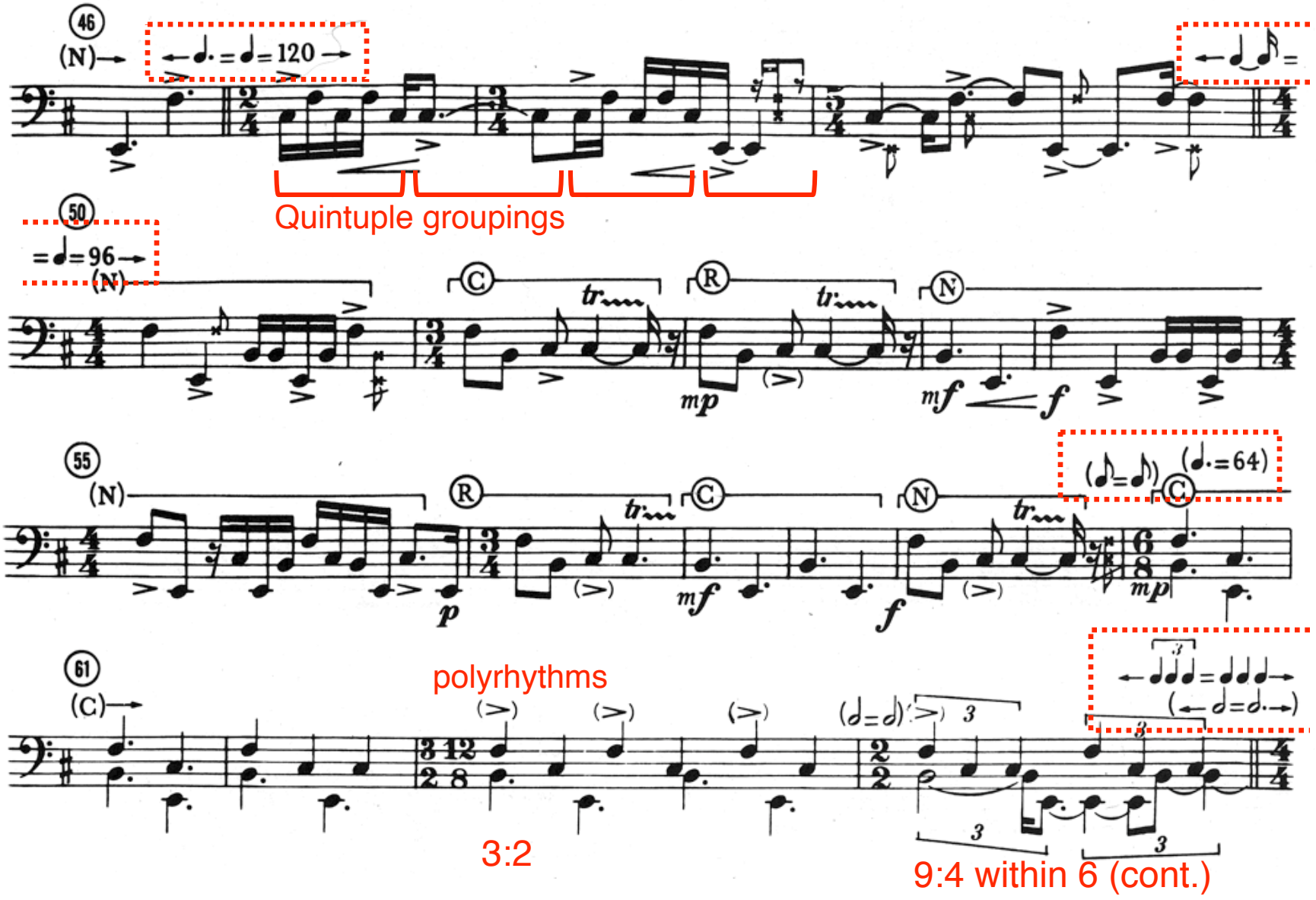
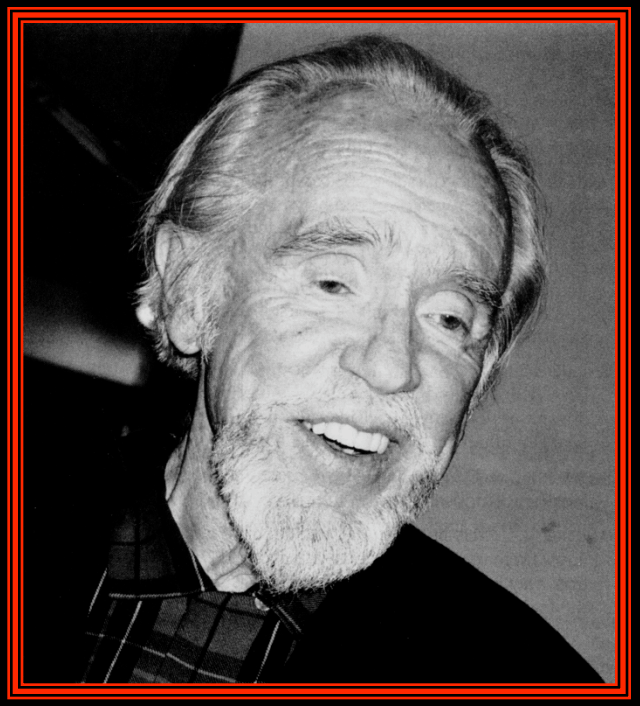
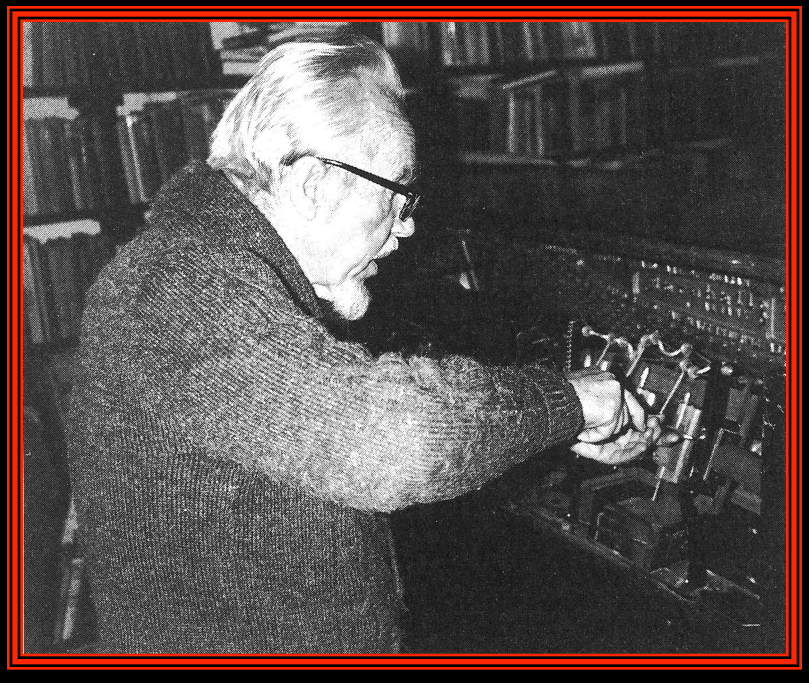
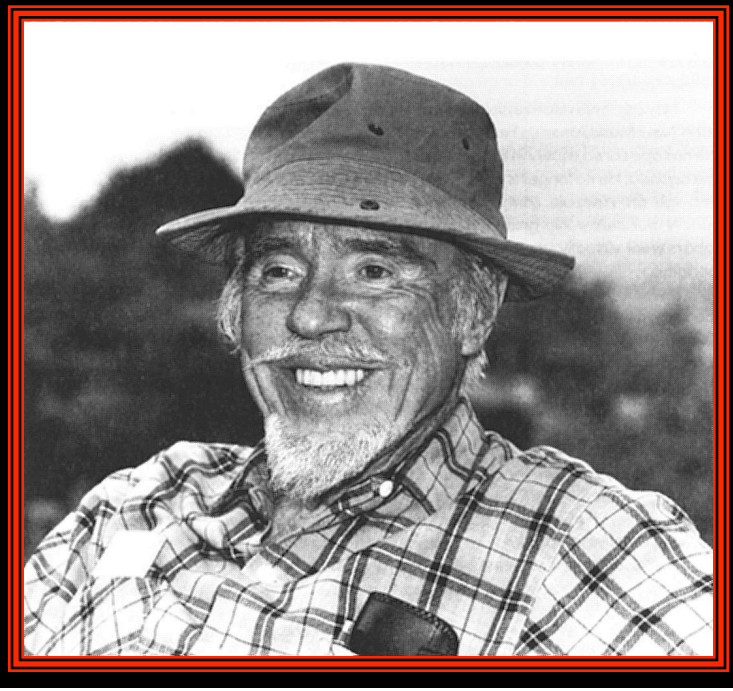




