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Speed in music

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Chapter 3: Tuplets

3.1 What is a tuplet?

In music practice and theory, and within this dissertation's broader investigation of speed, tuplets are a primary means of articulating time and subdivision. By examining tuplets, this chapter addresses the regulated dimension of musical time, which in [Chapter 2](#) was contextualized within smooth and striated temporality (Boulez, 1975; Deleuze and Guattari, 1987; Hulse 2016), and embodied, situated perspectives (Phillips, 2022; Haraway, 1988). Striated time is organized by recurring markers or metric grids, whereas smooth time unfolds as a continuous, unmeasured flow. Tuplets exemplify striation by partitioning spans into equal units and inscribing additional grid lines into musical time. Through tuplets, composers and performers take decisions that shape motion, afford or constrain embodiment, and participate in a work's politics of time, which is the way a work's identity is negotiated through a shifting constellation of variables, as outlined in Section 2.5: compositional design and notation, performance practice, instrumental and bodily affordances, acoustical conditions, technologies of timing, and listening conventions.

Throughout this chapter, I examine the definitions of key tuplet types, questions of harmonicity, notational practice, metrical identity, grouping strategies, and rhythm, and I include a section on the experience of tuplets in performance and listening. I also consider speed changes between tuplets and tuplets within tuplets, and I develop performative strategies for timing accuracy and ensemble coordination.

Origins

While striation in the form of a regular pulse was likely present at the beginnings of music, the conceptual roots of tuplets at least predate the modern term by several centuries. In medieval and Renaissance mensural notation, composers already manipulated proportional relationships through *tempus*, *prolatio*, and *color*, creating durational ratios such as *sesquialtera* (3:2) and *dupla* (2:1) that effectively performed the same rhythmic function as modern tuplets (Apel, 1953, pp. 96-195). By the late Baroque and Classical periods, the proportional logic of earlier mensural notation had long given way to modern metrical notation, in which occasional numeric indications above or beside beamed groups served to mark irregular subdivisions within an otherwise regular meter. This practice foreshadowed the fully standardized tuplet notation of the nineteenth century (Read, pp. 74, 214). Here are two examples from C.P.E. Bach's *Sonata V* for keyboard, Wq. 51 (1758-1760).



Example 3.1. Bach, *Sonata V*, Allegro

Yet the word “tuplet” itself is of much later origin, emerging in the twentieth century as a back-formation from the final element of terms such as *triplet*, *quintuplet*, and *sextuplet*. While these individual terms were already established in musical usage, *tuplet* - as a collective reference to all irregular subdivisions - did not become widespread until it entered the vocabulary of digital notation programs in the 1980s. The related expression *n-tuplets*, likely drawn from mathematical notation where *n* signifies a variable integer (as in *n-tuple*), had already appeared in a 1980 [video](#) demonstrating the *Mockingbird* music-notation system at

²⁴ C. P. E. Bach describes in his *Versuch über die wahre Art das Clavier zu spielen* (1749/1753–1762, p. 160) that the 18th-century convention when a written sixteenth note appears in a passage of triplet eighths, the sixteenth is assimilated to the triplet so that it aligns with the third note of the triplet group, rather than being realized as a literal two-against-three. For a detailed account of later 19th-century “impossible rhythms” created with tuplet notations, as well as practical performance solutions, see Julian Hook’s article “[How to Perform Impossible Rhythms](#)” (Hook, 2011).

Xerox PARC.²⁵ When Coda Music's *Finale* was released a few years later, its interface adopted the simpler "Triplet tool," omitting the *n* and thereby helping to canonize the modern term within the lexicon of digital notation (Coda Music Technology, 1988; mu:zines, 1989).

What is a tuplet?

A tuplet is a group of evenly spaced divisions within a specified duration of time. This duration may be a single pulse or a shorter or a longer span. Tuplets are traditionally understood as a way of creating faster or slower subdivisions that differ from those implied by the time signature:



While musical practice and software notation programs consider tuplets as exceptions, notes defined solely by the meter also move at a particular speed. For that reason, it is useful for the general concept of speed in music to broaden the definition of a tuplet to include divisions inherent to the current meter, such as four sixteenths in 3/4, or three eighths in 9/8:



Example 3.2. Examples of tuplet and meter-based subdivisions

These are also tuplets, but since they fall within the meter they typically don't need an extra tuplet notation.

To help understand this point, consider the structural and ornamental use of tuplets in a section of my work *Rickshaw Zip*, for piccolo and piano (2015). The rhythmic phrasing in the piccolo part between letter H to I consists of 16th notes with syncopations, with a slowing down via tuplets (32nds, sextuplets, quadruplets, triplets, duplets) during the last five beats. The last beat containing two eighth notes (bar 32) forms a grouping of two which is continued through the shift to triplets at letter I: triplets in groups of two.

²⁵ A manual for *Mockingbird* from 1982 lists "Beams and N-tuplets" among its engraving functions (Maxwell, 1982).

16th notes with irregular groupings (syncopations)

28

30

32 **slowing down via triplets** **I** triplets in groups of two *mp*

35 **triplets in groups of three** **J** 16th notes with irregular groupings (syncopations) *cresc.* *f*

Example 3.3. *Rickshaw Zip*, score excerpt

The last bar of letter I (bar 36) shifts to triplets in groups of three, emphasizing the beat in order to shift back to 16th note material at letter J, similar to H, except with a more ornamental use of triplets.

At letter K the music makes another structural shift to quintuplets, creating a floating character. This begins with quintuplets in groups of five - aligning to the beat - and later shifts to groups of two, providing a sharp quickening in accents to lead to the climactic end of the section (bar 45).

ornamental triplets

K quintuplets (in groups of five)

quintuplets in groups of two

L *l'istesso tempo*

Example 3.4. *Rickshaw Zip*, score excerpt

Across these examples, metrically determined articulations are as consequential for expression and form as explicitly notated tuplets. What matters for the musical argument is the speed of subdivision and the resulting event density, rather than artifacts of notational convention. In this chapter, I use the term “event” to refer to any sounding onset in the rhythmic grid, whether pitched or unpitched, rather than only traditionally notated “notes.” Therefore, all “evenly spaced divisions within a specified duration of time” include speeds inherent to the meter, and I extend the term tuplet to include them.

