7 Theorizing Complex Meters and Irregular Grooves

SCOTT HANENBERG

Introduction

Music-theoretical writing about the drum kit often stresses the instrument's role in shaping listener experiences of musical time. Much of this work concerns the backbeat, whether establishing its prevalence in specific rock and pop genres,[1] detailing a range of expressive microtiming feels,[2] or contrasting the pattern with other characteristic rhythms.[3] Study of the drum kit offers an effective point of contact between the sort of syntactic concerns central to much music-analytical writing and the experiential world occupied by performers and listeners.[4] Inquiry into the explanatory potency of the drum kit – what it tells the listener, how it communicates, and how to best interpret its intimations – is still rapidly evolving.

One question that remains to be explored in detail concerns the role of the drums within metrically irregular grooves, which are incompatible with the paradigmatic backbeat pattern often heard in Euro-American popular music. I argue that listener understanding of such grooves is acutely reliant on the guidance of the drums. To investigate this claim, I have analysed the drumbeats of grooves with large irregular cycles, ranging from ten to over sixty beats or pulses. In this chapter, I theorize a typology of additive successions well suited to the analysis of such cycles – I classify patterns as either *punctuated* or *split*. Punctuated grooves arise when an established meter is interrupted at regular intervals by isolated measures in another meter. Split grooves comprise cycles with two or more subsections of approximately balanced lengths. My research forges connections between drum-kit practice, theories of rhythm and meter, and cognitive models of listener entrainment.[5]

In comparing irregular drumbeats with cycles of different durations, an important distinction must be drawn between two types of listener engagement. Listeners can easily entrain to shorter repeating cycles, developing an immediate, intuitive connection to a groove. With progressively longer temporal spans, the ability to entrain is attenuated.[6] I posit that, as entrainment loses its efficacy, some listeners may choose to track irregularity through different means – either by counting, or by chunking and shifting between metric expectations.[7] Where the entrainment model is colloquially described as *feeling* the groove, the other strategies could be

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described as *thinking* the groove. The boundary between the two modes of attending is fluid and will vary for each listener; differences in tempo complicate matters further.[8]

Moreover, in transcribing grooves with larger repeating cycles, there is often more than one viable arrangement of measures and time signatures.[9] Whereas much music with a drum kit (rock, jazz, hip-hop, electronic, etc.) fits unproblematically into a 4/4 meter, even grooves with modest irregularities confound the straightforward mapping between meter and time signature that is often taken for granted in score-based musical traditions. Indeed, even the distinction between compound duple (6/8) and simple triple (3/4) meters can be difficult in the absence of a score.[10] The transcriptions in what follows are all my own; most could be re-barred and some admit alternative beat-levels (e.g. my 11/4 may be another listener's 11/8 or vice versa). My use of traditional European notation follows the practice of commercially available transcriptions of this music and that seen in private instruction common to neighbourhood lesson studios and institutions of higher education. Nevertheless, it remains a coarse shorthand for representing the sonic texts in question – not (as in the case of the classical score) the text itself. The best way to engage with my analysis involves finding and listening to the songs; this work is based on the original, studio-recorded album versions of each song, almost all of which can be found and heard online.

Regarding the repeating cycles under consideration, my criteria are as inclusive as possible: a groove is understood as any pattern of musical sounds that establishes a cyclic structure, and the cycles in question may be long enough to demand multiple meter changes. For example, I include a repeating pattern of sixty-one eighth notes in Radiohead's 'Paranoid Android' (1997), but I would never transcribe the passage in 61/8 time – I hear four measures of 4/4, three of 7/8, and one of 4/4. In what follows, I often employ nested brackets to represent the subdivision structures of complex spans.[11] The 'Paranoid Android' groove would be ((8,8)(8,8))((7,7)(7,8)). This method has the advantage of leaving certain potentially ambiguous features of the groove (e.g. beat level or time signature) open to interpretation.

In the songs analysed – mostly rock but admitting several outliers – the snare backbeat is often the most salient drumbeat cue and its metric role is the most codified of any drum-kit function, indeed, perhaps of any musical utterance. In 4/4 grooves, I hear the backbeat as exemplifying what Christopher Hasty calls 'metric continuation': an articulation that simultaneously extends the duration of an earlier counterpart, while itself demarcating a point of metric salience.[12] In metrically irregular grooves, the snare retains this metric-functional role, aiding listeners in parsing the unfamiliar structure. Often this happens by imitating the familiar 4/4 backbeat as closely as possible within the irregular metric context. Less

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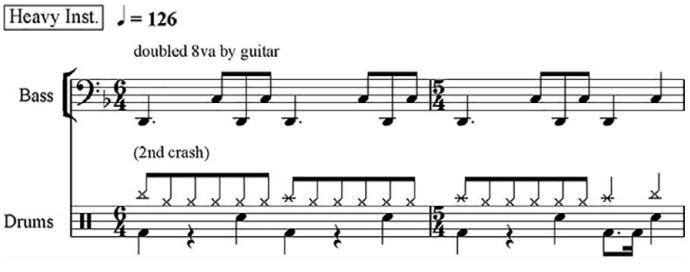
frequently the alternation of 'forebeat' (commonly articulated by the kick drum) and snare backbeat is more radically reimagined, or else the drumbeat abandons the backbeat trope altogether. I found one other common drumbeat option: undifferentiated articulation (i.e. using the same drum) of the beat or pulse level, or of a salient rhythmic pattern.

Punctuated Irregular Cycles

I refer to patterns in which one meter predominates, interrupted at regular intervals by measures in a second meter, as punctuated irregular cycles. Without exception, the interrupting change of meter comes at the end of the repeating cycle (or, put differently, exceptions to this trend are so rare that they foster ambiguity). The language that Scott Murphy uses in his discussion of Platonic-Trochaic successions is well suited to my analysis: both projects concern cycles made up of a *run* (a stable repeating pattern) and a *comma* (an interruption that punctuates that pattern).[13] A heavy 11/4 groove in Tool's 'Right in Two' (see Example 7.1) demonstrates a relatively simple punctuated structure, in which a single two-beat group punctuates an otherwise triple metric fabric (i.e. 3+3+3+2). In Murphy's terms, the run comprises three groups of three, and the comma is the final two-unit group. I have transcribed the groove as comprising alternating measures of 6/4 and 5/4 time, approximating the measure lengths found in a familiar 4/4 backbeat, but there are other plausible alternatives. A transcription showing three measures of 3/4 and one of 2/4 would highlight the punctuated nature of the cycle, while a consistent 11/4 meter would reflect the regular patterning at the deeper hierarchical level of the phrase.