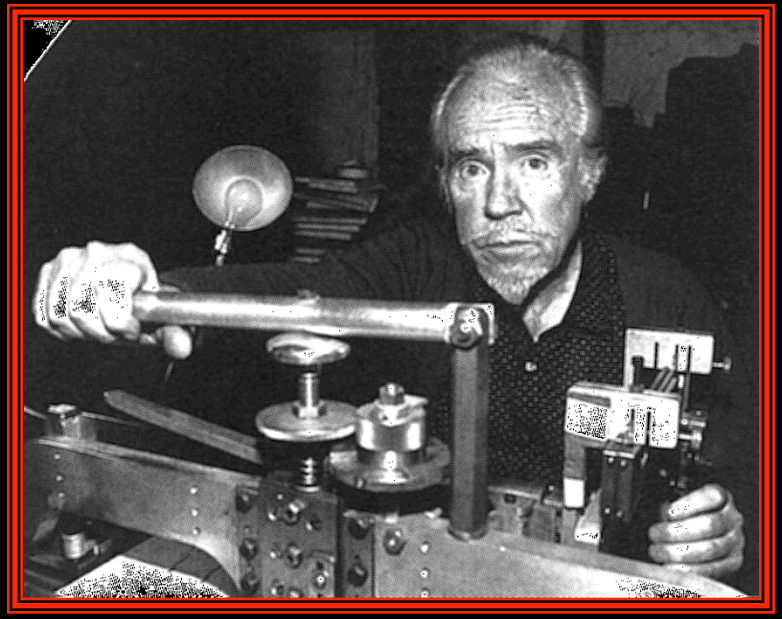
Conlon Nancarrow (1912-1997)