While different tuplets represent different rates of notes, each subdivision also carries a distinctive character that extends beyond metronomic speed. Altering the rate by shifting from one subdivision level to another may at times produce the impression of acceleration or deceleration, as in bars 31 and 32. At other times, when the new tuplet is sustained for some time, it can structurally change the rhythmic identity of the entire passage. A shift such as moving from eighth notes to triplet eighths in groups of two, or from four sixteenths to five quintuplets, does more than alter note density; it reshapes accent patterns, symmetry, and the overall rhythmic character. In this sense, a tuplet change both modifies speed and reconfigures the rhythmic identity, shaped by a range of parameters that will be discussed in the following section.

Even and odd tuplets

The uniqueness of a tuplet is based on several parameters, starting with whether the number of divisions is even or odd. The even-numbered tuplets of two, four and eight, all have a square, marching-like character, divisible by two. This binary quality is likely inherently comfortable for humans due to our experiences walking with two legs. In addition, instruments that produce notes through alternating motion, such as the guitar, typically played by strumming, and bowed string instruments, played by bowing, make this distinction especially evident.

Odd-numbered subdivisions, in contrast, cannot be split into two equal halves. There is no natural midpoint to anchor a secondary accent. These odd tuplets therefore have a different flow: rather than a “left-right” (or “up and down”) feeling, they create a sense of continuous motion that “rolls” forward into the next beat. For me, odd tuplets have a rounded, propelling character; they seem to *lead* into the following beat without the moment of repose or symmetry that an even split provides.

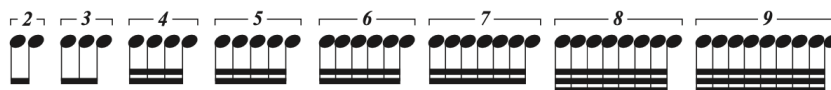
Between these categories are hybrid cases. Six can be felt as 3+3 (square and balanced, like a fast compound duple) or as 2+2+2 (more fluid and round). Nine can be perceived as 3+3+3 (regular and balanced) or as uneven groupings such as 4+5 or 5+4, giving it a more lopsided quality. Because of this flexibility, six and nine can behave as either stable or propelling, depending on interpretation.

Tuplets like four (which can be seen as 2×2), 6 (2×3 or 3×2), 8 (2×4), and nine (3×3) are sometimes termed multiplicative tuplets because their structure can be understood as multiplying smaller even/odd groupings (Barlow, 1980, p. 35). For example, eight has the structure 2×4 (even times an even), and six can be 2×3 (even times odd) or 3×2 (odd times even), etc. This multiplicative view highlights how our perception of these tuplets might combine characteristics: six subdivided as 2×3 feels like a binary framework (two main pulses) each filled with ternary (triplet) subdivisions – a mixture of square at one level and round at another.

Harmonicity and difficulty

Looking at another interpretation of tuplets, composer and music theorist Clarence Barlow developed the *indigestibility function* to measure the harmonicity of numbers and their relative difficulty in harmonic and rhythmic applications. His basic idea was that smaller numbers, or those that factor into small primes, are more “harmonic” and easier, while larger primes are more “indigestible” and more difficult. In rhythm, this means that subdividing a beat into an odd prime number of parts is harder to process than dividing it into factors of two or three. Using a formula that considers both the size of the number and its prime factors, seven (a prime) receives a high indigestibility value, while eight ($2 \times 2 \times 2$) receives a lower value. Although eight is larger, it is built from smaller primes and is therefore easier to “digest.”

The results of Barlow’s indigestibility calculation for numbers two through nine are as follows (a lower value means more harmonic/easier, a higher value means more complex):



Example 3.5. Duplets to nonuplets

- 2 1.0000000
- 3 2.6666667
- 4 2.0000000
- 5 6.4000000
- 6 3.6666667
- 7 10.285714
- 8 3.0000000
- 9 5.3333333

(Barlow, 1980, p. 23; Barlow, 2001, p. 6-13)

Several observations spring out from this list. It suggests, for instance, that three is only slightly “harder” (more indigestible) than eight (3.00 vs 2.67), that nine is less indigestible than five (5.33 vs 6.40), and that seven is much more indigestible than five (10.28 vs 6.40). Although this yields a tidy ordering, embodied effort and conceptual framing can lead to different outcomes. In my experience, a triplet per pulse often proves harder to perform than eight notes because it breaks duple symmetry, while eight aligns with it within a binary frame. More generally, even subdivisions (2, 4, 8, and so on) are easier to internalize than odd subdivisions (3, 5, 7, and so on), because only the even sets provide a symmetric midpoint and support left and right alternation. Moreover, five can be at least as difficult as seven, since both involve irregular groupings that resist even subdivision; I find septuplets more intuitive than quintuplets, since they often include a repeated grouping (2+2+3 or 3+2+2), whereas quintuplets require a constantly changing grouping (2+3 or 3+2). It is important to bear in mind that Clarence Barlow’s indigestibility metric was intended as an objective compositional measure - “All this is part of a composer’s technique” (Barlow, 2001, p. 7) - concerned perhaps with how readily a subdivision can be related by a listener to the unit pulse, rather than a test of performative accuracy.

Until now, these points have been applied to qualities of numbers that fit within a single beat. Composer Richard Barrett observes that indigestibility depends on the full ratio. Both numerator and denominator matter. For example, 6:4 is typically more digestible than 6:5 or 6:7 (Richard Barrett, personal communication, 2025). These ratio-based cases will be discussed [below](#). Speaking as a performer as well as a composer, I experienced that quintuplets and septuplets may feel awkward at first compared with sixteenths or eighths, yet with practice they can become just as natural. The larger point is that practice effaces differences in difficulty, while the structural and expressive possibilities of each number, its accent patterns, smoothness, or asymmetry, remain salient to musical identity. In many musical traditions outside Western Classical practice, such as South Indian Carnatic music or West African drumming, these so-called “indigestible” tuplets are treated as natural and foundational rhythmic units. This underscores that cultural context and familiarity, as much as numerical calculation, determine how digestible a rhythm becomes.

Groupings

Another important aspect of tuplets is how they can be subdivided into smaller groups. Studies in rhythm show that when we hear a rapid stream of evenly spaced sounds with no accents, our brains tend to impose groupings, a phenomenon called *subjective accentuation* (Bolton, 1894; Vos, 1973; Large, 2008). Typically, sequences are heard in twos, threes or fours. This means that in long runs of notes, performers and listeners often perceive subdivisions even when none are marked.