The drums are crucial in expressing the structure of this groove: an alternation of kick and snare stretches the standard backbeat to accommodate the three-beat spans, delaying the snare until every third beat. When the more familiar, two-beat backbeat alternation arrives at the end of the cycle, it expresses power and confidence, propelling the groove forward. The cymbals also participate in distinguishing the two-beat punctuation, switching from hi-hat eighths to emphatic quarter-note crashes.



Example 7.1 A punctuated 11/4 groove in Tool's 'Right in Two' (2006): 5:20

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Table 7.1 lists forty-one grooves with punctuated irregular cycles, organized according to drumbeat. Some songs contain more than one such groove. In the column that gives the cardinality of each cycle, I use an Asterix (*) to denote a sub-tactus pulse (i.e. at the eighth-note level or the quarter note in a double-time groove) and a double-sword (‡) to denote the level below that (usually that of the sixteenth note).

The most common subdivision structure for punctuated patterns retains the intuitive preference for quadruple hypermeter observed in most Euro-American music, rock and otherwise. Large-cardinality irregular grooves that follow this trend often comprise three measures in the initial meter followed by one in a new meter. Two variants of this three-plus-one hypermetric configuration are (1) a seven-plus-one patterning, as in Tool's 'Forty Six & 2', and (2) cases in which the comma is better expressed by two measures, as in Muse's 'Animals'.

Thirty-three of the grooves analysed are based on a backbeat or a modified version of it, with the snare drum expressing metric continuation. In twenty-one of these, a 4/4 groove with a traditional backbeat serves as the primary meter. The punctuated elements of such grooves are sometimes based on the same backbeat, admitting subtle metric deletions or expansions to fit the punctuating meter. In the verse groove of Metallica's 'Master of Puppets', every fourth measure can be heard as a distorted 4/4 with metric deletions within the first and third beats (i.e. the snare articulations retain their full quarter-note durations). Although the band's practice of never recording to a click track makes it difficult to say with certainty, I hear an internal structure of (2,4)(1,4) at the sixteenth-note level. While commas that vary the backbeat are not uncommon, the prevailing strategy is to mirror the structural interruption to the meter with a stylistic interruption in the drumbeat – a fill. In the second verse of Dream Theater's 'Metropolis Part 1: The Miracle and the Sleeper' (around 2:35), every third measure is abbreviated by an eighth note; drummer Mike Portnoy uses subtle fills to drive across these metric deletions to the downbeats of the following 4/4 measures. In this groove, the 4/4 backbeat is also modified in a way that prepares the recurring 7/8 measures. The second snare of every 4/4 measure is delayed by an eighth note, placing them in the final eighth-note position of those measures, recalling the placement of the final snare in many 7/8 backbeat variants.[14]

When 4/4 is not the primary meter, drummers usually retain the backbeat as much as possible within the metrically irregular context. Cycles that modify a compound quadruple (e.g. 12/8) feel, with the drummer marking the dotted eighth note with alternating kick and snare, account for five examples. Tori Amos is especially fond of stretching compound beats to form novel grooves. Larger cyclic patterns are found

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Table 7.1 *Examples of punctuated irregular cycles*

		Meter			
	Drums	Run	Comma	Cardinality	Artist—Song (year)
Kick-Snare Alternation	Backbeat; run has simple subdivision	4 (×2)	3	11*	Devo—'Blockhead' (1979)
		2 (×5)	1	11	King Gizzard & the Lizard Wizard—'Gamma Knife'(2016)
		4 (×2)	5	13	King Crimson—'Starless' (1974)
		2 (×5)	3	13*	Dream Theater—'Metropolis Part 1: The Miracle and the Sleeper' (1992)
		4 (×3)	3	15	TTNG—'Gibbon' (2008)
					Yes—'Siberian Khatru' (1972)
			5	17	TTNG—'Panda' (2008)
		4 (×4)	3	19‡	Dream Theater—'Scene Six: Home' (1999)
					Frank Zappa—'Keep it Greasy' (1979)
					Mahavishnu Orchestra—'Celestial Terrestrial Commuters' (1973)
			5	21*	UK—'In the Dead of Night' (1978)
			7	23*	Dream Theater—'Metropolis Part 1: The Miracle and the Sleeper (1992)
		4 (×6)	5 (×2)	34‡	Dream Theater—'Metropolis Part 1: The Miracle and the Sleeper' (1992)
		4 (×7)	5	33*	Phish—'Split Open and Melt' (1990)
		4 (×12)	(2,4)(1,4)	61‡	Metallica—'Master of Puppets' (1986)
		5 (×2)	7	17	Tool—'The Grudge' (2001)
		5 (×3)	3 (×2)	21	Muse—'Animals' (2012)
			(3,3,2)	23	Tool—'Hooker with a Penis' (1996)
		7 (×3)	8	29*	Dream Theater—'Scene Six: Home' (1999)
					Nine Inch Nails—'March of the Pigs' (1994)
		4+5 (×3)	4+4	35	Dream Theater—'The Count of Tuscany' (2009)
	Backbeat; run has compound subdivision	3 (×4)	3	15*	Queens of the Stone Age—'I think I Lost My Headache' (2007)
		3 (×6)	8	26*	Tori Amos—'Virginia' (2002)
		3 (×7)	2	23*	Radiohead—'You' (1993)
			4	25*	Tori Amos—'Carbon' (2002)
					Tori Amos—'Spark' (1998)