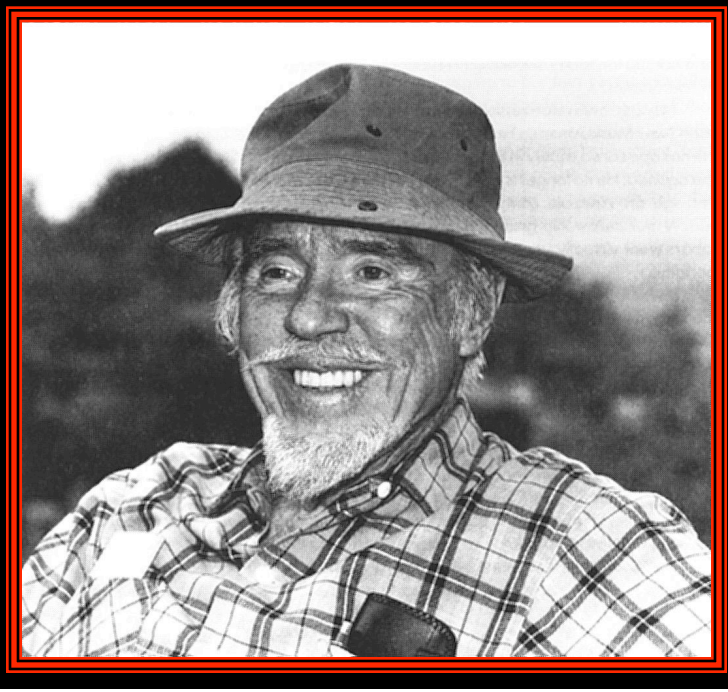


Background

- Born in Texarkana, Arkansas.
- Played jazz trumpet in his youth; later studied composition in Cincinnati and Boston with Walter Piston, Roger Sessions, and Nicolas Slonimsky.
- Joined Communist Party; fought with the Abraham Lincoln Brigade against Francisco Franco in the Spanish Civil War (1937-39).
- Moved to Mexico City in 1940 to avoid persecution for his Communist affiliation; lived there for the remainder of his life.
- Technical demands of early works yielded unsatisfactory results in performance, forcing him to seek alternative solutions.
- Adopted player piano after reading Cowell's *New Musical Resources*.
- Composed in relative obscurity until being "discovered" in the late 1970s, prompting international dissemination of his work.



Conlon Nancarrow (1912-1997)



Musical characteristics

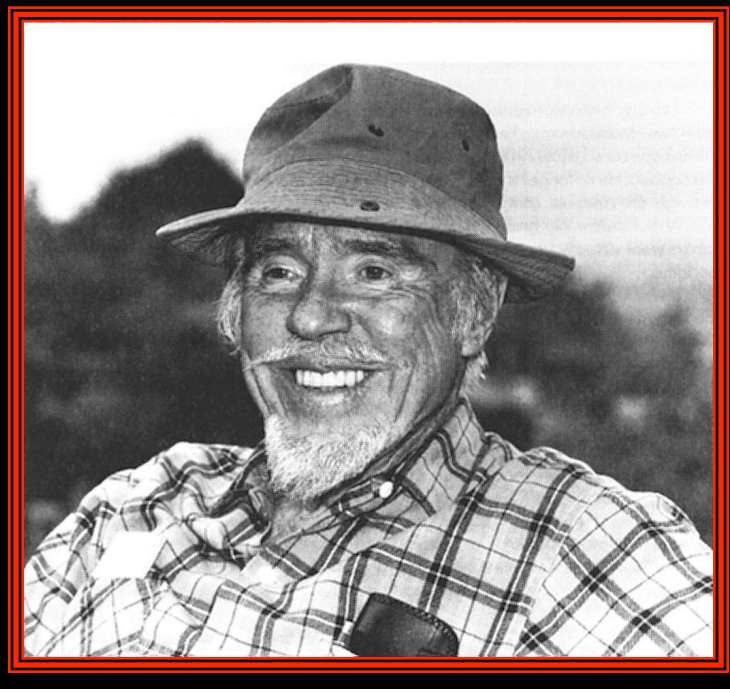
- Harmonic and rhythmic language reflects a distinct jazz influence (particularly in his early works), reminiscent of Art Tatum.
- Explored complex temporal relationships through canonic studies; “temporal dissonance.”
- His works successfully combine mathematical elegance with musical expressiveness and unabashed humor.
- Examples of unusual proportional relationships in Nancarrow’s Studies:

No 34: $\frac{9}{4/\ 5/\ 6} / \frac{10}{4/\ 5/\ 6} / \frac{11}{4/\ 5/\ 6}$

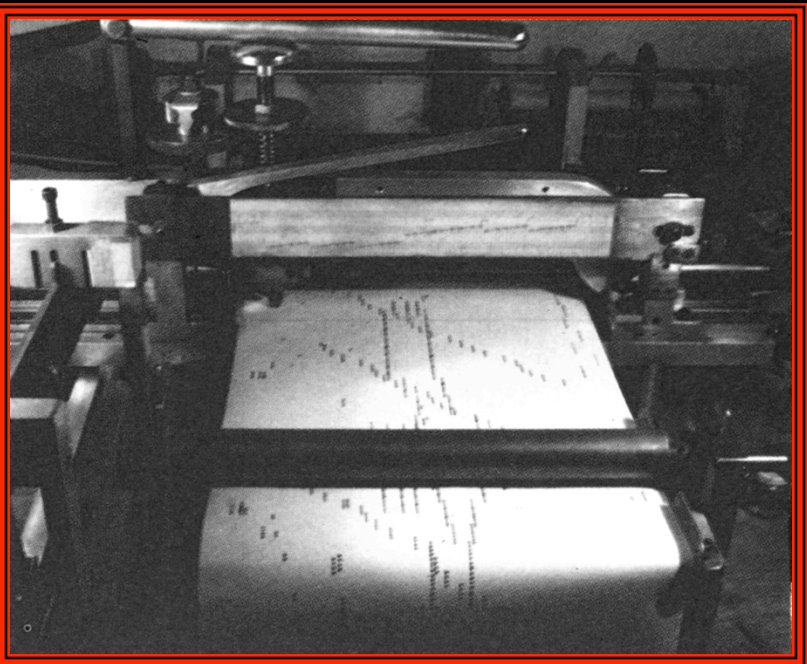
No 27: 5% / 6% / 8% / 11%

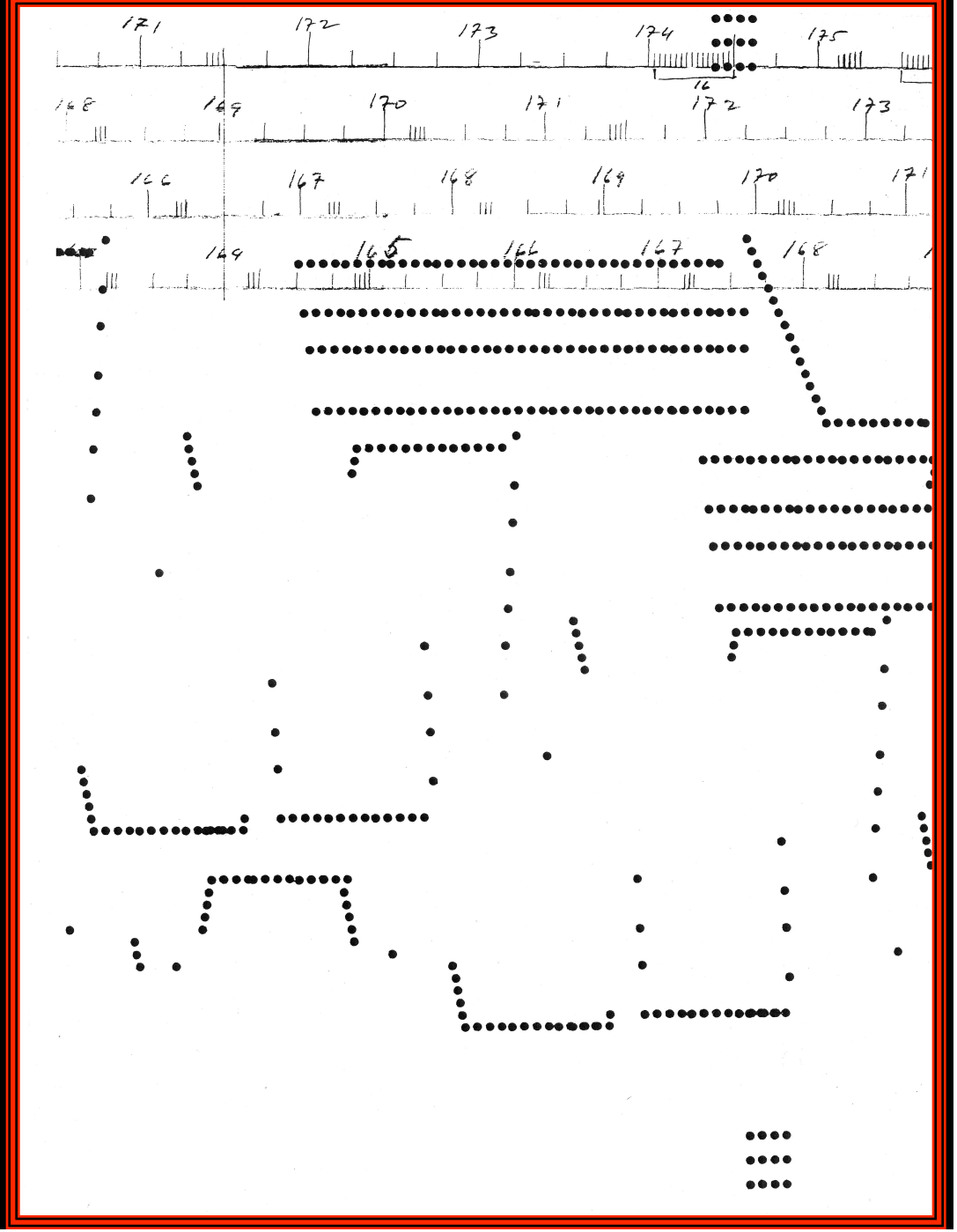
No 33: $\frac{\sqrt{2} \times (\sqrt{2} / 2)}{2 \times (\sqrt{2} / 2)}$

Conlon Nancarrow (1912-1997)