In tuplets, these groupings emerge clearly. Quintuplets are commonly heard as 2+3 or 3+2, and septuplets as 3+4, 4+3, 2+2+3, 2+3+2 or 3+2+2. Because they cannot be divided evenly, they take on an irregular, lopsided quality, taking a step on the spectrum of temporal identity towards a smooth articulation of time. In my composition *Stone Soup* (2001), for example, I use both 3+4 and 4+3 septuplets, highlighting their asymmetry to create rhythmic tension.



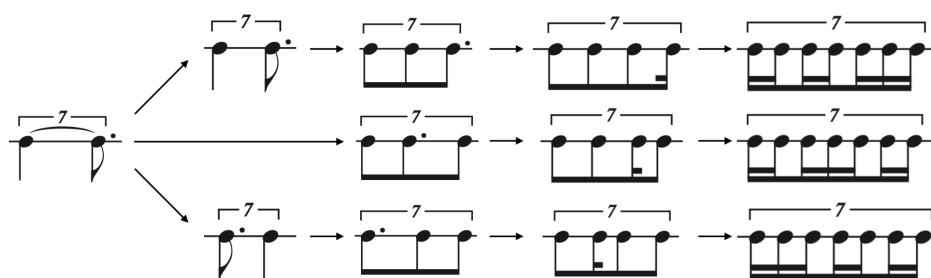
Example 3.6. *Stone Soup*, score excerpt. [Audio](#) excerpt.

Extending this point, rhythmic structure can also be parsed at multiple levels, a phenomenon Barlow terms *stratification* (Barlow, 1980). In a septuplet, a listener may apprehend the figure in one or more of the following strata.

- 1st: a single span
- 2nd: 4+3 or 3+4, (two groups)
- 3rd: 2+2+3, 2+3+2, 3+2+2, (three groups)
- 4th: 2+2+(2+1), 2+(2+1)+2, (2+1)+2+2, (each 3 broken down to a 2+1)
- 5th: constituent sixteenths

In performance, I realize this fourth stratum by internally subdividing any ternary grouping into 2+1 or 1+2. This parsing provides a reliable anchor for timing and supports accurate control of the total duration.

This practice of stratification lets composers shape accent patterns and texture while the underlying septuplet remains intact. For performers, the concurrent layers provide alternative anchors for timing, phrasing, cueing, and synchronization. For analysis, they show how one surface can project different metrical identities and, with them, different kinds of perceived speed.



Example 3.7. Stratification of septuplets

These groups manifest themselves as rhythms in the following passage of *Stone Soup* (McGowan, 2001) with additional rhythms added to the groups.



Example 3.8. *Stone Soup*, score excerpt. [Audio](#) excerpt.

Larger tuplets admit further levels of stratification. Nonuplets (9) may be felt as 4+5, 5+4, each with their possible subgroups, or as 3+3+3, which provides a consistent ternary pulse. These groupings are not only theoretical but aid the performance: odd tuplets are easier to execute when chunked into familiar patterns, such as memorizing a long number sequence by breaking it into groups.

Rhythms

Tuplets establish the speed of a subdivision grid, but this does not in itself determine the actual event density. Not every position within the grid is necessarily articulated; some sound while others remain silent, producing rhythms through selective activation of the grid rather than its mere existence. Rhythm therefore emerges not only from the grid but from the specific pattern of sounds and silences within it. The pace of articulated events can thus diverge from the implied change in speed suggested by the tuplet.

With slurs and rests included, the following list presents rhythmic permutations in 16ths, quintuplets, sextuplets, and septuplets with 16th notes and longer. Each tuplet yields variations according to the number of notes, and with larger tuplets the number of possible permutations increases.

16ths



Quintuplets



Sextuplets

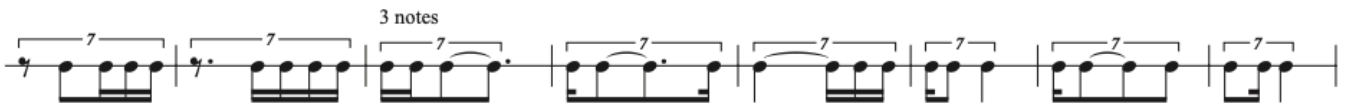
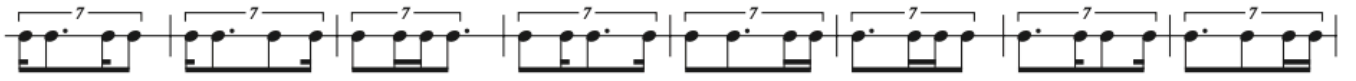
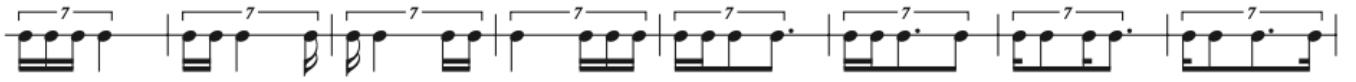


Septuplets

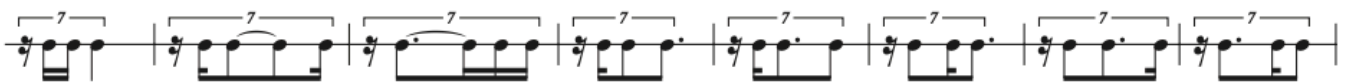




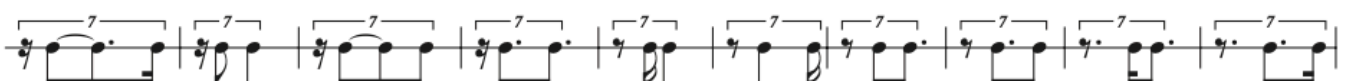
4 notes



3 notes



2 notes



1 note

Example 3.9. Rhythms within tuplets

To conclude: *each tuplet carries a distinct rhythmic character*, shaped by parity (even or odd), harmonicity, possible groupings, and the specific rhythms employed within the tuplet grid. Quintuplets differ from septuplets as much as an apple differs from a banana - both fruits, yet distinct in flavor. As Steven Schick observes in *The Percussionist's Art*:











7:6, for example, has a very different kind of rhythmic personality than does a duple subdivision at exactly the same speed. It's a question of feel. (Schick, 2006, p. 106)

In other words, perceived identity is not only a matter of how many notes fit in a beat or how fast they proceed; parity, grouping, and accent combine with other musical parameters such as articulation and timbre to produce each subdivision's unique feel. These contrasts can be heard in my work *The Speed of Time* (2014), which cycles through different tuplets and changes only at the bar lines.



Example 3.10. *The Speed of Time*, [score and video](#) example.