	Backbeat Variant; triple run	3 (×3)	2	11	Allman Brothers—'Whipping Post' (1971) Tool—'Right in Two' (2006)
	Backbeat Variant; irregular run	5 (×4)	(2,2,2)	26*	TTNG—'26 is Dancier than 4' (2008)
		5 (×7)	7	42‡	Tool—'The Grudge' (2001)
		7 (×7)	9	58*	Tool—'Forty Six & 2' (1996)
		(3,3,2) (×3)	(3,3,3)	33*	Hail the Sun—'Eight-Ball, Coroner's Pocket' (2012)
		5+4 (×2)	3	21‡	Frank Zappa—'Keep it Greasy' (1979)
Undifferentiated		3 (×3)	2	11	Hail the Sun—'Eight-Ball, Coroner's Pocket' (2012)
			4	13(*)	Ben Folds—'Bastard' (2005) Egg—'I Will Be Absorbed' (1970) Tool—'Undertow' (1993) Tori Amos—'Carbon' (2002)
		5 (×2)	4	14*	Dream Theater—'A Nightmare to Remember' (2009)
		4 (×5)	5	25‡	OSI—'Memory Daydream Lapses' (2003)
		8 (×2)	(3,4,3)	26‡	Mahavishnu Orchestra—'One Word' (1973)

*Denotes probable sub-tactus pulse; ‡ denotes probable sixteenth-note pulse.

in 'Carbon', 'Spark', and 'Virginia' (see also 'Datura' in Table 7.2).[15] Drumbeat patterns such as that seen in 'Right in Two', in which the alternation of kick and snare is played out every three beats, as opposed to the slower (five-, six-, and seven-beat) spans just described, suggest triple meter more readily than compound meter. The Allman Brothers' 'Whipping Post' is another such example.

Other primary meter options typically modify simple-time (4/4) backbeats trough deletion, as in 7/8 measures, or expansion. An example of the latter is the outro groove of TTNG's '26 is Dancier than 4', with a run comprising four repetitions of a 5/8 pattern followed by a six-pulse comma. The internal articulation of each subsection in the run is a quarter-note kick followed by three snares – a sixteenth, an eighth, and a dotted eighth. The first and third snare articulations are structural, resulting in a (4,3,3) pattern for each 5/8 measure.

Only eight of the punctuated grooves I surveyed eschew the backbeat possibilities just detailed, instead supporting a prominent rhythmic pattern with an undifferentiated articulation (i.e. playing the entire pattern on the same drum). The snare drum is the most common in this role, paralleling its importance in modified backbeat grooves. Many of the rhythmic succession represented in this category likewise have counterparts with modified-backbeat drum patterns (see e.g. Hail the Sun, 'Eight-Ball, Coroner's Pocket', and Egg, 'I Will Be Absorbed'); however, some successions are limited to this category. An instrumental near the three-quarters point in Dream Theater's 'A Nightmare to Remember' has a pattern of (3,2,3,2,2,2), which I parse as a run of ten pulses (5,5) and a comma of four. In a recurring instrumental passage in OSI's 'Memory Daydream Lapses' the ride cymbal subdivides a twenty-five-pulse cycle as (4,4,4,4,4,2,3) – a run of twenty and a comma of five. The initially even pulse is in a comfortable quarter note, making the five-sixteenth note comma especially jarring on early hearings. Some listeners may also entrain at the half-note level, parsing the pattern as (8,8,9).

Before moving on to split cycles, I consider a case where punctuated, large-cardinality groupings occupy regular metric frameworks. The rhythmic acrobatics of Swedish metal group Meshuggah are theorized by Jonathan Pieslak and Olivia Lucas, both of whom note the band's penchant for cyclic irregular riffs, punctuated to fit phrase and formal boundaries based on 4/4 meter and foursquare hypermeter.[16] What is remarkable about the band's handling of these grooves is the functional promiscuity of the snare drum. Whereas the irregular cycle is almost always given by the guitars and bass, supported by the kick drum, and whereas the cymbals are almost always responsible for maintaining a steady quarter-note beat, allowing entrainment to the overarching foursquare organization of the groove, the snare is free to ally itself to either stratum. In my habit of hearing the snare as the leading metric cue in this music, the patterning of

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Table 7.2 *Examples of split irregular cycles*

Drums		Meter		Artist—Song (year)
		Backbeat Modifications		
Type	Snare Placement	Card.	Split	
Simple-meter Backbeat	– 2 – 4 |– 2 – |1 2 – 4	11	4 | 3 | 4	Dionne Warwick—'I Say a Little Prayer for You' (1967)
	– 2 – 4 ° |– 2 – 4 ° °		5 | 6	Dream Theater—'A Nightmare to Remember' (2009)
	– – 3 – 5 – 7 – 9 – 11		5 | 6 or 3 | 4 | 4	Esperanza Spalding—'Crowned and Kissed' (2012)
	– 3 - - |- 2 - 4 - 6	11*	5 | 6	Van Der Graaf Generator—'Man-Erg' (1971)
	– 2 – 4 – 6 |– 2 – 4 – 6 7	13	6 | 7	Genesis—'Turn it on Again' (1980)
	– 2 – – 5 – 7 | – 2 – 4 – 6		7 | 6	Radiohead—'Sail to the Moon (Brush the Cobwebs out of the Sky)' (2003)
	– 3 - |– 3 - - |1 - ° °	13*	4 | 5 | 4	Fromuz—'13th August' (2008)
	– 3 - – |– 3 - 5 - -		6 | 7	Dream Theater—'Metropolis Part 1: The Miracle and the Sleeper' (1992)
	– 3 - – ° |– 3 - ° °		7 | 6	Nine Inch Nails—'The Becoming' (1994)
	– 2 – – 5 – |– 2 3 – – 6 – –	14	6 | 8	Tool—'Vicarious' (2006)
	– 2 – 4 – 6 – |– 2 – 4 – 6 – 8	15	7 | 8	Pretenders—'Tattooed Love Boys' (1979) Toadies—'Possum Kingdom' (1994)
	– 2 — — — |– 2 – 4 – 6 -+		8 | 7	Soundgarden—'Spoonman' (1994)
	– 3 - – 7 |– 3 - – 7 -	15*	7 | 8	Incubus—'Make Yourself' (1999) Soundgarden—'The Day I Tried to Live' (1994) Tool—'Ticks & Leeches' (2001)
	— 3 – — ° | — 3 – — ° ° °	16*	7 | 9	TTNG—'Baboon' (2008)
	– -+ — — 7 – |— 3 – — – – –	17	8 | 9	Björk—'Crystalline' (2011)
	— 3 – — 7 – – |— 3 – — 7 –		9 | 8	The National—'I Should Live in Salt' (2013)
	1 – – 4 |– -+ – 4 |– – 3 |– – 3 | – -+ – 4 |° ° ° °	22	8 | 6 | 8	Tori Amos—'Police Me' (2009)
	– – 3 – – 6 – – 9 – 11 – 13 |– – 3 – – 6 – ° ° °	23	13 | 10	TTNG—'Rabbit' (2008)
	– 2 – 4 – 6 7 |– 2 – 4 – 6 7 | – 2 – 4 – 6 – 8 |– 2 – 4 – 6 7	29	14 | 15	Fu Manchu—'Pick-Up Summer' (1992)
		30	14 | 16	TTNG—'26 is Dancier than 4' (2008)

