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Syncopation in rock: a perceptual perspective

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Introduction

While study of the social and cultural aspects of popular music has been flourishing for some time, it is only in the last few years that serious efforts have been made to analyse the music itself: what Allan Moore has called 'the primary text' (1993, p. 1). These efforts include general studies of styles and genres (Moore, 1993; Bowman, 1995); studies of specific aspects of popular styles such as harmony and improvisation (Winkler 1978; Moore 1992, 1995; Walser 1992), as well as more intensive analyses of individual songs (Tagg 1982; Hawkins 1992). In this paper I will investigate syncopation, a phenomenon of great importance in many genres of popular music and particularly in rock.

One issue that arises frequently in the studies cited above is the question of whether it is valid or useful to apply methods from mainstream music theory and analysis to popular music. In this paper I will make the case that such an approach can indeed be valuable. However, my concern here is not with well-established paradigms such as Schenkerian analysis and set theory, but rather with a recently developing branch of music theory, what might be called cognitive music theory. Cognitive music theory is an interdisciplinary field, lying in the overlap between music theory and psychology, which brings together the perspectives of the two disciplines in studying problems of music perception and cognition. In large part, cognitive music theory has been concerned with aspects of music which are often taken for granted in mainstream music theory, but which closer study has shown to be highly complex, for example, the mental representation of chords and keys (Krumhansl 1979, 1990; Lerdahl 1988), the detection of meter (Lerdahl and Jackendoff 1983; Parncutt 1994), the way melodies are perceived and remembered (Meyer 1973; Dowling 1978; Rosner and Meyer 1986; Narmour 1990), and the grouping of musical events into segments and phrases (Lerdahl and Jackendoff 1983; Deliege 1987; Palmer and Krumhansl 1987). This work parallels work in cognitive psychology and cognitive science which investigates the mental processes and representations underlying other commonplace abilities such as vision and language. Cognitive music theory is allied with psychology, also, in that it generally concerns itself with the hearing of a broad population, rather than just trained experts: often, the goal is to describe the hearing of an 'experienced listener', namely someone who is familiar with a genre of music through exposure but not necessarily musically trained. As such, cognitive music theory does not seem open to the criticism, sometimes levelled against theory and analysis by students of popular music, that it is merely concerned with pieces as autonomous formal objects, divorced from experience and culture.[1] It is true that the kinds of musical structure studied in music cognition tend to be, in a sense, fairly basic or low-level aspects, and are assumed to be explicable on their own terms without reference to higher levels of cultural context and 'meaning'. But to study lower levels of musical structure in this way is not to assume that the higher levels are unimportant, any more than studies of phonology and syntax deny the importance of higher-level understanding in language. A full understanding of popular music, or any other kind of music, must surely address both the higher levels of musical experience and the lower-level processes and representations that support them.

As in much music theory, my evidence in this paper is simply pieces of music, along with my own intuitions, as an experienced listener of the style, about their structural (particularly metrical) implications. In the present case, however, the 'pieces of music' at issue are represented not by scores, as in conventional music theory, but by recordings, which I have transcribed. There is no reason why this should be problematic; however, it does raise some methodological questions, which I will address later.

Syncopation

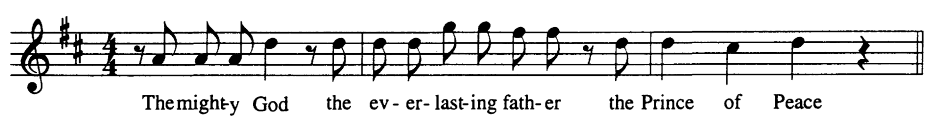
The *Oxford Companion to Music* defines syncopation as 'the displacement of the normal musical accent from a strong beat to a weak one'. While I will propose a slightly different understanding of the term, this definition does point to two important aspects of syncopation. First, syncopation involves a deviation from the 'normal' placement of an accent: usually, accents occur on strong beats, but in a syncopation, a weak beat (or rather an event on a weak beat) is accented. Second, syncopation involves displacement; in a syncopation, an accent that belongs on a *particular* strong beat is shifted or displaced to a weak one (I will suggest that it is actual events, rather than accents, that are displaced, but the idea of something being displaced from where it belongs is essentially right). The distinction between these two points – the accenting of weak beats, and the displacement of an accent from one beat to another – is important. Simply understood as the accenting of weak beats, syncopation is commonplace in many kinds of music, including classical music. Two instances are shown in Example 1, both from Beethoven piano sonatas: in each case, several weak beats are accented by notes in the right hand. However, it is not at all clear that these passages involve displacement; are the accents really heard as belonging on some other beat? In the case of rock, however, the sense of displacement is much more apparent, and there are strong constraints on the ways in which this displacement occurs. In this way, I shall argue, the nature of syncopation in rock is fundamentally different from that in classical music.

The terms rock and classical are, of course, vague and problematic. I shall not attempt to define them here, but shall rely on their common-sense meanings. My conception of rock is roughly indicated by my choice of musical examples, although perhaps not everyone would consider all of these examples to be rock. The phrase 'classical music' is meant in its broader sense: i.e., art music of the eighteenth and nineteenth centuries, rather than merely music of the classical period.