3.2 Changing tuplets in music

Switching between different tuplets can be a valuable expressive tool, creating a clear change in the visceral sensation of speed. Although this effect is familiar to performers, the specific speed change that occurs when moving from one tuplet to another is rarely described explicitly. Each pairing of tuplets yields a distinct proportional change in speed: some shifts produce dramatic increases in perceived speed, while others result in more subtle differences. One perspective rarely articulated is to translate those qualities into

quantities, looking at tuplet changes in percentages. For example, moving from  to  is 33% faster, which is already substantial; from  to , the next step up, is 25% faster; and from  to  still 20% faster. Non-consecutive transitions can yield much larger jumps: from  to  is 75% faster, and from  to  60% faster, and so on.

The same combinations getting slower produce negative percentages:

-  to  is 25% slower, or -25%

-  to  is -20%

-  to  is -43%

-  to  is -37%

Each change in tuplet speed carries its own distinct physical quality, comparable to shifting gears in a vehicle: the pace changes are not only quantitative but also alter the sensation of [motion](#) and the stability of any underlying pulse. These qualitative differences can be an important expressive element in music.

The following chart emphasizes that there is no single consistent speed adjustment that applies to all tuplet transformations. For performers, each must be embodied and learned through repetition, and awareness of the degree of speed change can be a helpful guideline.























		to										
												
from		100%	200%	300%	400%	500%	600%	700%	800%	900%	1000%	1100%
		50%	100%	150%	200%	250%	300%	350%	400%	450%	500%	550%
		33%	67%	100%	133%	167%	200%	233%	267%	300%	333%	367%
		25%	50%	75%	100%	125%	150%	175%	200%	225%	250%	275%
		20%	40%	60%	80%	100%	120%	140%	160%	180%	200%	220%
		17%	33%	50%	67%	83%	100%	117%	133%	150%	167%	183%
		14%	29%	43%	57%	71%	86%	100%	114%	129%	143%	157%
		13%	25%	38%	50%	63%	75%	88%	100%	113%	125%	138%
		11%	22%	33%	44%	56%	67%	78%	89%	100%	111%	122%
		10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	110%
		9%	18%	27%	36%	45%	55%	64%	73%	82%	91%	100%

Figure 3.1: Speed adjustment chart

As shown in Figure 3.1, the percentages describe how much faster or slower the surface becomes, but they only capture one aspect of how tuplet changes are experienced. An equally important factor is how the underlying pulse is organized or disrupted. A move from duplets to triplets over the same pulse, for instance, can produce a large increase in event rate while leaving the sense of a stable beat largely intact. By contrast, a move from sextuplets to septuplets over the same span may involve a smaller numerical change in speed, yet it can significantly destabilize the underlying pulse. In such cases, the "digestibility" of particular ratios, and the possibility of reinterpreting the pulse through metrical modulation, can be equally or more perceptually relevant than the raw percentages. These relationships are further conditioned by the surrounding musical context, in particular whether an audible or conducted reference pulse is maintained elsewhere in the music.

In the following sections from the guitar part of Riccardo Nova's *Primes Seventeen* (2010-14), for guitar, percussion, and electronics, musical material is played by the guitar in sections that sequentially increase in tuplet and thus speed: 16ths, quintuplets, sextuplets, 32nds and nonuplets. The speed changes from one bar to the next are given.

Bar 30 (2'04''): initial tempo



Bar 33 (2'15''): 25% faster



Bar 39 (2'37''): 20% faster



Bar 47 (3'06''): 17% faster



Bar 54 (3'35''): 14% faster



Bar 64 (4'11''): 13% faster



Example 3.11. Nova, *Primes Seventeen*. [Video](#).

$\Delta\%$:	-25%	17%	14%	-25%	33%	25%
Ref%:	75%	88%	100%	75%	100%	125%

Example 3.13. Thomas, *Twitter-Machines*

Thomas’s score goes a step further by adding an explicit note on speed that permits flexible realization of the notated percentage changes.

$J = 120$; or, **As fast as possible**, if 120 is too fast (tempo **should** be variable and does not have to be stable from measure to measure. This will add to a “twittering” and “jazzy” effect.
(Read Thomas, 2005, bold in original)

Performers may choose to exaggerate the speed changes to bring out “twittering” or “jazzy” effects. As with expressive timing marks such as *rubato* or *ad lib.*, it is usually advisable first to learn the rhythms as written, and then apply timing expression. In a piece such as *Twitter-Machines*, where no familiar stylistic model dictates how these variations should sound, such choices are guided less by an external genre template than by the internal criteria of the piece: the proportional relations indicated in the score, the physical feel of the gestures under the hands, and local cues such as contour, articulation and dynamics. In this process, the speed percentage methods can serve as a practical aid.

The notation must therefore be read holistically: not only the tuplets and instructions, but also meter, beaming, articulation, dynamics, registral contour and phrasing together shape the intended motion; the percentage indications function within this notated ecology rather than as an autonomous layer.

Using tuplets to change speed opens a continuum of rhythmic expression that is distinctive. Unlike altering tempo by arbitrary amounts, tuplets shift speed through exact proportional ratios, giving each change its own signature. Even adjacent tuplets produce not only a new speed but also a new character, shaped by factors such as even/odd distinction, harmonicity, grouping, and articulation. While 6 cm and 7 cm may appear nearly identical in spatial terms, a sextuplet and septuplet diverge markedly in rhythm because of their grouping and momentum. Tuplets therefore act like a dial that clicks into distinct positions, each one a unique expressive setting. This blend of proportional speed change and qualitative character provides a rich palette of resources for composition and performance.



3.3 Ratio tuplets

As briefly mentioned above, all tuplets are in fact ratios and most of the examples above imply the second number as the same number subdivision as the note value typical in one beat:


- three (triplets) - 3:2
- four (quadruplets, or often 16ths) - 4:4
- five (quintuplets) - 5:4
- six (sextuplets) - 6:4
- seven (septuplets) - 7:4
- eight (octuplets, or often 32nds) - 8:8
- nine (nonuplets) - 9:8

This can be conceptualized as a box model: the second number indicates the size of the box in units of the base note, and the first number indicates how many equal elements fill that box. If the base unit is not stated, it is inferred from its context, such as the subdivision of the beat as given by the meter and the number of available beats in the meter. Thus the two numbers in a ratio tuplet work together, the second showing the span of time and the first the number of divisions within it.



In addition to tuplets which fill one or two beats completely, the technique also permits more localized speed changes which may assume fractional beat lengths, notated as a ratio: those can be shorter than a



beat, e.g. $\frac{1}{4}$  or longer: $\frac{2}{4}$ .