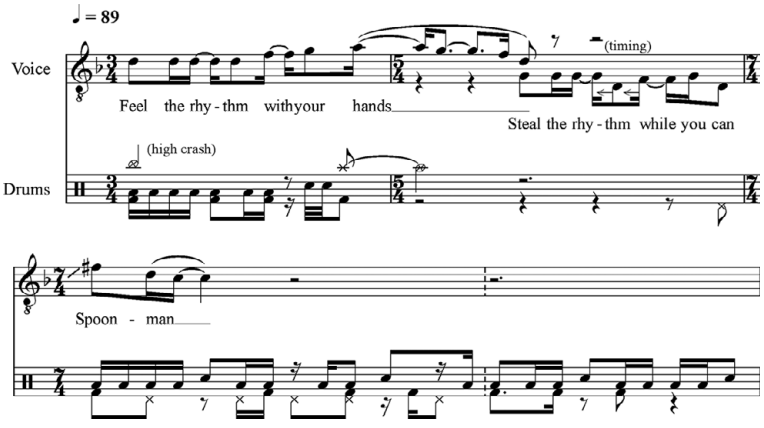
Table 7.2 (*cont.*)

Drums		Meter		Artist—Song (year)
		Backbeat Modifications		
Type	Snare Placement	Card.	Split	
	– -+ — – -+ – |– -+ – – 5 — | – -+ — – -+ – |– -+ – – 5 – 7 – 9			
	— 5 - - - — – |— 5 - - - — — – -	33‡	14 | 19	The Matt Savage Trio—'Blues in 33/8' (2006)
	— 3 – — 7 – — 11 – 13 | — 3 – — 7 – — 11 | — 3 – — 7 |— 3 – ° ° °	38*	24 | 14	National Health—'Tenemos Roads' (1978)
	— 5 - – — 13 - |— 5 - – — - - - | — 5 - – — 13 - |— 5 - – — 13 - –	59‡	29 | 30	Dream Theater—'The Count of Tuscany' (2009)
Compound-/triple-meter Backbeat	1 - - — |– 3 - — 1 - - — |1 - – —	13*	6 | 7	Tool—'Schism' (2001)
	– 3 - – 7 |– 3 – 6		7 | 6	Mutant-Thoughts—'Odd Boy' (2019)
	— 4 - — — 12 - - 15 - -	17*	5 | 6 | 6	Noisia—'The Hole Pt. 1' (2019)
	° ° ° - 5 6 - 8 9 |° ° ° - 5 6 - 8 9 10	19*	9 | 10	The Beatles—'Happiness is a Warm Gun' (1968)
	— 4 - — 9 - - |— 4 - - — 10 -	22*	11 | 11	Dream Theater—'A Nightmare to Remember' (2009)
	— 4 - - — 10 - - - | — 4 - - — 10 - - - |	27*	13 | 14	Tori Amos—'Datura' (1999)
	— 4 - - — ° ° ° ° | — 4 - - — — 13 ° ° °	29*	13 | 16	Tool—'Intolerance' (1993)
	— 4 - - — 10 - - ° ° ° | — 4 - - — 10 - - ° ° ° ° ° °	33*	15 | 18	Dream Theater—'The Count of Tuscany' (2009)
	— 4 - - — 10 ° ° ° |— 4 - - — 10 ° ° ° | — 4 - - — 10 ° ° [complicated throughout by toms]	38*	13 | 13 | 12	Tori Amos—'Carbon' (2002)
	— 4 - - — 10 .+ - - |— 4 - - — 10 - .+ ° ° ° |— 4 - - — 10 .+ - - | — 4 - - — 10 - .+ - -	55*	28 | 27	Tori Amos—'Datura' (1999)

Mixed Subdivision	— 4 - ° ° |– ° ° – 3 - - |– – 5 - - – .+ .+ - .+ .+ - |- - 3 - - 6 - - 9 – 3 - – 7 - |- - 3 - - 6 - - 9 - - 12 – – 5 - - – |– – 5 - - 8 - – – – 5 - – |– - 4 - - - - 10 - - — 4 - - — 10 - - — 16 - - | – – 5 - - - - – 15 - – 19 -	11* 12* 17* 20* 20* 20‡ 38*	7 | 4 5 | 7 8 | 9 8 | 12 9 | 11 8 | 12 18 | 20	Tool—'Right in Two' (2006) Tool—'Schism' (2001) Hail the Sun—'Eight-Ball, Coroner's Pocket' (2012) Radiohead—'Go to Sleep (Little Man Being Erased)' (2003) Tool—'The Patient' (2001) Nine Inch Nails—'Just Like You Imagined' (1999) Soundgarden—'Rusty Cage' (1991)