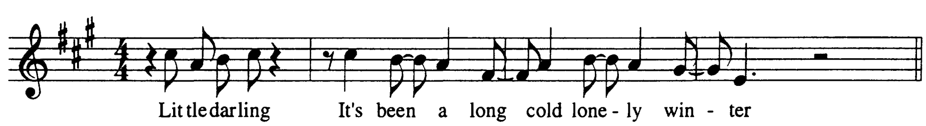
The clearest evidence of syncopation in rock is found in the setting of text. Consider the melodies in Example 2. The first is from Handel's *Messiah*; the second and third are from Beatles songs, 'Here Comes The Sun' and 'Let It Be'. It is a well-known fact that text tends to be set to music in a way which matches the stresses of the text with the metrical accents or 'strong beats' of the music. In most

Example 1a. Beethoven, Sonata op. 2 no. 3, 1, mm. 147–50

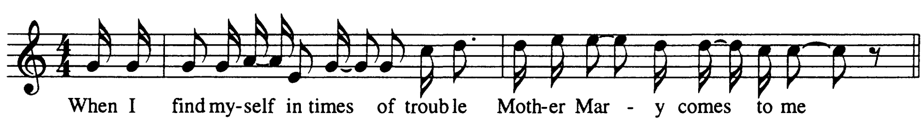
Example 1b. Beethoven, Sonata op. 31 no. 1, 1, mm. 66–9



Example 2a. Handel, 'For Unto Us a Child is Born', from Messiah



Example 2b. The Beatles, 'Here Comes The Sun'



Example 2c. The Beatles, 'Let it Be'

pre-twentieth century vocal art music or folk song, it will be found that stressed syllables generally coincide with relatively strong beats. This can be seen in the Handel passage in Example 2a. In the two Beatles melodies, however, this is clearly not the case. The melodies are shown in Figure 1 with their associated metrical structure (which is clearly communicated by the accompanying instruments). The

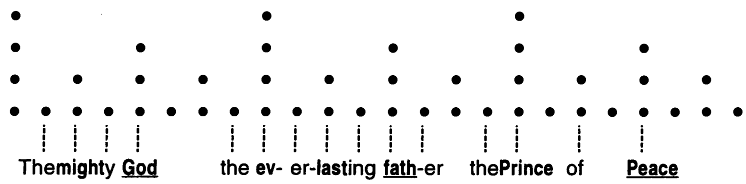


Figure 1a. 'For Unto Us a Child is Born', metrical structure

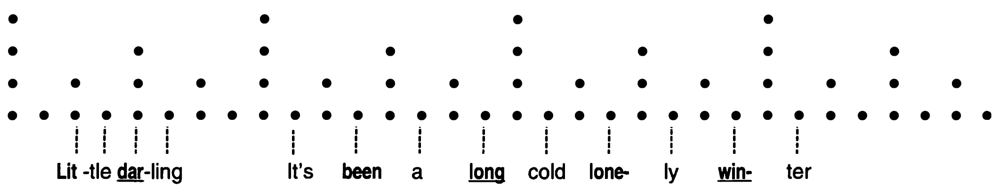


Figure 1b. 'Here Comes The Sun', metrical structure

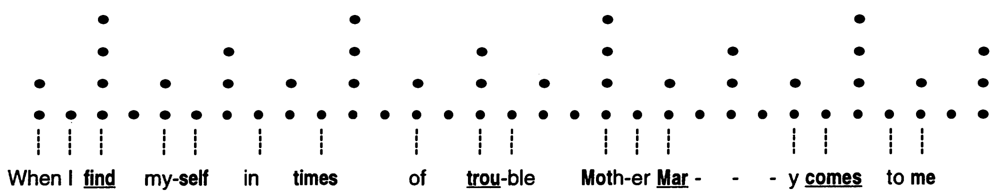


Figure 1c. 'Let it Be', metrical structure

stress pattern of the lyrics is also shown in an informal way, with stressed syllables emboldened and highly stressed syllables emboldened and underlined. In 'Here Comes The Sun', 'been', 'long', 'lone-' and 'win-' are stressed; the syllables in between are unstressed. But in the music, each of these syllables falls on a weak metrical beat; thus they are all equal in metrical terms. In 'Let It Be', '-self' is stressed while 'my-' is unstressed; musically, however, 'my-' is on a stronger beat than '-self'. Yet the Beatles melodies do not sound anomalous or metrically ambiguous; indeed, they are quite typical of the style in their use of rhythm. At first thought, this might suggest that the rules for text-setting in rock are fundamentally different from those in classical music. Notice, however, that if certain notes in the melodies are shifted over by a quaver or semiquaver, the metrical grid becomes nicely aligned with the stress pattern of the words. It seems reasonable to suggest, therefore, that, in the internal representation we form when listening to rock music, we are understanding the metric grid and the stress pattern as coinciding. We retain, on principle, the assumption that stressed syllables should occur on strong beats, but we understand certain syllables as 'belonging' on beats other than the ones they fall on. I will begin by proposing a simple way of formalising this rule, using the framework of Lerdahl and Jackendoff's *Generative Theory of Tonal Music*. I will then use this model to explore some of the specific ways that syncopation is used in rock.[2]