Crucially, a tuplet determines the speed of the rhythmic grid rather than the number of articulated notes, and the pace of the sounding rhythm can operate independently of that grid. When the grid is understood as a separate rhythmic layer, it can likewise expand or contract, just as a rhythm can grow denser or more diffuse.

In the following example, the tuplet is written as 4:3 rather than 2:3: . The grid accelerates by 33%, yet the articulated notes are twice as long, so the sounding rhythm is slower than the preceding sixteenth notes despite the denser subdivision. Tuplets therefore articulate transformations in the metric framework or felt pulse more than they prescribe literal note density, allowing composers to play creatively against the grain of the tuplet. Tuplets also unsettle the proportional relation of two to one in notated rhythm (for example sixteenth to eighth or eighth to quarter), which can lessen the visual clarity of the bar. This idea is explored further in the ['tuplets within tuplets'](#) section.


Ratio tuplets can create beats which have different lengths than implied by the time signature. These beats establish their own frame of pulses, which, together with the main pulse, creates a situation of multiple


simultaneous pulses. These layers of pulses can be in syncopation: e.g. $\frac{3}{4}$  creates  - or


in a series, which can establish a polypulse: $\frac{3}{4}$  becomes . This introduction of irregularities in the implicit grid has the same effect as the explicit irregularities possible with rhythms, which gives tuplets a similar role in defining [striated and smooth time](#).

Tuplets do not abandon metric striation so much as re-striate it: they replace one pattern of equal subdivision with another, locally incompatible one. For the performer, this produces a second, precisely countable grid that can be executed with high accuracy. For the listener, however, the rapid alternation between competing subdivisions can weaken the salience of any single underlying pulse and be heard less as a clean change of grid than as a momentary "softening" of metric regularity. In that sense, tuplets can yield brief passages of perceptual smoothness within an otherwise striated temporal field, even though their production remains fully metrically specified.

Striation and frame tuplets


I differentiate between *striation* tuplets and *frame* tuplets. By *striation* tuplets I mean ratios that subdivide a duration into a different speed at the subdivision level, creating a local grid distinct from the larger metrical frame. For example, 3:2 -  - as a *striation* tuplet indicates three sixteenth notes in the time of two sixteenth notes, essentially the standard triplet rhythm within one eighth note. Most of the examples until now represent this approach.

Conversely, a *frame tuplet* refers to beats or time spans that carry rhythmic figures. For example, 5:4 quarter notes -  - means five quarter-note beats in the time of four quarter-note beats. When those beats contain their own subdivisions and rhythms, the tuplet functions as a frame tuplet:

 . The ratio establishes a new metrical frame or tempo that runs in proportion to the original. In rehearsal and performance this difference is tangible: *striation* tuplets are usually felt as faster or slower activity within a stable tactus, whereas *frame* tuplets invite performers to adopt the tuplet layer itself as a new pulse, with consequences for how they count, cue, and coordinate with others.

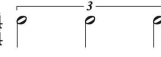
In principle, many *frame* tuplets could be rewritten as *striation* tuplets, and some editors would indeed prefer that for the sake of visual uniformity. The usefulness of the distinction in my work is therefore not notational but functional. When I compose with *striation* tuplets I am primarily coloring the density and articulation of an existing pulse; when I use *frame* tuplets I am thinking in terms of proportional tempi and multiple simultaneous pulses that may be sustained, phased against one another, or brought back into alignment. The terms are best understood as perspectives, one more local and the other more extended, that name two different compositional and performative functions rather than two different species of notation.


With some ratio tuplets the subdivision of the main pulse no longer results in a whole number. For


example, in $\frac{3}{4}$  sixteen notes spread evenly across three beats work out to a little more than five notes per beat, rather than a whole-number subdivision. Such fractional tuplets create a floating quality in relation to the main pulse. They also render traditional subdivision techniques impractical, requiring other strategies for performance, such as focusing on larger frames, as will be discussed below.


Contextualizing further, *frame* tuplets create additional layers of temporality. *Striation* tuplets define grids of different speeds at a surface level, whereas *frame* tuplets establish a new layer of *striation* that differs both from the surface-level subdivisions and from the underlying meter and pulse. In this way, *frame* tuplets provide a distinct temporal dimension, adding complexity beyond the immediate articulation of rhythm.

Tuplet and grouping

A common method to perform tuplets in practice, such as $\frac{4}{4}$ , is to approximate the placement of the notes across the entire span (here one bar), often with some unevenness. This can be understood as producing smooth time. This rhythm, however, can be performed with absolute striated accuracy by breaking it down into a combination of tuplet and grouping, in this case, triplets in groups of four:

 . The tuplet brackets indicate the beat positions, while the beaming shows the

note lengths. In similar fashion, a 5:3 -  - can be conceptualized as quintuplets in groups of three:

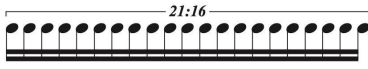
 . The rule therefore is: a ratio tuplet of x:y is x tuplet in groups of y. In order to perform these accurately, a method of counting the groupings and determining where the beats fall is very



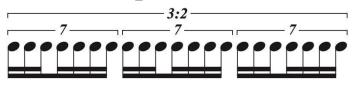
helpful: 1 2 3 4 5 . The arrows reinforce which notes within the groupings coincide with the beats.

Frame reductions

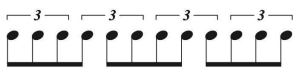
In some cases, ratio tuplets with larger numbers of notes cannot be simplified through the earlier methods.

For example, in 21:16, $\frac{4}{4}$ , the combination of tuplet and grouping (ventiunplet (21) in groups of 16) is impractical at this speed. When reduced to a repeating tuplet within one beat (21 ÷ 4), the result is 5¼ notes per beat, slightly faster than quintuplets. Such an approximation provides a useful calibration to begin with, which can then be refined.

Since 21 equals three septuplets and 16 spans two half notes, one way to reconceive this ratio is to place

septuplets within a 3:2 frame:  . This reduces the complex tuplet to a combination of two relatively manageable layers: a 3:2 framework and septuplets.

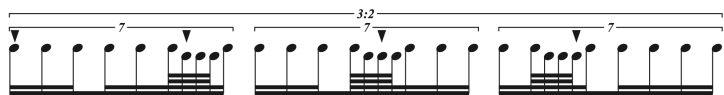
Learning to perform this, one can proceed in steps:

- a: Practice triplets in groups of four:  .