Undifferentiated Articulations

Type	**Succession**	**Card.**	**Split**	
Undifferentiated Articulation Throughout	3,2,3,3	11‡	5 | 6	Tool—'Right in Two' (2006)
	2,2,3,2,2,2,2	15*	7 | 8	Penguin Cafe Orchestra—'Perpetuum Mobile' (1987)
	3,2,2,3,3,2,3	18*	7 | 11 *or* 10 | 8	Dream Theater—'The Count of Tuscany' (2009)
	(3,3,2,2)(3,3,4,2)	22‡	10 | 12	Hail the Sun—'Testostyrannosaurus' (2012)
	(3,3,2,2)(3,3,2,2,2)			Incubus—'Adolescents' (2011)
	(3,3,2,2,2)(3,3,2,2)		12 | 10	Tool—'Swamp Song' (1993)
	(2,2,2,3)(2,2,3,3)(2,3,3)	27*	9 | 10 | 8	Tool—'Jambi' (2006)
	(3,3,3,2,2)(3,3,3,2,2,2)	28*	13 | 15	Tool—'Undertow' (1993)
	(3,4,4,4)(3,3,4,3)	28	7 | 8 | 6 | 7	Tori Amos—'Star of Wonder' (2009)
	(2,2,2,2,2,2,)(3,3,3,3,3)	29*	14 | 15 *or* 12 | 5 | 12	Hail the Sun—'Eight-Ball, Coroner's Pocket' (2012)
	(16)(3,3,8)	30‡	16 | 14	Emerson, Lake & Palmer—'Karn Evil 9 1st Impression, Pt. 1' (1973)
	5/4 (x3) | 6/8 (x4)	54*	30 | 24	Queen—'Innuendo' (1991)
Some Backbeat	4,3,3,4	14	7 | 7 *or* 4 | 6 | 4	Of Monsters and Men—'Crystals' (2015)
	(3,3,3,3)(4,4,4,4)	28*	12 | 16	Tool—'Schism' (2001)
	(4,4,4,4)(3,3,2,4,2,4,2,2)	38‡	16 | 22	Emerson, Lake & Palmer—'Karn Evil 9 1st Impression, Pt. 1' (1973)
	(4,4,4,4)(5,5,4)(5,5)	40‡	16 | 14 | 10	Dream Theater—'A Nightmare to Remember' (2009)



Example 7.2 A split fifteen-beat cycle in the verse of Soundgarden's 'Spoonman' (1994): 0:18

this drum has a decisive influence on my interpretation of Meshuggah's various grooves. Thus, in the opening groove from 'Stengah' (Pieslak's Example 7.3), where the snare supports an 11/8 riff on the third and sixth articulations in a (3,4,3)(3,4,5) sixteenth-note structure (until five repetitions lead to a 9/8 comma), that irregular organization is the dominant metric structure in my hearing. Conversely, in the opening of 'Lethargica' (Lucas's Example 7.2), where the snare marks a slow half-time backbeat against the displaced 23/4 riff, I find it easier to move with the available underlying 4/4.

Split Irregular Cycles

Grooves of the split type are based on a cycle with two or more subsections, the lengths of which are approximately balanced. In the clearest split patterns, subsections are easily differentiated by a change in pulse grouping (e.g. shifting from 2s to 3s). Radiohead's 'Go to Sleep (Little Man Being Erased)' exemplifies this strategy, alternating measures of 4/4 and 12/8.[17] The change in meter is reinforced by a change in drumbeat, from standard backbeat in the 4/4 measures to a snare on every third eighth note in 12/8. Split patterns of this sort invite the listener to keep two metric schemas available at all times, shuttling between them as necessary.

When no change of grouping occurs, cues in phrasing or arrangement are typically required to support a split interpretation. This is the case in Soundgarden's 'Spoonman' (see Example 7.2). The repeating pattern of fifteen beats could be parsed as (4,4)(4,3) – suggesting a punctuated logic – but two features of the arrangement contradict this analysis. The first is the long instrumental pause through the second measure. In the absence of a

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continuous groove in any part of the rhythm section, the re-entry in the cycle's third measure is marked as a new beginning, paralleling the first measure. Such parallelisms often indicate a split pattern, though they are seldom so clear. The second feature of 'Spoonman' that supports a split structure is the (3,2,3) grouping of the first half: the short drum fill marks beat three as closing a measure and the vocal phrasing establishes a more local parallelism between the first and sixth beats of the pattern (a transcription in 5/4 + 3/4 would better reflect the structure of the vocals, while my version prioritizes the drums). Without the stability of an ongoing 4/4 meter to connect the first two measures with the third, the punctuated possibility is untenable.

Table 7.2 catalogues fifty-nine split cycles. The most consistent trend within these grooves is the prevalence of two-part organization at the highest level, though three-and four-part structures are not uncommon. As with punctuated cycles, drumbeats derived from the backbeat predominate, accounting for forty-three groves. Twelve of the other sixteen use undifferentiated articulations, and the remaining four combine the two approaches.

Within split cycles with a backbeat-variant drumbeat, more than half (twenty-six grooves) are directly based on the 4/4 archetype; a further ten modify a compound- or triple-meter framework; and in the remaining seven irregularity is pervasive enough that comparison to a regular meter is less useful than simply considering the particulars at hand. With those rooted in the 4/4 backbeat model, the most common approach is a two-part split alternating between a septuple group and a quadruple one (the latter may require two measures, depending on hierarchical level). The first part invariably ends with a metric deletion, balanced by a second part without deletion. Examples include 'Tattooed Love Boys' by the Pretenders and 'Make Yourself' by Incubus. Fu Manchu's 'Pick-Up Summer' expands the pattern, using a septuple sub-cycle as the base meter with only occasional 4/4 measures to begin the second part of the split: (7,7)(8,7) or (4,3)(4,3)|(4,4)(4,3) at the beat level. Björk's 'Crystalline' demonstrates a related but distinct situation, leading with a measure of 4/4 and expanding the second part by an eighth note: (8,9) or (4,4)(4,5) in eighth notes.

Examples based on a compound-meter archetype include some of the longest, most complex cycles I have found. In an extended instrumental in the introduction of Dream Theater's 'The Count of Tuscany', a four-part structure arises through the alternation of compound duple measures and larger compound options – triple in the first part, quadruple in the second. The structure is (6,9)(6,12) or a compound (2,3)(2,4). The drums enter after the cycle is established by other instruments, at first with long fills through the triple and quadruple measures, marking these spans as independent units and driving towards the downbeats of the more stable duple measures. Portnoy then shifts to a modified backbeat, alternating kick and

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snare in the first two compound beats of each measure, retaining shorter fills through the remaining beats of the longer measures: Kick – Snare | Kick – Snare – [fill] | Kick – Snare | Kick – Snare – [fill] – [fill].