Lerdahl and Jackendoff's theory of meter

In *A Generative Theory of Tonal Music*, Fred Lerdahl and Ray Jackendoff propose a detailed theory of metre: more specifically, a theory of the nature of metrical structure and the way it is inferred from musical surfaces (1983, pp. 68–104). (The theory of metre is only one component of a larger theory governing various kinds of hierarchical structure in music perception.) Lerdahl and Jackendoff distinguish between 'well-formedness rules', which govern the kinds of structures that are legal, and 'preference rules', which predict the structure that will be formed for a given piece. The metrical well-formedness rules state that a metrical structure consists of a series of levels of beats, in which beats at each level are equally spaced, and every second or third beat at one level is also a beat at the immediately higher level. In a standard 6/8 metre, for example, there will be one level of beats corresponding to quavers, every third beat at that level will be a beat at the next level up, corresponding to dotted crotchets; every second beat at that level forms a still higher level, corresponding to bars. (Note that beats are points in time, rather than actual events.) The well-formedness rules permit a large number of metrical structures to be formed; the task of the preference rules is to select the optimal structure for a given piece. Some of the preference rules are listed in Figure 2 (the language has been simplified in some cases). What the theory says, in effect, is that among the possible well-formed metrical structures for a piece, the one we will choose is the one which most satisfies the preference rules. In some cases, the preference rules may reinforce each other, leading to a stable and unambiguous metrical interpretation; in other cases, they may conflict (that is, there may be no metrical structure which satisfies all the rules); in this case, the effect will be one of instability and ambiguity.

An example of Lerdahl and Jackendoff's theory is shown in Example 3, using the melody of Mozart's 40th symphony. It is assumed that even a listener who was unfamiliar with the piece would infer the correct metrical structure for the melody,

MPR 1	Prefer a metrical structure in which parallel groups of events receive parallel metrical structures.
MPR 3	Prefer a metrical structure in which strong beats coincide with event-onsets.
MPR 4	Prefer a metrical structure in which strong beats coincide with stressed events such as sforzandos.
MPR 5a	Prefer a metrical structure in which a relatively strong beat occurs at the inception of a relatively long pitch event.
MPR 5f	Prefer a metrical structure in which strong beats coincide with changes in harmony.
MPR 6	Prefer a metrical stable bass (i.e., the other metrical rules apply particularly strongly to bass notes).

MPR 11	(proposed by the author) Prefer a metrical structure in which strong beats coincide with stressed syllables of the text.

Figure 2. Metrical Preference Rules (from Lerdahl and Jackendoff 1983, pp. 347–8). Only some of the rules are shown; in some cases the language has been simplified

Example 3. Mozart, Symphony no. 40, 1 (after Lerdahl and Jackendoff 1983, p. 74)

shown in the example as structure A. This corresponds to the notated metre: that is, the highest level of beats in structure A corresponds to the downbeats of measures in the score. (In some cases there may also be levels of metres above the measure – so-called 'hypermetrical' levels – but these need not concern us here.) The theory's aim is to explain why it is that this particular structure would be inferred as opposed to other structures, such as structure B or C. For example, structure A is preferred over the others because it results in the three crotchet D's being metrically strong; this satisfies MPR 5a, which prefers strong beats on longer events. Structure C is less preferred because, under that interpretation, several strong beats do not coincide with event-onsets (MPR 3). (Structure A also aligns strong beats with events in the bass line – not shown – which is particularly preferred by MPR 6.) Finally, MPR 1 asserts that segments which can be regarded as parallel should be assigned parallel metrical structures; thus a structure is preferred which assigns parallel structures to the repeated quaver–quaver–crotchet motive: this favours A and B over C.

The examples of syncopation discussed earlier related to the setting of text. We noted that there is a general principle in Western music that stressed syllables of text should be aligned with strong metrical beats; this rule often seems to be violated in rock. We encounter a problem here, in that the metrical theory of *GTTM* its original form does not address text-setting.[3] I therefore propose a simple extension of the theory, MPR 11:

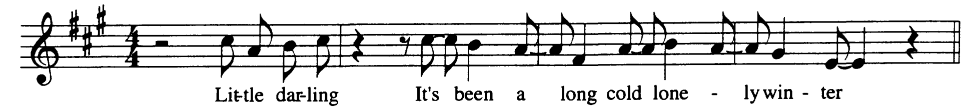
MPR 11. Prefer a metrical structure in which strong beats coincide with stressed syllables of the text.

In other words, in inferring a metrical structure from a vocal melody, we prefer a structure in which stressed syllables and strong beats are aligned. Several points should be made about this rule. First, it is rather imprecise; it predicts that a metrical structure in which stressed syllables are aligned with strong beats will be preferred over one in which they are not, but it says nothing about how this will be measured. This is in keeping with the spirit of the other rules in *GTTM*, which are generally stated in a fairly informal fashion. We have also said nothing here about the highly complex matter of stress in language. There is in fact some disagreement about how linguistic stress should be represented. One theory proposes a tree structure, representing pairs of syllables as strong or weak relative to one another, with each strong syllable then forming a strong–weak relationship with another syllable; another model proposes a metrical grid (similar to Lerdahl and Jackendoff's grids for music, except that beats at each level need not be evenly spaced), with more stressed syllables being marked by higher-level beats. (For a review of work in this area, see Dogil 1984). We will not pursue this matter further here; either representation would provide the information necessary for present purposes, that is, the relative stress levels of syllables in a phrase. A final point: it seems clear that MPR 11 is strongest at fairly low levels (both of stress and of metre). At higher levels, one often finds conflicts between metre and stress; for example, in the Handel phrase in Example 2, 'FATHer' is stressed relative to 'EV', but is metrically weaker; but this does not seem wrong or unnatural. Thus MPR 11 operates primarily at local levels.