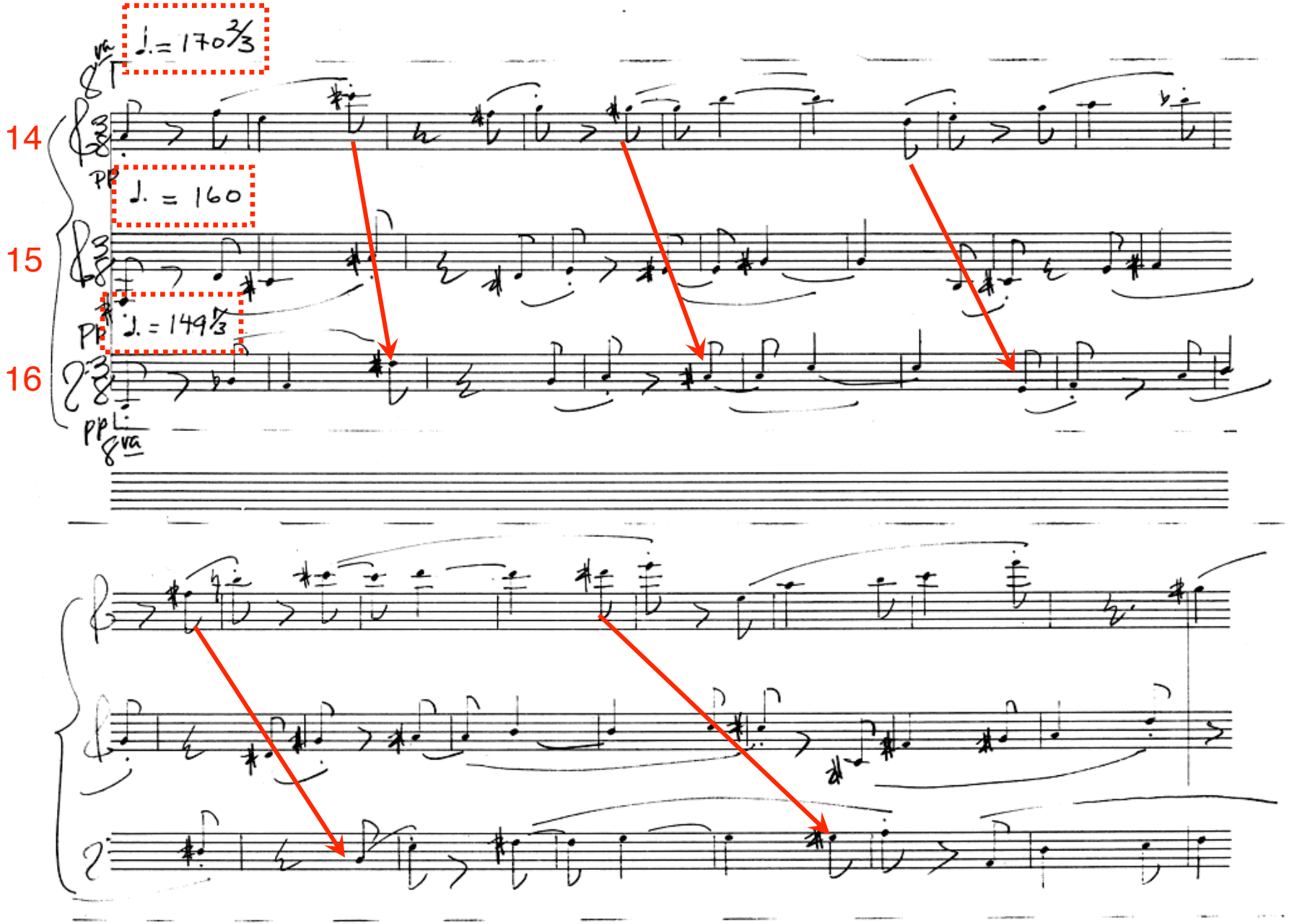


Piano roll punching machine (below) and sample portion of roll (right).





Conlon Nancarrow: *Player Piano Study No. 24* (1948-60)



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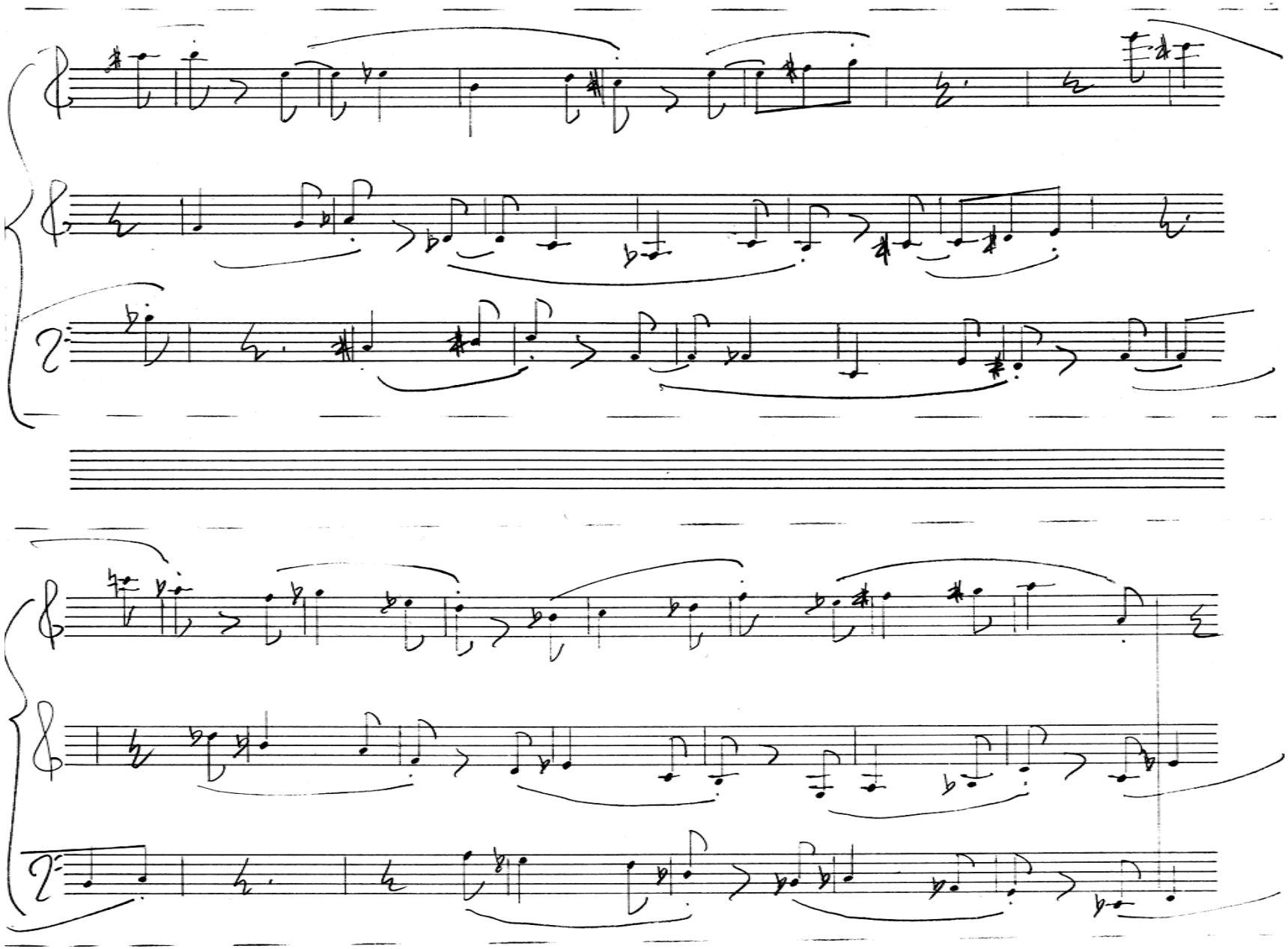