Not all compound-meter grooves are restricted to pure compound beat divisions. Eleven- and thirteen-pulse options are often used to vary an otherwise 6/8 or 12/8 metric fabric. Not surprisingly, Amos is responsible for some of the most involved manipulations of this sort. At its most complex, 'Datura' is based on a process of metric alternation that extends upward through three hierarchical levels. The measure level comprises an alternation of 6/8 and larger measures, the two-bar level alternates between thirteen (6,7) and larger cardinalities, and the four-bar level alternates between twenty-eight (13,15) and twenty-seven (13,14). The drums are an indispensable aid for any listener wishing to hear their way through these complexities, consistently marking the fourth pulse of every measure with a snare backbeat. Drum fills stretch the metric fabric to accommodate the longer measures. Another notable example is a recurring instrumental in Tool's 'Intolerance' that expertly balances elements of compound and 4/4 meters. The two-part (13,16) structure juxtaposes what seems like an expanded 12/8 (or 12/16) measure against a double tresillo (3,3,3,3,2,2), most commonly understood as a syncopated expression of a 4/4 meter. By marking the fourth sixteenth note of each measure with the snare, the drumbeat only weakly directs the listener towards a compound hearing, leaving interpretation open.

Ambiguous and Mixed Cases

While the structures of most of the larger patterns I have identified are best described as either punctuated or split, there exist several ambiguous cases as well as some cycles large enough to employ both strategies at different hierarchical levels. Table 7.3 summarizes eight relevant examples. The ((8,8)(8,8))((7,7)(7,8)) groove in Radiohead's 'Paranoid Android', noted in my introduction, exemplifies the mixture of punctuated and split strategies. At a high level, the cycle is a two-part split. The first part remains consistently in 4/4 time, while the second punctuates a 7/8 run with a single 4/4 measure. The drums maintain a backbeat or close variant, peppered with fills that do not destabilize the established meter. Frank Zappa's 'Catholic Girls' contains a more complex instrumental – more changes of meter, using meters that are less common (see Example 7.3). Nevertheless, apart from the inversion of the hierarchical relationship between split and punctuated strategies, the structural principles at work in 'Catholic Girls' are essentially the same as in 'Paranoid Android'. As the example shows, the better part of the groove alternates between pairs of measures in 9/16 (2,2)(2,3) and 7/16 (4,3), establishing a split cycle of four

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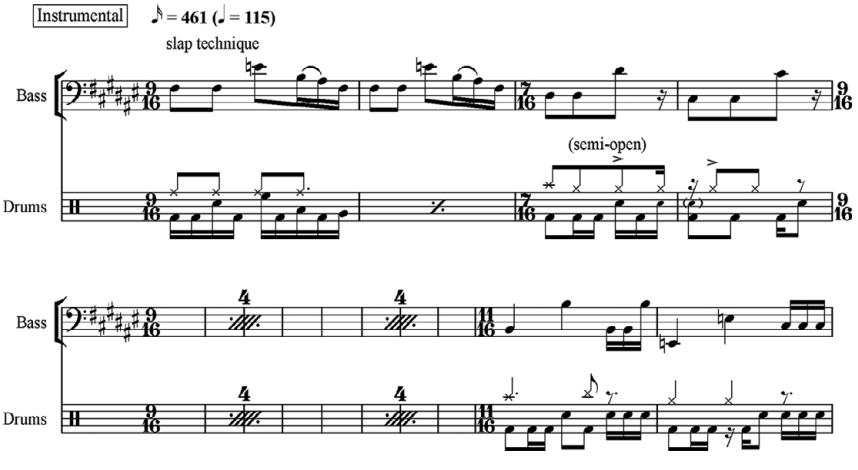
Table 7.3 *Examples of ambiguous irregular cycles*

Drumbeat Description	Meter: Structure Description	Meter: Card.	Artist—Song (year)
	Ambiguous Grooves		
Backbeat variant with second of three snare hits displaced	Split (3/4 + 4/4) or punctuated (3,3,3,3)(2)	14*	Tool—'Schism' (2001)
Compound-meter backbeat with extended, hemiola fills	Split (9/8 + 3/4) or punctuated (3,3,3) (2,2,2)	15	Dream Theater —'The Count of Tuscany' (2009)
Undifferentiated kick	No clear/consistent subdivisional structure; synth sometimes groups sub-beats as ((2,2)(2,2))((3,2)(2,2))	17*	Björk—'Hollow' (2011)
Backbeat or half-time backbeat (simple grouping); fills (compound)	Split (8,6,9) or punctuated (2,2,2,2,2,2,2)(3,3,3)	23*	TTNG—'Baboon' (2008)
Backbeat and backbeat variant	Four-part split: 3/4, 7/8, 3/4, 4/4 or (6,7)(6,8); but punctuated texture—3x similar guitar riff + fourth measure of chordal texture	27*	Better than Ezra —'King of New Orleans' (1996)
Some slow compound-meter backbeat; some compound-meter undifferentiated kick	Mostly 6/4; isolated 4/4 measure but not the final measure of the cycle (i.e. not quite 'punctuated') 6/4 (×3); 6/4, 4/4; 6/4 (×2)	40	Radiohead—'The Tourist' (1997)
	Grooves that Mix Punctuated and Split Structures		
Mixed – see Example 3	Deep four-part punctuated (32,32,32,22‡); run comprises split structures (9,9|7,7) 9/16 (×2) | 7/16 (×2)—all ×3; 11/16 (×2)	118‡	Frank Zappa —'Catholic Girls' (1979)
Backbeat and backbeat variant + fills	Deep two-part split (4mm. + 4mm.); second part punctuated (7,7)(7,8) 4/4 (×4) | 7/8 (×3), 4/4	61*	Radiohead —'Paranoid Android' (1997)



Example 7.3 A combination of punctuated and split structures in the instrumental in Frank Zappa's 'Catholic Girls' (1979): 1:38