- b: Reduce that to the 3:2 frame:  becomes  .

- c: Insert septuplets into that frame:  .


- d: For further refinement, an awareness of exactly where the beat falls is helpful:



Speed percentage

As mentioned above, calculating the percentage of speed change can also be useful.

In the 21:16 example, if the rhythms are grouped differently than three septuplets,

, the 3:2-with-septuplets strategy is less practical. The speed change from 16 to 21, though, is an increase of 31%. For comparison, quintuplets are 25% faster than quadruplets and sextuplets 50% faster, so the 16th-note speed of the passage is only slightly faster than quintuplets. Establishing the quintuplet 16th-note speed for the figure therefore brings one very close to the actual speed (+6%).

Another example that does not reduce to a simpler frame is 17:16, since 17 is a prime number. Here it is straightforward to recognize that 17th notes are just slightly faster than 16th notes (about a 6% increase), which provides a practical reference. The tuplet 17:16 also has a floating quality, as no notes align with the beats throughout.

An interesting challenge from musical literature is several bars from Xenakis' ensemble piece *Thallein* (1988):

Example 3.14. Xenakis, *Thallein*, score excerpt (full score). [Video](#).

In this passage, the bassoon part plays in rhythmic unison with the strings yet moves at a subtly different speed from the other two instrumental groups: the upper woodwinds and piano, and the brass.

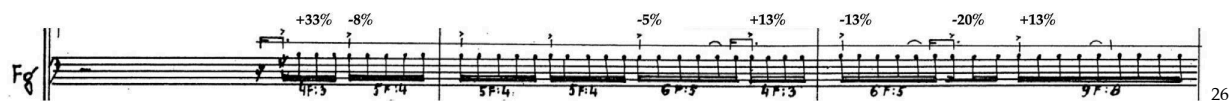
Example 3.15. Xenakis, *Thallein*, score excerpt (bassoon part).

Each tuplet changes speed - 4:3 → 5:4 → 6:5 → 4:3 → 6:5 → 16ths → 9:8 - producing a series of subtle accelerations and decelerations. The notated lengths of each group above the staff clarify where speed changes occur, but indicating the relative percentages of these shifts can make the transitions clearer to the performer.

Two approaches are possible: the first compares all tuplets to a common reference, such as the 16th note; the second measures the percentage change between successive tuplets, indicating both the direction and magnitude of each shift. Positive percentages indicate acceleration and negative percentages indicate deceleration.

Example 3.16. Xenakis, *Thallein*, score excerpt.

Another approach is to measure the percentage change between successive tuplets, which indicates both the direction and size of each shift. Positive (+) values mark accelerations, while negative (-) values indicate decelerations.



Example 3.17. Xenakis, *Thallein*, score excerpt.

The speed changes produce delicate shifts in musical character, and the percentage technique provides a precise way to both describe and conceptualize these subtle transformations.

Changes in tempo

Instead of describing speed changes as percentages, the same passage can also be expressed as a series of tempo shifts. This involves creating a tempo map as a practical shortcut: with the main tempo set at 52 bpm to the quarter note, each different tuplet corresponds to a distinct tempo.



Example 3.18. Xenakis, *Thallein*, score excerpt.

This approach has been used by performers Irvine Arditti and Steven Schick to navigate the nested tuplets in the music of Brian Ferneyhough (Schick, 2006, p. 104; Arditti & Platz, 2013, p. 88).

Speed combinations as harmony

Other advanced, more personalized approaches for performing tuplets also exist, such as developing an embodied harmonic interpretation to regulate speed combinations. The harmonicity of intervals dates back two and a half millennia to Pythagoras. Henry Cowell more recently discussed possible “scales of rhythm” in *New Musical Resources* (Cowell, 1996 [1930], p. 98), and Stockhausen extended this idea by systematizing scales of rhythm within his serial practice, treating durations as proportional series analogous to pitch collections. In his lecture *...how time passes...* (Stockhausen, 1957 [1959]), he further conceptualized a continuum between rhythm and pitch, in which changes of speed transform temporal intervals into audible frequencies. A further comparison of their theories can be found in [Chapter 4](#). Barlow proposed that musical speeds and rhythmic ratios can also be understood in terms of harmonicity, treating temporal intervals analogously to pitch intervals so that changes in speed resemble shifts in harmony (Barlow, 2001, p. 6). In fact, what Barlow describes as the ‘indigestibility’ of certain tuplets relates precisely to this point: it reflects a translation of the harmonicity of just-interval ratios into proportional relationships between tuplet speeds.

²⁶ This is based on the percentage of a/the change formula: $C = (x - y) / y$, where y is the first speed, x is the second speed and C is change.

As Schick explains in performing Michael Gordon's *XY*, he experiences the ratio of speeds similarly to the ratio of pitches in intervals. For example, a perfect fifth of two pitches occurs with a frequency ratio of 3:2, which is also a rhythmic triplet. Instead of a direct translation between rhythm and pitch frequency, Schick experiences the changing tuplets as a harmonic sequence where "dissonant" rhythms, such as 6:5, can resolve to "consonant" rhythms, such as 3:2 (Schick, 2006, p. 77).

The image shows a musical score excerpt for measures 333 through 336 of Michael Gordon's *XY*. The score is written for two staves, likely piano and violin/viola. Measure 333 features a piano (p) dynamic with two triplet markings (3) over the first two staves. Measure 334 has a forte (f) dynamic with a triplet (3) on the first staff and a sixteenth-note pattern on the second. Measure 335 returns to piano (p) with a triplet (3) on the first staff and a sixteenth-note pattern on the second. Measure 336 has a forte (f) dynamic with a quintuplet (5) on the first staff and a sixteenth-note pattern on the second. The notation includes various rhythmic values and dynamic markings.

Example 3.19. Gordon, *XY*, score excerpt. [Audio](#) (approx. at 9 minutes and 15 seconds).

This "harmonic" perspective does not directly provide a counting method, but it offers an expressive guide and a conceptual justification for phrasing and for why one combination might feel harder than another. A rhythm may feel unstable and more difficult to coordinate because it is "dissonant" rhythmically, just as dissonant intervals create beats and roughness in sound.

3.4 Tuplets within tuplets

In essence, ratio tuplets create new rhythmical grids, compressed or expanded, which in turn can also contain their own tuplets, leading to *tuplets within tuplets*, also known as *nested tuplets*.