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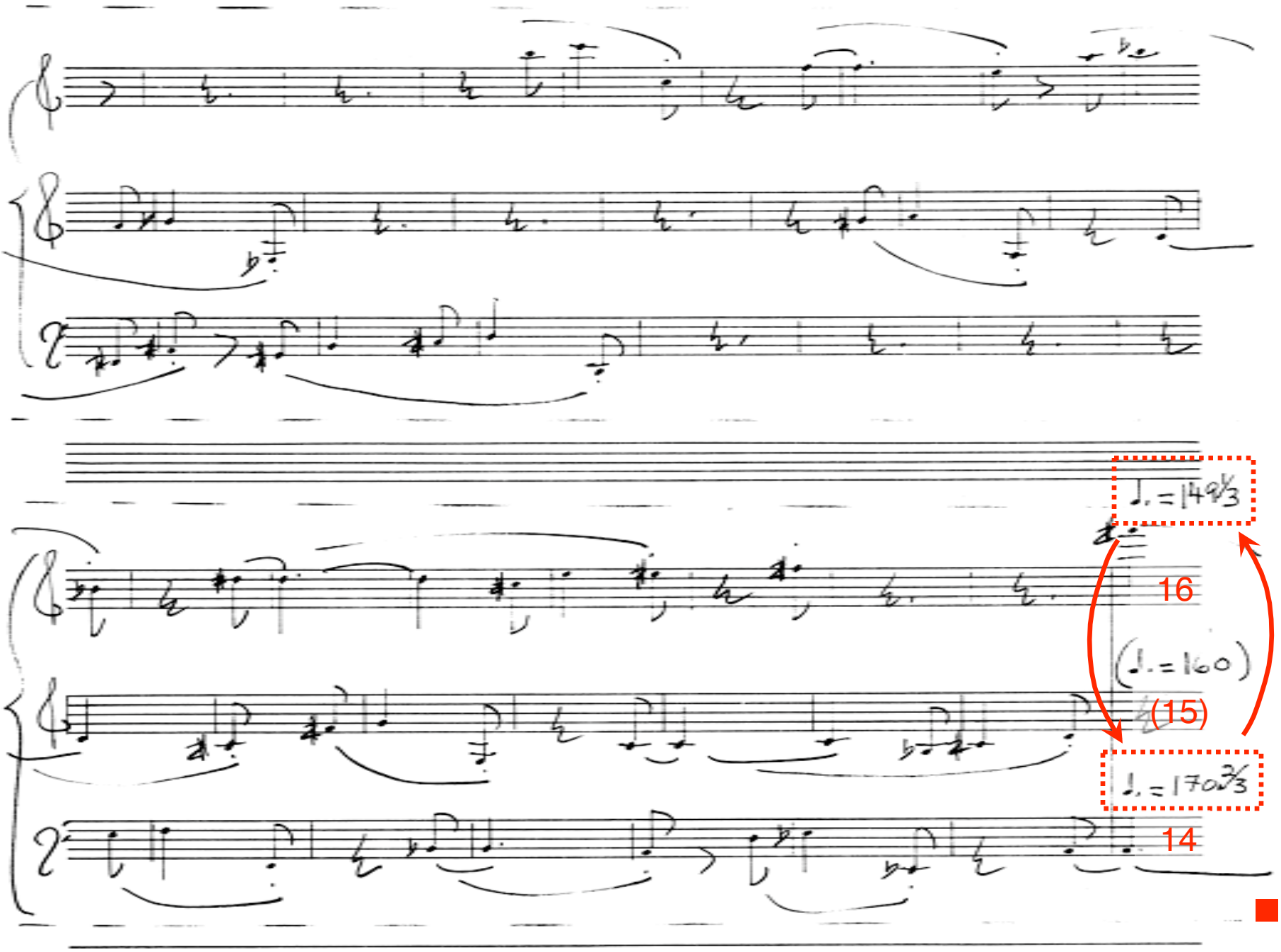
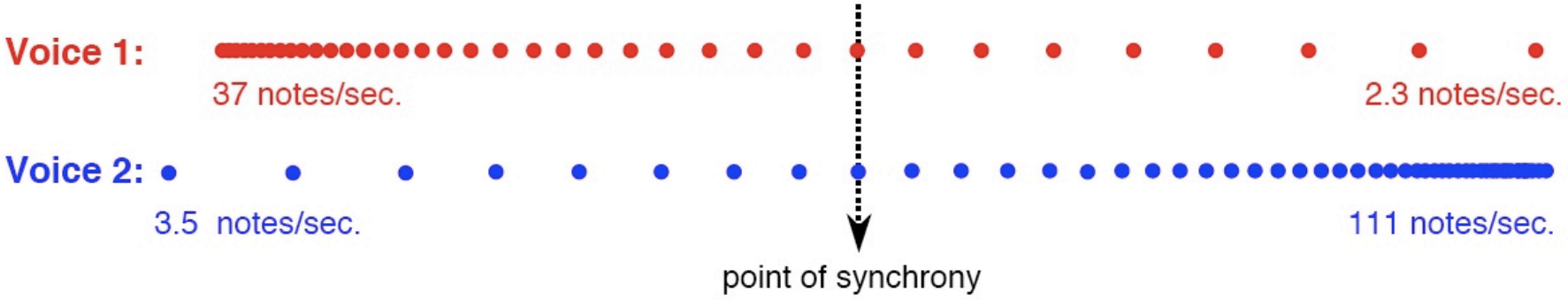
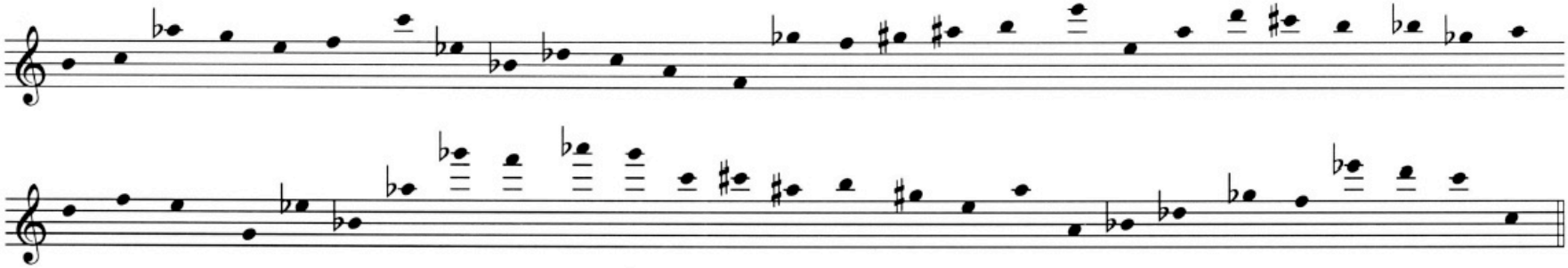