Incorporating rock syncopation into the *GTTM* theory

Let us now apply *GTTM*'s theory of metre (including the new rule just added) to the melodies in Example 2. In all three cases, the metrical structure corresponding to the notated metre is clearly implied by the accompaniment (which is not shown here). This is accounted for nicely by *GTTM's* metrical preference rules; by the notated metre's strong beats are well aligned with events rather than rests (MPR 3), particularly bass note events (MPR 6), as well as changes in harmony (MPR 5f). In the Handel, the melody appears to reinforce the notated metre as well. As discussed earlier (and as MPR 11 now stipulates), we prefer to align stressed syllables with strong beats; given the notated metre, stressed syllables and strong beats in the Handel coincide almost perfectly. In the Beatles melodies, however, the notated metre seems quite incompatible with the melody. In some cases stressed and unstressed syllables are equally metrically weak (as in 'Here Comes The Sun'); in other cases, unstressed syllables are actually metrically stronger than adjacent stressed ones (as in 'Let It Be'). (Since other syllables in each melody reinforce the notated metre, such as the phrase 'LITTle DARling', there is conflict not only between the melody and the accompaniment, but also between the different sections of the melody.) There are conflicts between these melodies and the notated metre, with regard to other preference rules as well. For example, MPR 3 would prefer a structure where every event-onset falls on a strong beat; yet in the second phrase of the first example, 'It's been a long cold lonely winter', exactly the opposite is the case. MPR 5a prefers structures where longer syllables fall on metrical accents; in the second example, however, '-self', 'times' and 'Mar-' are relatively long but fall on weak beats. In the Handel melody, by contrast, both of these rules are followed fairly strictly (as they are in most classical music; I shall return to this point).

The phenomenon of rock syncopation would seem to present a problem, or at the very least a question, for *GTTM* as it stands. For it is a case where conflicts between the metrical preference rules appear to be extremely common, indeed, normative. There are several possible ways of explaining this situation. One pos-



Example 4. Ungrammatical setting of 'Here Comes The Sun' lyric

sibility is to simply regard syncopations as minor destabilising elements, which are outweighed by other factors favouring the notated metre. As mentioned above, preference rule conflicts are in themselves not be taken as evidence against the theory; they occur frequently in many kinds of music, often to add an element of ambiguity or tension. In rock, the accompanying instruments usually establish the metre of a song quite clearly; syncopations in the melody, it might be argued, simply add a small degree of metric instability. Lerdahl and Jackendoff's remarks on jazz suggest that they might support this view:

The stylistic norm [of jazz] is not simply stresses on weak beats; it consists rather of a number of strategies aimed at increasing local metrical tension. The normal preference rules do not fail to apply; in fact they are exploited as a means of creating the desired metrical tension, which results from a conflict among rules. (Lerdahl and Jackendoff 1983, p. 279.)

I find this argument rather implausible. It would suggest that rock syncopations, apart from adding a small degree of ambiguity, do not really affect our judgments of a song's metre; they are heard as conflicting with the metres but are disregarded or overruled. But, as argued earlier, the syncopations in Example 2 do not seem incompatible with the notated metre; there is very little sense of ambiguity or instability in these melodies. Indeed, it seems quite likely to me that even if one of these melodies was heard unaccompanied, the metre that was inferred would be the correct one. Moreover, other possible settings of these melodies clearly *do* seem incompatible with the notated metre. Consider the alternative setting of the 'Here Comes The Sun' lyric in Example 4 (assume, as before, that the notated metre is clearly implied by the accompaniment). This setting seems to conflict with the notated metre; in the context of an accompaniment implying the notated metre, it would, I think, sound quite wrong. This suggests that we do not simply disregard, or override, melodic syncopations in our judgments of metre, indeed, syncopated rhythms often seem to reinforce the metre of a song rather than conflicting with it.

An alternative approach would be to view syncopation as some sort of deviation from an underlying structure. When we hear a syncopated melody, therefore, we infer an underlying structure for it which is different from the surface structure. Lerdahl and Jackendoff posit a 'musical surface', a mental representation of the pitches and durations of a piece which is used as the input for metrical analysis and other processes (1983, p. 3). What I am proposing here is that there is a 'deep surface representation' (as opposed to the 'surface surface representation'), also consisting of pitches and durations, which is similar to the 'surface surface' except that syncopated events are 'de-syncopated': that is, stressed syllables are shifted over to the strong beats on which they belong. It is then this deep representation which serves as the input to further processing. (To avoid confusion I will simply refer to these as the 'deep structure' and the 'surface structure'. These terms are of course borrowed from linguistics, but no further analogy with language is intended.) We therefore posit the following rule:

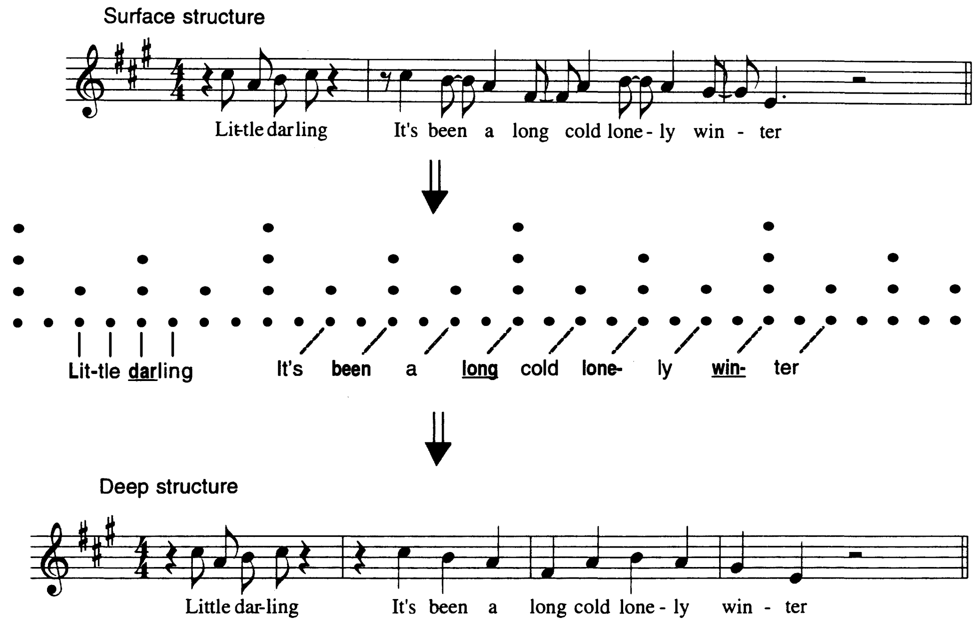
Syncopation Shift Rule. In inferring the deep structure of a melody from the surface structure, any event may be shifted forward by one beat at a low metrical level.

For the sake of generality, we could propose a 'deep structure' in other tonal music as well, except that in classical music the deep structure and surface structure are identical. (In fact, some have proposed deep-structure/surface-structure distinctions for classical music as well, as I discuss below.) How is it to be determined whether or not a particular event is to be shifted forward, or which level it is to be shifted at? The answer is simple: the solution is chosen which most satisfies the metrical preference rules. (All the rules are to be taken into account here, not just the one pertaining to text.) We therefore either leave an event where it is, or shift it forward to a following beat at some level, depending on which resulting deep structure better satisfies the preference rules.

Two points of clarification are needed here. By an 'event', I mean a single note in a line; thus there may be several simultaneous events at a given moment. This is an important point; it should be possible for one event to be de-syncopated (that is, to be shifted forward to a following beat), while other simultaneous events (such as accompaniment chords) are not. Another question arises here: when we shift an event forward, do we shift the attack-point forward (thereby making the event shorter), or do we shift the entire event forward? This is a rather difficult question. Shifting only the attack-point forward might reduce the duration of the event to zero (or it might even make the attack-point occur later than the end of the event); on the other hand, shifting the entire event forward might cause it to overlap with the following event in the melody. I believe the problem of getting the right durations for events can be solved, but I will not address it here; for now we will simply adjust the durations of events in an *ad hoc* manner.

The idea of regarding musical surfaces as transformations of underlying structures is not new. In particular, it brings to mind Schenkerian approaches to rhythmic structure, such as those of Arthur Komar (1971) and Carl Schachter (1980). In these approaches, rhythmic information is added to Schenkerian reductions, so that events in the reduction are given explicit rhythmic values. What is important for present purposes is that this reductive process may also involve the rhythmic alteration of events. For example, syncopated events may be shifted to metrically stronger positions, irregular phrases may be made regular (for example, a 5-bar phrase might be 'normalised' to 4 bars), and so on. In a sense, the fact that rhythmic transformations have been proposed elsewhere in music theory might provide further justification for proposing them in rock. However, as some authors have noted (Lester 1986, p. 187–9; Lerdahl and Jackendoff 1983, p. 288), the idea of positing transformations as a general aspect of rhythmic structure is in some ways problematic. It is often difficult to decide what the underlying structure for a passage should be; particularly at higher levels, it is not entirely clear what the motivation is for positing normalised versions of passages at all. Indeed, reductions of the kind proposed by Schachter and Komar might best be regarded, and in fact may well be intended, as ways of enhancing one's hearing of pieces, rather than as models for general perception. By contrast, the kind of normalisation that I propose here is extremely local and quite constrained in the way it may be applied. I shall argue that there is quite strong and compelling evidence for the 'psychological reality' of normalisations of this kind. Whether normalisation can legitimately be applied in more general and large-scale ways is an important question, but we will not pursue it here.

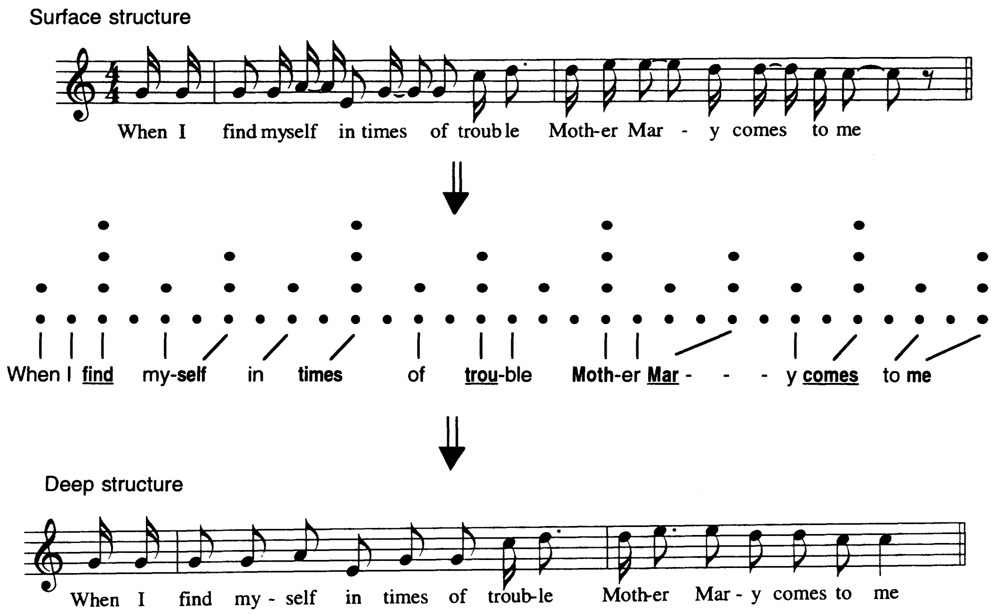
The scheme I am proposing is as follows. In hearing a melody, we first form a 'surface' representation of pitches and durations; we then form a 'deep structure'