For example, take the earlier 21:16 example, first as one bar of twenty-one 16th notes:



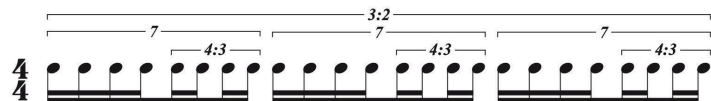
Compress that with a tuplet into a bar of 4 beats:



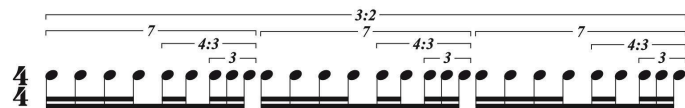
Break the 21 notes into three groups of 7 (grouped 4+3), which are placed into the 3:2 frame (3 half notes in the time of 2 half notes).



Add a 16th to the groups of 3, compressing it with a 4:3.



Add a 16th note to the last group of 2, compressing it into a triplet.



Example 3.20: Frames of 21:16.

This process of grouping and embedding tuplets can be approached in many ways. The above example reflects the logical rhythmic development characteristic of Carnatic music, where multiple rhythmic layers are constructed hierarchically in a way that is relatively straightforward to conceptualize and to coordinate in performance. With more complex combinations, however, tuplet-within-tuplet structures demand alternative conceptual strategies for performance.



Example 3.21. Complex tuplets within tuplets. [Video](#).

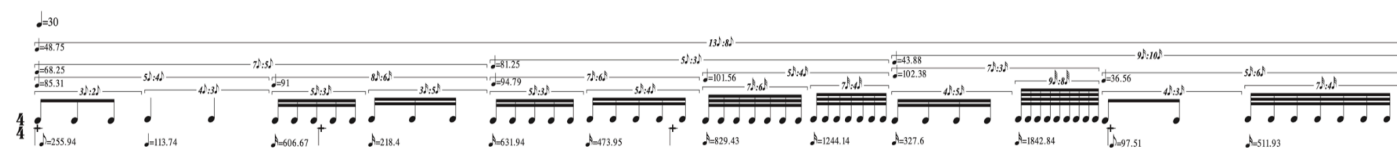
In this multilayered jungle of tuplets within tuplets, references of how the speed compressions and expansions relate are lost in the large amount of irregular changes. A more graphic representation, where the beats are clearly marked and the proportional speed relationships are visually represented, can illustrate these changes with greater clarity.

Graphic placement of notes according to the beat:



Example 3.22. Complex tuplets within tuplets. [Video](#).

In the next notation, I have included the tempi of the frame tuplets, the rhythmic tuplets, and the individual note speeds. These provide useful tempo references for the various layers. However, this approach essentially bypasses the tuplet groupings, reducing the musical function of the tuplet to a tempo change. While it can be helpful for understanding the absolute notated speed of the notes in relation to the general tempo, it tends to diminish the metrical, beat-related, or agogic accents that may play an important expressive role in the music.



Example 3.23. Complex tuplets within tuplets. [Video](#).

In this example, the relative speed of note values varies greatly throughout the measure. Durations of specific note lengths (such as eighth notes) are not standardized, and in some comparisons shorter note lengths in one part of the measure are slower than longer note lengths in another. In conventional notation, rhythmic values follow a clear 2:1 hierarchy - sixteenth notes to eighths to quarters - forming a stable proportional framework. Tuplet notation, however, disrupts this hierarchy by altering the temporal equivalence of note values between different tuplets, so that the same written note value can signify different actual speeds depending on its tuplet context. This is both the essence and the musical potential of tuplet writing: it opens expressive possibilities by changing the temporal rate at which events occur, enabling transformations of rhythmic character. At the same time, it creates visual and conceptual complexity, since identical note values can represent different speeds depending on the tuplet that contains them. This destabilization requires heightened attention from the performer to how rhythmic relationships shift across changing grids, particularly in tuplet-within-tuplet situations.

Building on the previous discussion of how tuplet notation reshapes proportional relationships and performance perception, I concluded Section 3.3 by outlining strategies for executing speeds accurately. Yet beyond calculation, the most effective guidance for a performer comes from understanding why the music is notated as it is. Notation itself functions as expressive communication, and insight into a composer's rhythmic reasoning helps shape interpretation. Recognizing how rhythmic intricacy interacts with other active musical parameters allows performers to engage more deeply with the expressive logic of the notation. For instance, in the complex tuplet example above, a performer who understands which layer carries the principal melodic contour and which layers function as background can decide to project the frame tuplets dynamically while allowing inner subdivisions to recede, rather than attempting to give every event equal weight. In my own ensemble writing, awareness that certain nested tuplets are derived from Carnatic rhythmic structures can similarly encourage performers to phrase across the bar in seven-note groups instead of defaulting to the notated meter. Comprehending the compositional rationale behind notational choices connects the performer to the composer's expressive intentions and supports interpretive decisions that align with the work's larger structural and aesthetic design. For a detailed discussion of tuplet-within-tuplet phrasing from both technical and musical perspectives, see "Developing an interpretive context: Learning Brian Ferneyhough's *Bone Alphabet*" (Schick, 1994).

3.5 The experience of tuplets

Throughout this chapter I have approached tuplets from the perspectives of performer and composer, addressing embodied practices of execution and the compositional strategies that give them form. From that perspective, a further distinction becomes necessary: the experiential difference between making and hearing.

Performers and listeners experience tuplets differently. For performers, a tuplet may register as a polyrhythmic juggling act, a shift in the internal grid, or a change in feeling, depending on the implementation and on bodily or technological constraints. Techniques for precision include subdivision strategies, embodied cues, and ensemble entrainment. These techniques are themselves situated and may shift from practice room to stage, from a dry studio to a reverberant hall, or from acoustic to amplified contexts.

For listeners, the same tuplet may register as quickening or slackening, a burst of energy, a stretched gesture, or a moment of rhythmic disorientation. Perception is shaped by factors such as sightlines, distance from the sources, timbral blend, acoustic masking, and learned expectations of meter and style. In some concert-hall seats a layered tuplet texture reads as surface complexity; elsewhere it fuses into a single flow with altered accentuation.