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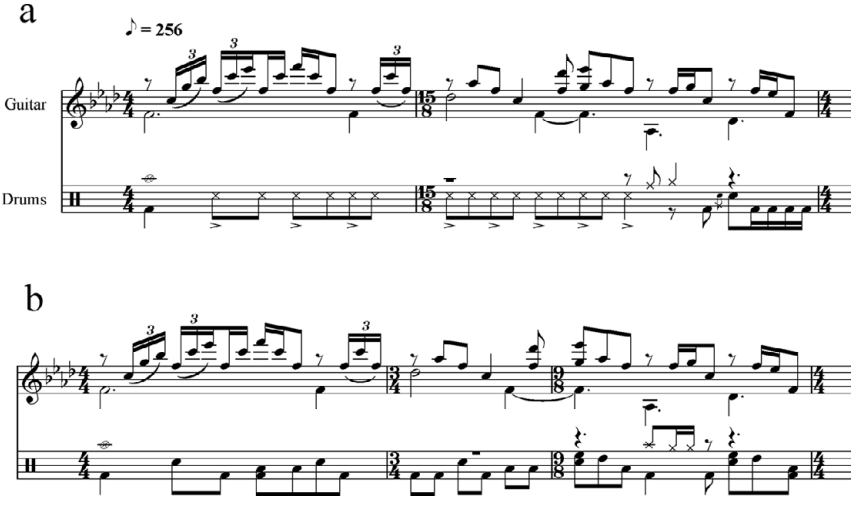
duple measures. At a deeper (fourteen-measure) level, a run comprising three repetitions of this split cycle is punctuated by two measures of 11/16, modeled on a triple meter with a deletion of the final sixteenth note (4,4,3). The full cycle is thus ((9,9)(7,7))((9,9)(7,7))((9,9)(7,7))(11,11). The drums are confined to undifferentiated tom and cymbal work through much of the groove, reinforcing the surface-level subdivisions of the melodic line. However, a few emphatic snare articulations are definitive in directing listener attention. For example, a backbeat articulation in the first 7/16 measure clarifies the duple nature of that measure and confirms the irregularity of the overall passage (otherwise, it might be possible to hear the (9,9)(7,7) span as a syncopated 4/4 groove). The snare drum also renders the triple structure of the 11/16 measures unambiguous.

Unlike the complex but clear metric structures just discussed, other examples listed in Table 7.3 are less well defined, often due in part to the absence of a backbeat variant in the drums. I consider one example in detail to highlight some relevant considerations when analysing ambiguous cases. The opening groove of TTNG's 'Baboon' presents a mild conflict between an undifferentiated quarter-note snare rim knock through the first two thirds of the cycle and a dotted rhythm in the guitar through the last two thirds (see Example 7.4(a)). The twenty-three eighth notes are most likely grouped as (8,6,9), and the first and last groups almost certainly recommend simple and compound subdivision, respectively. What is less clear is the subdivision of the six-pulse group: when I follow the snare, I hear a measure of simple triple meter, whereas the guitar suggests compound duple time, anticipating the following compound triple group.



Example 7.4 Two drumbeats suggest different interpretations of the same guitar riff in TTNG's 'Baboon' (2012): (a) 0:00, (b) 0:47

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The compound-meter interpretation is reinforced by vocal articulations throughout the first verse, likely leading first-time listeners to hear an alternation of 4/4 and 15/8 measures – a clear split structure.

New complications arise in the second verse, despite the shift to a traditional backbeat through the first two measures of the cycle (see Example 7.4(b)). The same two conflicting metric layers remain present but, because of the emphatic nature of the backbeat, I find that it requires a concerted effort to entrain to the compound-meter option as early in the cycle as in verse one. Moreover, the final seven pulses do not group together to punctuate a straightforward run of two 4/4 measures. Rather, the compound feel in the final beats is supported by the drums beginning with the final snare backbeat of the second measure, suggesting either an extension followed by a compound duple measure (8,9,6) or an elision of 4/4 and 9/8. This latter interpretation is reflected in my transcription through my use of the 3/4 time signature, which does not denote a true measure of simple triple time (most often articulated with snares on beats two and three) but rather an abbreviated 4/4 measure.

The drumbeat changes again in the third verse, now articulating a half-time backbeat for the first seven beats of the cycle. This option undercuts the early compound grouping even more decisively than the standard backbeat in the second verse. The shift to compound time is clarified through its contrast to the initial half-time feel: the drums support an unambiguous 9/8 measure, interrupting the second would-be 4/4 measure. But what is the logic of the resulting (4,4)(4,2)(3,3,3) structure? Is it split – either in two parts with differing subdivisions, seven duple and three triple units, or in three parts like the first verse (8,6,9) – or is it a simple-meter run punctuated by a compound-meter comma? One issue concerns the relative proportions of the groups involved: eight, six, and nine are about as well balanced as fourteen and nine, making it difficult to intuitively hear either grouping structure as preferable. Put differently, while the nine-pulse group is undoubtedly small enough to satisfy the definition of a comma, it is not so small as to compel that interpretation (unlike, for example, a three- or even a six-pulse group). The same question of balance characterizes the ambiguous grooves in Dream Theater's 'The Count of Tuscany' and Tool's 'Schism'.

Conclusions

The drum kit shapes listener interpretations of metric structures in several ways. The perceptual salience of most drum-kit articulations lends the instrument a welcome clarity within demanding musical soundscapes such

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as those presented above. At the musical surface, this clarity aids in the task of beat identification. Changes in sub-tactus grouping (below the level of the quarter note), for instance, are often open to multiple interpretations, or would be without some direction from the drums. At the measure level, backbeat variants are by far the most common approach taken by drummers when navigating irregular grooves. For listeners, these drumbeats afford ready analogy to the archetypal 4/4 backbeat, clarifying which beats and sub-beats serve the role of metric continuation within an irregular cycle. Also following their use in regular meters, drum fills in irregular metric contexts are typically deployed at phrase boundaries. In punctuated cycles the comma is often marked by a fill – sometimes modifying the drumbeat only modestly, to accommodate the change of meter, other times employing more assertive means to draw listener attention away from the metric irregularity and refocus it towards the impending downbeat. In split cycles fills may indicate subgroup boundaries, most commonly with larger cycles.