Conlon Nancarrow: *Player Piano Study No. 21* — "Canon X" (1948-60)
Analysis

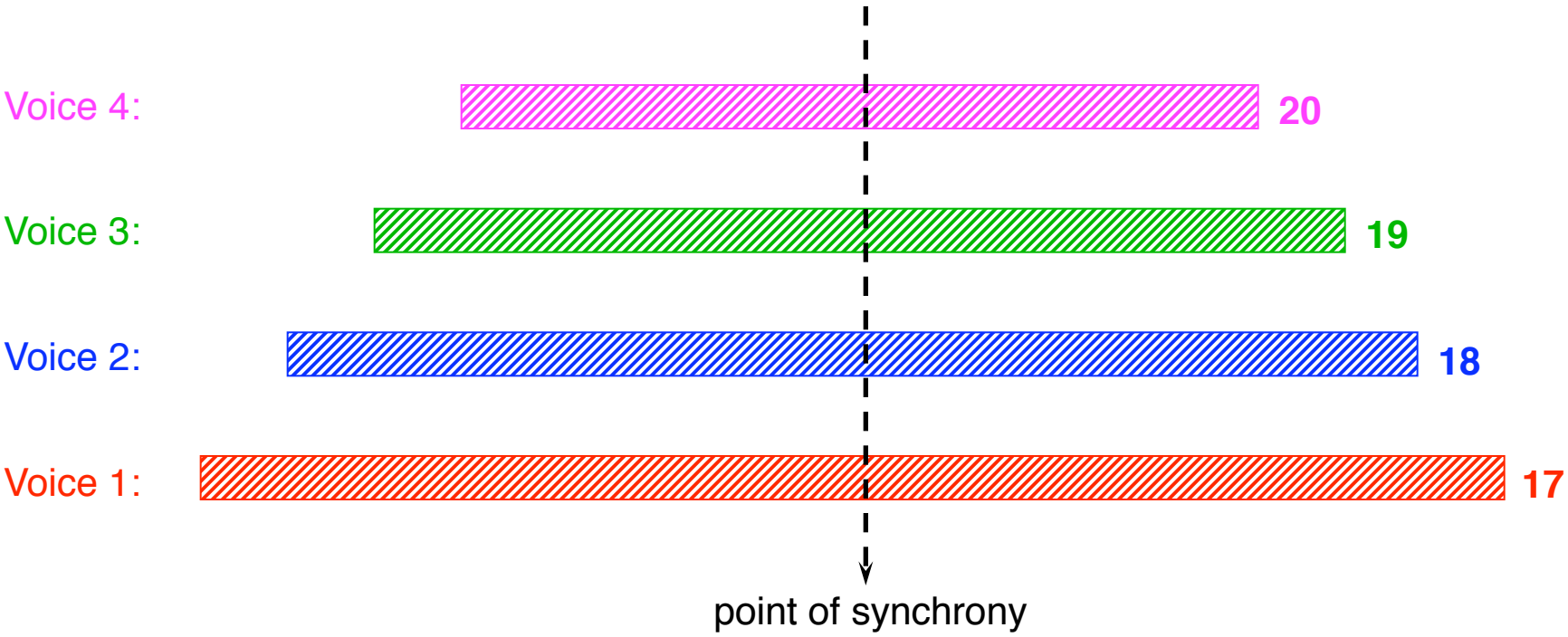


- *Rate* of tempo change is a function of the tempo.
- Each voice is based on a melodic cycle of 54 notes:

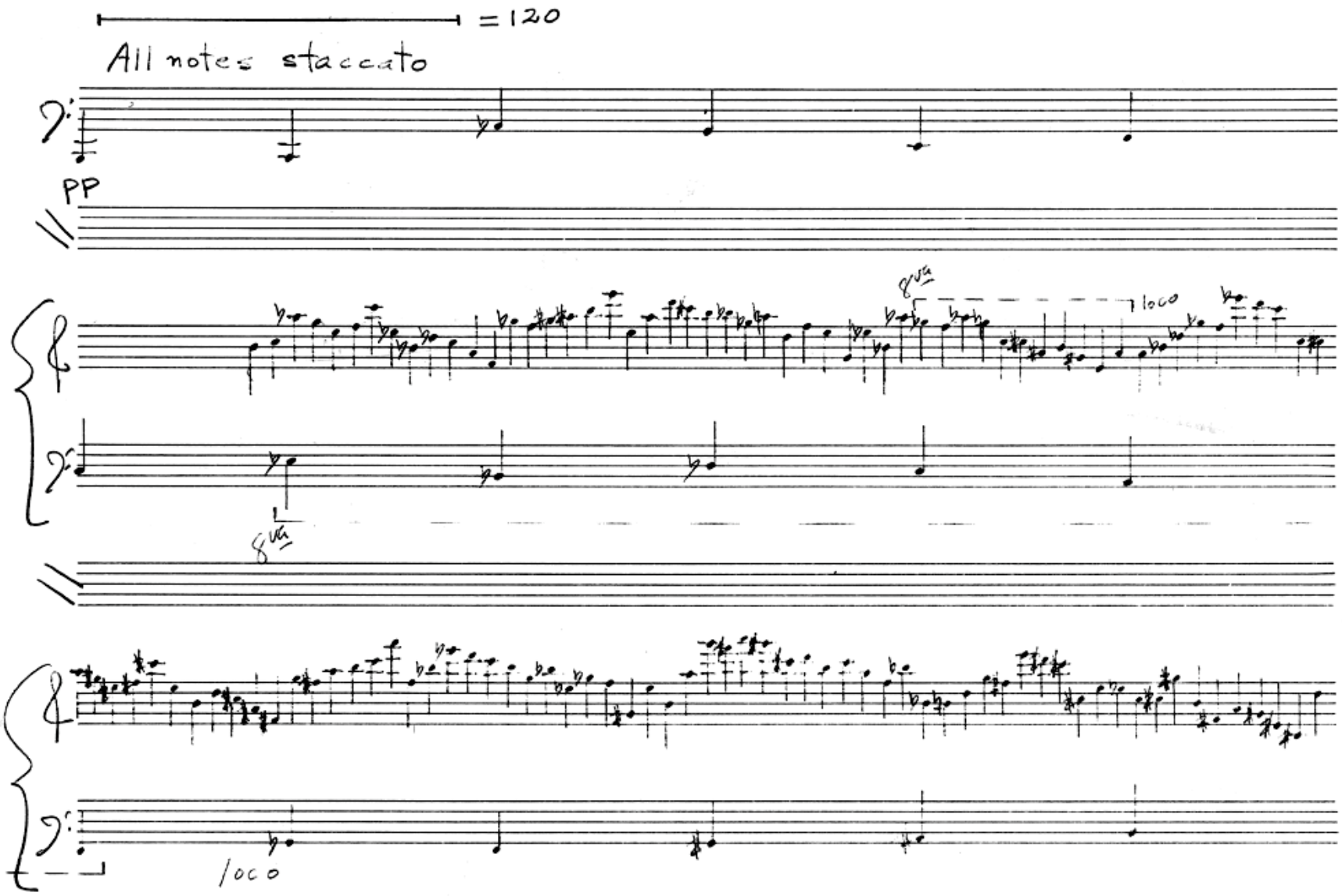
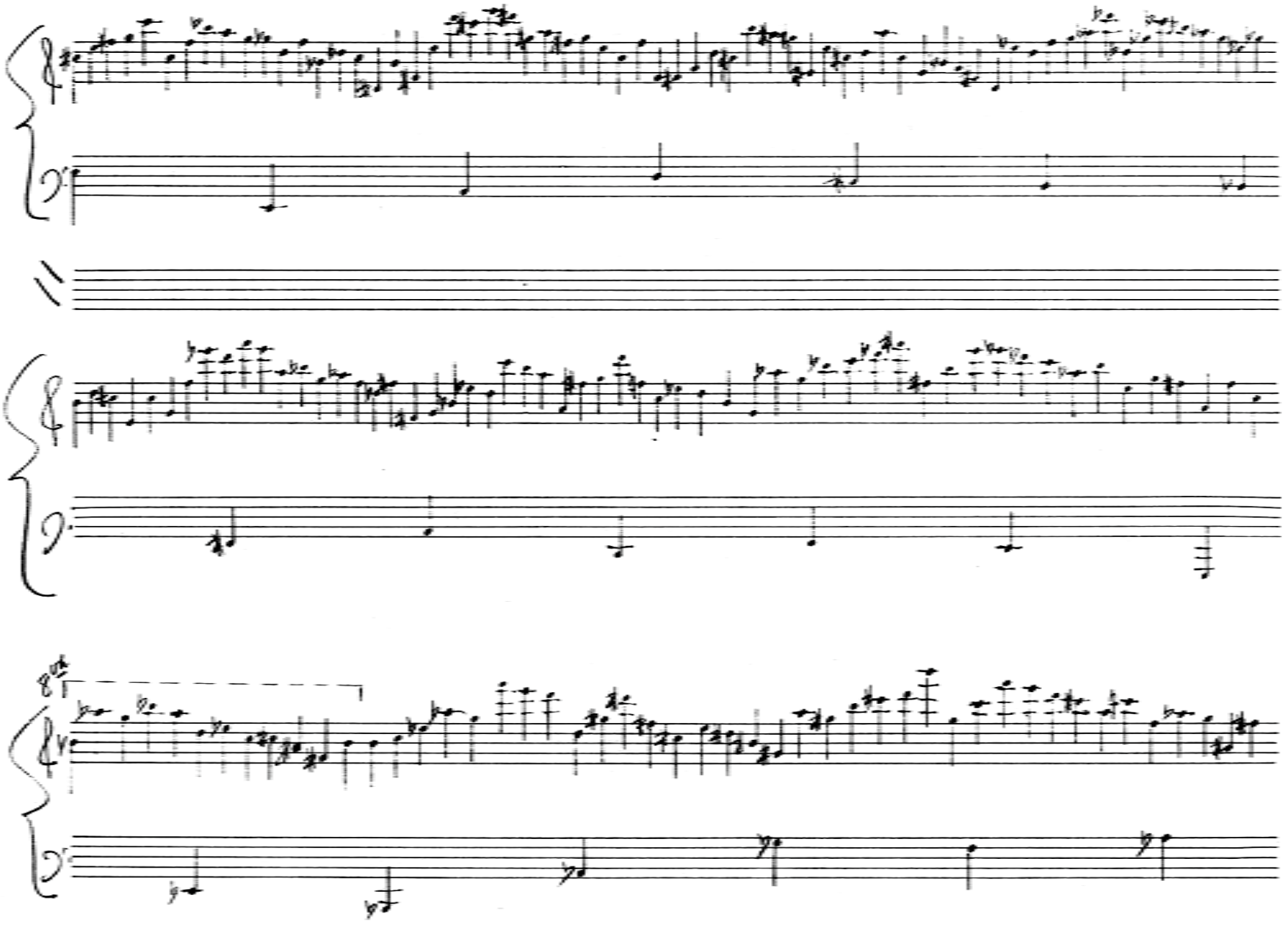


- Initial tone of melodic cycle is omitted with each pass (e.g., 54, 53, 52,…3, 2, 1).
- Series is transposed with each pass according to a separate four-and-a-half twelve-tone sets (=54 notes).
- Harmonic language evolving toward "pantonality."
- Last study to utilize incremental hole-punching mechanism.

Conlon Nancarrow: *Player Piano Study No. 36* (1965-77)
Analysis



Conlon Nancarrow: *Player Piano Study No. 21* — “Canon X” (1948-60)



Conlon Nancarrow: *Player Piano Study No. 21* — “Canon X” (1948-60)