Example 5. 'Here Comes The Sun', showing metrical shifts

representation, which is similar, except that the syncopations have been 'normalised'. It is then this deep structure which serves as the input for further structures such as metre (and other kinds of structure as well, as I explain below). However, there is feedback in the system, in that the deep structure we choose for a melody will depend on the metrical preference rules: we will choose the deep structure that allows the preference rules to be maximally satisfied.

Let us apply this model to the phrase from 'Here Comes The Sun', shown in Example 5. This shows the way the deep structure of the phrase is generated from the surface structure. The placement of the syllables in the metrical diagram represents their position in the surface structure; the lines show how they are shifted (in some cases) to different positions in the deep structure. In the first half of the phrase ('Little darling'), the surface structure of the melody satisfies MPR 11 well: the stress level of events corresponds nicely to their metrical strength, so no shifting of events is necessary. Now consider the syllables 'It's–been'. According to MPR 11, stressed syllables should fall on stronger beats rather than unstressed syllables; thus 'been' should fall on a stronger beat rather than 'it's'. If we leave the syllables exactly as they are, they have the same metric strength: both are on beats at level 1 (i.e., the lowest level). But now if we shift 'been' forward by one beat, it now falls on a beat at level 3; now 'been' is stronger than 'It's'. In this case it makes no difference whether we shift 'it's' forward to the following beat (level 2) or leave it where it is; either way, 'been' is still stronger. By this technique, the syllables can be shifted forward such a way that every pair of adjacent syllables satisfies MPR 11, as shown in Example 5. As mentioned, if we consider only MPR 11 here, it is not necessary to shift unstressed syllables forward. But now recall MPR 3, stating that a metrical structure is preferred in which event-onsets coincide with strong beats. This rule favours not only associating 'been' with the following beat

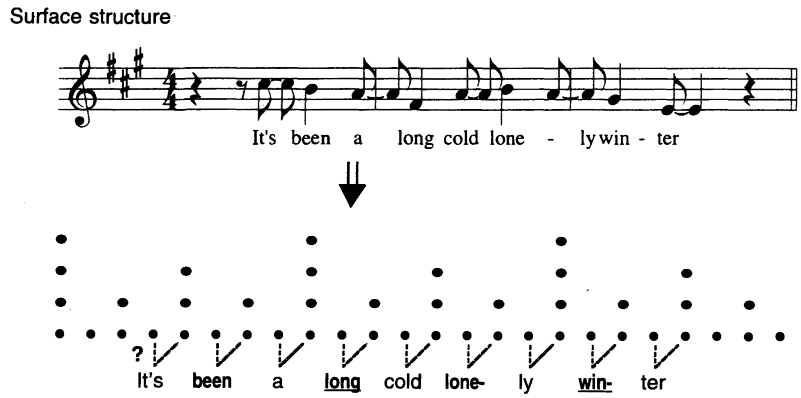


Example 6. 'Let it Be', showing metrical shifts

(reinforcing MPR 11), but also 'It's', and every other syllable in the line. This leads to the deep structure shown in Example 5.

'Let it Be' presents a slightly more complicated example (see Example 6). Here, several events are shifted forward by a beat at the semi-quaver level, such as 'self' and 'comes'; however, two events, 'Mar-' and 'me', are syncopated at the quaver level. This presents no difficulty for the current model. The syncopation shift rule says only that an event may be shifted forward by one beat at a low metric level; there is nothing to prevent different metric levels being chosen at different points within the same piece or even the same phrase. As in 'Here Comes the Sun', there are several events whose placement in the surface structure fully satisfies MPR 11, but which are shifted forward so as to satisfy MPR 3 and MPR 5a. It may be noted, however, that this was not done in every possible case. The second syllables of 'trouble' and of 'mother' would satisfy the rules more if they were shifted forward (since that would place the syllables on stronger beats), but I have left them unchanged: why? My intuition here is that these cases do not represent syncopations, perhaps because the first syllables of 'trouble' and 'mother' are naturally short and therefore fit well with the original rhythm. However, it is not clear that such considerations should be taken into account. There is clearly some indeterminacy here; it is not always obvious what the deep structure for a melody should be. While this is a difficulty, I do not believe it is intractable. It seems that we apply the syncopation rule only to resolve the most severe violations of the preference rules; other minor conflicts are perhaps left as they are. However, I will not attempt to work out these details here.