In this chapter, analysis of the drum kit has revealed a great deal of syntactic detail within the recordings analysed. Attending to the syntax of drum-kit performances decodes irregular metric patterns, which in turn shape the temporal experience of grooves. While this syntactic treatment of the music has been my primary focus, I hope to have drawn attention to the importance of performance practice in shaping recorded music, and to the ultimate subjectivity endemic to listener interpretation. Regarding performance practice, this study would have been impossible without understanding the backbeat and its role in rock drumming. Further investigation of drumming performance (e.g. sticking patterns or teacher lineages) would enhance my analysis. Regarding listener interpretation, these analyses are limited insofar as they remain my own. To fully understand the interaction of drumming and meter at an intersubjective level will require cognitive studies pooling hundreds of listeners' metric interpretations. Ultimately, the theory of punctuated and split metric structures that I have sketched here demonstrates the centrality of drum-kit syntax to the performance, perception, and analysis of metrically irregular rock music.

Notes

1 See G. Tamlyn. 'The Big Beat: Origins and Development of Snare Backbeat and other Accompanimental Rhythms in Rock'n'Roll', unpublished thesis, University of Liverpool (1998), pp. 54–60; M. Mauch and S. Dixon. 'A Corpus-Based Study of Rhythm Patterns', *13th International Society for Music Information Retrieval Conference* (2012), pp. 163–168; N. Biamonte. 'Formal Functions of Metric Dissonance in Rock Music', *Music Theory Online* 20:2 (2014).

2 See M. W. Butterfield. 'The Power of Anacrusis: Engendered Feeling in Groove-Based Musics', *Music Theory Online* 12:4 (2006), following J. A. Prögler. 'Searching for Swing: Participatory Discrepancies in the Jazz Rhythm Section', *Ethnomusicology* 39:1 (1995), pp. 21–54. See also

A. Danielsen (ed.), *Musical Rhythm in the Age of Digital Reproduction* (Burlington: Ashgate Publishing, 2010).

3 See M. Butler. *Unlocking the Groove: Rhythm, Meter, and Musical Design in Electronic Dance Music* (Bloomington: Indiana University Press, 2006); I. Chor. 'Cognitive Frameworks for the Production of Musical Rhythm', unpublished thesis, Northwestern University (2010); and N. Biamonte.

4 An eloquent injunction to seek out such points of intersection between 'the rigour by which scientific work is judged' and 'the experience that is music' is found in A. F. Moore, 'Listening to the Sound Music Makes' in C. Scrotto, K. Smith, and J. Brackett (eds.), *The Routledge Companion to Popular Music Analysis: Expanding Approaches* (New York: Routledge, 2019), p. 48.

5 In particular, I follow F. Lerdahl and R. Jackendoff. *A Generative Theory of Tonal Music* (Cambridge: MIT Press, 1983);C. Hasty. *Meter as Rhythm* (New York: Oxford University Press, 1997); D. Temperley. *The Cognition of Basic Musical Structures* (Cambridge: MIT Press, 2001); J. London. *Hearing in Time: Psychological Aspects of Musical Meter*, 2nd ed. (New York: Oxford University Press, 2012); and the extensive experimental work of Mari Riess Jones, Edward Large, and Caroline Palmer.

6 London, *Hearing in Time* suggests that metric entrainment has an upper limit of 1.8–2 seconds, summarizing experimental findings.

7 On chunking see, e.g. I. Neath and A. M. Surprenant, *Human Memory: An Introduction to Research, Data, and Theory*, 2nd ed. (Belmont: Wadsworth, 2003).

8 On tempo see, e.g. J. London, B. Burger, M. Thompson, and P. Toiviainen. 'Speed on the Dance Floor: Auditory and Visual Cues for Musical Tempo', *Acta Psychologica* 164 (2016), pp. 70–80.

9 Fundamental issues in transcribing recorded music are outlined by C. Doll. 'Some Practical Issues in the Aesthetic Analysis of Popular Music' in C. Scrotto, K. Smith, and J. Brackett (eds.), *The Routledge Companion to Popular Music Analysis: Expanding Approaches* (New York: Routledge, 2019), pp. 7–9, which treats rhythmic interpretation.

10 See T. de Clercq. 'Measuring a Measure: Absolute Time as a Factor for Determining Bar Lengths and Meter in Pop/Rock Music', *Music Theory Online* 22:3 (2016); R. Cohn. 'Meter' in A. Rehding and S. Rings (eds.), *The Oxford Handbook of Critical Concepts in Music Theory* (Oxford: Oxford University Press, 2019); and C. Doll, 'Some Practical Issues in the Aesthetic Analysis of Popular Music'.

11 This and other systems of numerical shorthand for describing metric subdivisions are summarized in M. Gotham. 'Meter Metrics: Characterizing Relationships Among (Mixed) Metrical Structures', *Music Theory Online* 21:2 (2017), pp. 2–5.

12 See Hasty, *Meter as Rhythm*, p. 105.

13 See S. Murphy. 'Cohn's Platonic Model and the Regular Irregularities of Recent Popular Multimedia', *Music Theory Online* 22:3 (2016).

14 I discuss the relevant drumbeat patterns in Chapter 4 of 'Unpopular Meters: Irregular Grooves and Drumbeats in the Songs of Tori Amos, Radiohead, and Tool', unpublished thesis, University of Toronto (2018). And in 'Using Drumbeats to Theorize Meter in Quintuple and Septuple Grooves', *Music Theory Spectrum* 42:2 (2020).

15 Drummer Matt Chamberlain is an indispensable asset in bringing life to these metric irregularities, but it seems that Amos is their originator. Examples of the same sort of metric play are found as early as *Under the Pink* (1994), before Amos began working with Chamberlain (see, e.g. 'Past the Mission', 'Icicle', and 'Yes, Anastasia').

16 See J. Pieslak. 'Re-casting Metal: Rhythm and Meter in the Music of Meshuggah', *Music Theory Spectrum* 29:2 (2007), pp. 219–245; O. R. Lucas. '"So Complete in Beautiful Deformity": Unexpected Beginnings and Rotated Riffs in Meshuggah's obZen', *Music Theory Online* 24:3 (2018).

17 A transcription can be found in B. Osborn. *Everything in Its Right Place: Analyzing Radiohead* (New York: Oxford University Press, 2017), p. 67.