These contrasts are only a starting point. A situated perspective, in the sense illuminated by Haraway (1988), reminds us that perception and action are partial, embodied, and specific to concrete configurations of bodies, tools, and environments. Tuplets do not exist within a simple binary between performer and listener. Situatedness involves many parameters that jointly determine what tuplets afford and how they are experienced: bodily state (fatigue, breath, embouchure, injury), learned habits and stylistic training, instrument and setup, notational design and rehearsal annotations, ensemble coordination and leadership, technological mediation (microphones, monitors, click tracks, headphones), spatial and acoustic conditions (room size, reverberation, stage layout, audience proximity), the institutional setting (concert conventions, rehearsal time, venue etiquette, amplification norms), and audience expectations (genre literacy, polyrhythm familiarity, ambiguity tolerance, virtuosity norms). The same performer will not experience the same tuplet identically across situations, and different listeners within one hall may hear different rhythmic identities depending on location, attention, and prior enculturation.

The LEMI frame (Phillips, 2022) clarifies this, provided that each facet is understood as plural and dynamic. Listeners include diverse auditory vantage points and histories. The environment includes acoustics, architecture, and technologies. The musical stimulus includes notation, timbre, tempo, articulation, and density. Interaction refers to how these elements continuously affect one another during performance. Under such conditions, tuplets are not abstract ratios alone; they are lived and enacted by performers and perceived in multiple, likely divergent, ways.

The significance lies both in the gap and in the coupling between performed structure and perceived effect. For composers and performers, tuplets constitute a versatile resource rather than a device with a single expressive function. They may be used to sculpt narrative arcs of tension and release, to differentiate voices or registers, to accommodate instrumental idioms, to translate speech or poetic rhythms, or simply to introduce local color and complexity. At the same time, listeners absorb these constructions through situated hearing that may or may not track the notated ratios. Such hearing is most often shaped by factors beyond notation. Understanding the experience of tuplets therefore requires awareness of the situation: who is acting or listening, with which bodies and tools, in which space, and under which notational and social constraints.

Despite the technical explications in this chapter, tuplets therefore do not possess a single experiential identity. They take on multiple identities as affordances for action and perception that emerge from specific arrangements of listeners, environments, musical materials, and interactions. Accordingly, claims about “how a tuplet sounds” must be anchored in the concrete situations that produce them. This situated variability does not weaken the analytical account developed earlier in the chapter. It clarifies what that

account is for, namely to describe the temporal constructions that performers implement and listeners encounter under changing conditions.

3.6 Conclusion

The preceding section points toward the chapter's central claim: tuplets are regulated subdivisions that contribute to striated musical time, yet their musical identity is realised in practice through bodies, instruments, notation, rehearsal processes, acoustics, and listening positions. On that basis, the chapter's main contributions can be stated as follows. An expanded definition is proposed in which tuplets include irregular note divisions as well as conventional metric subdivisions. Percentage change in the local event rate between tuplets is introduced as a practical way of comparing their effects on perceived speed and feel, alongside approaches based on least common multiple relationships. The chapter also addresses harmonic, rhythmic possibilities, grouping strategies, ratio tuplets, striation and frame tuplets, and tuplets within tuplets. Together, these topics provide the basis for the conclusions that follow.

Tuplets emerge as far more than a notational curiosity; they are a creative tool of enormous power in shaping musical time. By altering the subdivision of a musical moment, tuplets allow composers and performers to morph the perceived speed and feel of the music, effectively playing with the listener's sense of speed while the underlying pulse might remain unchanged. In doing so, tuplets can even significantly change the identity of a musical idea: a melody played in triplets has a different character than the same melody in straight eighths or quintuplets. It is like the same sentence spoken with a different rhythm or accent, conveying a new expression.

Tuplets also introduce structural changes, such as new accent patterns and new points of synchronization or non-synchronization. The uniqueness of each tuplet's feel can be harnessed for contrast and expression, and the challenge of performing them has led to various solutions, ranging from mathematical to embodied methods. In this sense, tuplets compel musicians to engage deeply with time at a granular level.

From a broader theoretical standpoint, tuplets epitomize striated time, subdividing the musical grid into varied increments. As mentioned in the discussion of smooth and striated time in [Chapter 2](#), changes in rhythms place the music's temporal quality on a spectrum between these poles. While tuplets are implied subdivisions that reveal themselves only through musical events, transitions between them also create irregularities, positioning those moments along the same spectrum of smooth and striated time. When tuplets occur within tuplets, as in Brian Ferneyhough's ensemble writing, the resulting network of ratios can generate such a dense web of conflicting striations that the underlying metric scaffolding becomes obscured and the surface approaches an impression of smooth time for listeners.

The image shows a complex musical score excerpt for five instruments: A. Fl., C.A., Cello, Sop., and Hpsd. The score is filled with intricate notation, including numerous tuplets (groups of notes beamed together), dynamic markings (pp, mp, p, f, sfz), and performance instructions such as 'poco', 'legato', 'giusto', 'poco sul ponticello', 'cant.', 'detache', 'legato poss.', 'ard.', 'gliss.', 'in mp', and 'fa'. The notation is dense and spans multiple measures, illustrating the complexity of the piece.

Example 3.24. Ferneyhough, *Etudes Transcendantales*, score excerpt. [Video](#).

In such passages, the same notational devices that demand extreme striated precision from performers function perceptually to erode the sense of a stable grid. In his own compositional practice, Barrett describes how triplets can be utilized to approximate logarithmic tempo scales, achieved through successive proportional changes (Barrett 2019, pp. 18–19), which likewise tend to efface regular points of coincidence and contribute to a continuously shifting, almost smooth temporal flow.²⁷ More generally, the temporal richness of nested triplets arises from multiple simultaneous layers of implied speeds that may either reinforce or blur metric regularity. By contrast, in music that moves without any sustained pulse or floats in free rubato, the concept of triplets ceases to apply directly, since there is no operative grid to subdivide. In this light, triplets can be understood both as markers of metric regularity and as tools that can saturate and even destabilize that regularity: the more extensively they are deployed, the more intricately interwoven the temporal fabric becomes.

In summary, triplets remind us that musical time is not fixed but elastic. By subdividing durations in varied ways, they create speed shifts within the notated grid, with departures from and returns to that grid. Even the most complex rhythms, once mastered, become part of a performer's natural vocabulary. At that point, musicians treat triplets as an expressive resource for shaping perceived speed, phrasing, and accentuation, rather than as a technical device to be executed. The aim of exploring triplets is precisely this: to internalize these ratios so that they become second nature and are ready for expressive use. When this happens, the categories "normal rhythms" and "triplet rhythms" dissolve, leaving only rhythmic expressions with different speeds and characters at the musician's disposal. This clarifies that triplets are a valuable tool for working with speed in music.

²⁷ Barrett's approach is explored further in [Chapter 4](#).