Now let us examine how the syncopation rule might work with the ungrammatical setting of the 'Here Comes The Sun' lyric, from Example 4 (assuming, again, that the notated metre is communicated by the accompaniment). Consider just the



Example 7. Ungrammatical setting of 'Here Comes The Sun' lyric, showing possible metrical shifts

second half of the phrase, shown in Example 7. Again, we will examine the syllable pair 'It's–been'. The stress pattern dictates that 'been' should be stronger. But notice that there is no legal way of shifting these syllables forward such that the preference rules are satisfied. As they stand, both syllables fall on weak beats; MPR 3 would prefer shifting both of them forward to stronger beats. But if they are shifted forward, the metric strength of 'it's' will exceed that of 'been', thus violating MPR 11. If 'been' is shifted forward but not 'it's', MPR 11 will be satisfied but not MPR 3. In other words, by the current model, there is no way of shifting events in this example so that both of these rules will be satisfied. Thus the model predicts that this setting of the text would be heard as conflicting with the notated metre, as I believe it is. In this case, then, the model is able to distinguish a good setting of the line from an bad one.

Applications and extensions of the model

This simple model proves to be quite useful in exploring the uses of syncopation in rock. I will begin by examining some general consequences of the model and some constraints on the way syncopations are used. I will then briefly consider syncopations in instrumental melodies and the relationship of syncopations to harmonic structure. Finally, I will consider the aesthetic functions of syncopation, and discuss its role in more complex situations such as metrical shifts and metrically irregular passages.

Syncopation could be viewed as a conflict between stress and metre. We 'resolve' the syncopation, where possible, by shifting an event forward to the following beat. The cases we have considered so far all involve shifting an event forward to a beat which is stronger than the beat it falls on in the surface structure. Could a syncopation also be resolved by shifting an unstressed syllable to a weaker beat? Such situations do arise, but under somewhat limited circumstances. The only time they occur is in cases where an unstressed syllable is immediately followed or preceded by a syncopated stressed one, as in the phrase from 'Hey Jude' shown in Example 8. In the last word of this phrase, the first syllable 'bet-' is clearly stressed relative to the second syllable '-ter', yet the beat of the second syllable is stronger than the beat of the first. In order to resolve this, we might shift 'bet-' forward to the strong beat that follows it. But this does not solve the problem; 'bet-' and '-ter'

Example 8. The Beatles, 'Hey Jude'

are now equally stressed. Moreover, both syllables now occur on the same beat: a conceptually troubling situation (we return to this point below). Clearly the way to resolve this is by associating '-ter' with the following *weak* beat. This is the one case where a syllable may be associated with a beat weaker than the one it falls on. This situation is fairly common in rock, but it rarely occurs a number of times in succession; that is, we rarely encounter a series of syllables in which each syllable is shifted forward to the beat of the following one. The phrase from Marvin Gaye's 'I Heard It Through The Grapevine' shown in Example 9 is an extreme example.

Example 9. Marvin Gaye, 'I Heard It Through The Grapevine'

A phrase from 'Daughter', by Pearl Jam, illustrates a related point (see Example 10a). Here, 'daught-' is stressed relative to 'me', but falls on a beat of equal metric strength; we can resolve this conflict by shifting it forward to the following beat at the quaver level. As the rules stand, there is no reason to shift the second syllable of 'daughter'. However, shifting the first syllable but not the second would cause the first syllable of 'daughter' to fall on a beat *after* the second syllable! The more natural solution would be to shift the second syllable of 'daughter' forward by a quaver as well, as shown in Example 10b. In general, it seems countentuitive to have situations where two events in a melody fall on the same beat in the deep structure, or where the order of events in deep structure differs from their order in surface structure. We can prevent this with a simple change to the syncopation shift rule:

Syncopation Shift Rule (revised). In inferring the deep structure of a melody, any event may be shifted forward by one beat at a low metrical level. The order of events in a line in the deep structure must be the same as their order in the surface structure.

We mentioned that it is quite possible for events within a piece or phrase to

Example 10. Pearl Jam, 'Daughter'

Example 11. 'Fleetwood Mac, 'Go Your Own Way'

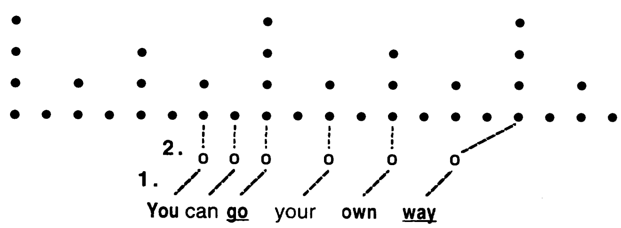


Figure 3. 'Go Your Own Way', metrical structure, showing two-stage metrical shifts

Example 12. The Beatles, 'Day Tripper'

Example 13. The Beatles, 'Hey Bulldog'

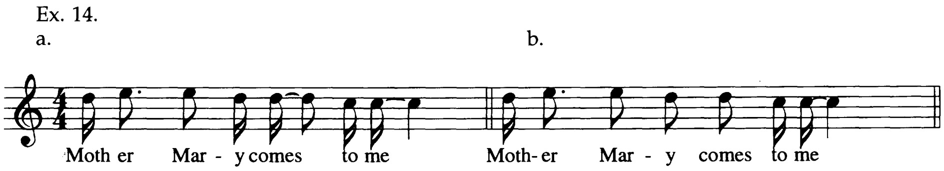
be syncopated at different levels. This raises a further question: do we ever find a single event that is syncopated at more than one level; for example, at both the quaver and semiquaver level? This would mean that the event was shifted forward to a beat three semiquavers after the beat it occurred on. This phenomenon does in fact occur, but only very occasionally. One example is found in the Fleetwood Mac song, 'Go Your Own Way'. This is shown in Example 11. In my view, in our hearing of this phrase, we first shift each note of the phrase forward to the following quaver beat; then we further shift the final note of the phrase to the following crotchet beat. (This two-stage shifting process is shown in Figure 3.) (Another example is the Nirvana song 'Come as you Are', on the phrase 'No I DON'T have a GUN'; here again, 'gun' seems to be syncopated at both the quaver and crotchet levels. Such cases are rare, however, and one feels that they are 'stretching the rules' of the style.

While all the examples discussed so far have used vocal music, syncopations may also occur in instrumental lines. Two examples of syncopated instrumental lines are shown in Examples 12 and 13, from the Beatles songs 'Day Tripper' and

'Hey Bulldog'. The motivation for considering these lines as syncopated is essentially the same as in the case of vocal melodies. As they stand, the lines appear to create metrical conflicts between certain events of the melody and the notated metre (implied, as usual, by the accompaniment and by other parts of the melodies themselves). In 'Day Tripper', for example, the D at the end of bar 1 and the following F# are on weak beats (and are followed by strong beats with no event); MPR 3 would thus favour treating these events as metrically strong. But again, these melodies do not seem incompatible with the notated metre; the logical explanation is that the syncopated beats are understood as occurring on the following beat.

Syncopations may also have implications for harmonic structure. As I have discussed extensively elsewhere (Temperley 1997), the perception of tonal music involves a complex process of harmonic analysis, which entails segmenting the music into short spans (which I call 'chord-spans') and identifying the harmony of each one, based on the pitches present in the span and other contextual factors. Metres is an important factor in the way this process is performed; there is a strong preference for beginning and ending chord-spans on strong beats of the metre. Since the root of a chord-span depends on the pitches that are present in the span, the exact position of events in time is obviously a factor in the harmonic analysis. This raises a question, however: in this harmonic analysis, is it the deep structure or the surface structure that is used? The former alternative seems more likely. Consider 'Here Comes The Sun'. The harmony in the second measure is clearly A; strictly speaking, the F# could not be considered part of this chord-span, since it is not a chord-tone of A (nor is it a 'legal' ornamental dissonance). Clearly, the F# should be considered part of the following span (with root D); but this would mean beginning a span on the last quaver of a bar, and, as mentioned above, there is usually a strong tendency to avoid beginning chord-spans on very weak beats. What seems to be happening is that, for harmonic purposes as well as metrical purposes, the F# is really understood as belonging on the following beat; if so, then it can be included in the following D span in bar 3 without requiring a harmony change on a weak beat. Notice that this provides a further motivation for the idea of an unsyncopated deep structure. Without it, we would have to assume that the basic rules of harmonic analysis, that is, the way chords are derived from pitches, were fundamentally different in rock than in classical music. Once a deep structure is assumed, however, the same principles would appear to apply to both styles fairly readily. Of course, this is not to deny that there are also fundamental differences between rock and classical music in terms of harmony; see, for example, Moore (1992).

Another source of evidence for unsyncopated deep structures should be mentioned, although it is somewhat anecdotal. This relates to the way syncopated melodies are remembered. I have noticed that when people reproduce a syncopated melody, they often reproduce it with slightly different syncopations from the original. (I have also noticed that, in trying on my own to remember the exact syncopations of a song, even a song that I know extremely well, sometimes find it quite difficult to do so.) This is in contrast to unsyncopated melodies, such as Christmas carols and folk songs, which usually seem to be reproduced fairly accurately. For instance, in asking various people to sing the opening phrase of 'Let It Be', I have heard various different versions of the second half of the phrase, including the two shown in Example 14. Notice, however, that the two versions of the melody shown in Example 14 have the same deep structure as the original. This raises the possibility that perhaps what is stored in memory is the deep structure of a melody; per-



Example 14

haps the syncopations are somehow encoded as alterations of this melody, but are stored in a less reliable form than the melody itself. Alternatively, perhaps the melody is simply stored as a deep structure, along with general instructions like 'somewhat syncopated'; in reproducing the melody, someone would then have to choose their own syncopations. If it proves to be true that people reproduce syncopated melodies in a way which preserves the deep structure but not the syncopations, this would provide strong evidence for the psychological reality of the kind of 'deep structure' I have proposed (this might be an interesting area for experiment).

Syncopation as a musical resource

Earlier I argued against the view that the function of syncopations in rock is to add metrical tension or instability. One might ask, then, what functions do they serve? This is a very difficult question, but I wish to offer a few thoughts. One basic attraction of syncopation is that it allows for a great variety of surface rhythms. I mentioned earlier that in classical music, certain metric preference rules tend to be followed to a high degree, particularly MPR 3, which prefers event-onsets (rather than rests or continuations of events) to occur on strong beats. (When I say the rule is followed, I mean that the music is usually written so that a metrical structure can be formed for it which satisfies the rule to a high degree.) Of course, the rule is not followed absolutely (so that event-onsets are *always* on strong beats and rests *never* are), but it is followed to a much greater degree than in rock. As a result of this, many rhythmic patterns found in rock simply never occur in classical music. For example, I would challenge anyone to find a melody with anything like the rhythm of the first line of 'Let It Be' in classical music. Now, in rock, the preference rules may well apply as strongly as they do in classical music, but they apply only to deep structures; the surface rhythm is allowed considerable freedom, due to the syncopation shift rule. The variety of surface rhythms in rock is reflected in many of the melodies cited in this paper; it is often also reflected in the interaction between melody and accompaniment lines. Consider Example 15, from 'Two Princes' by the Spin Doctors. The example shows the melody on the top staff, the bass

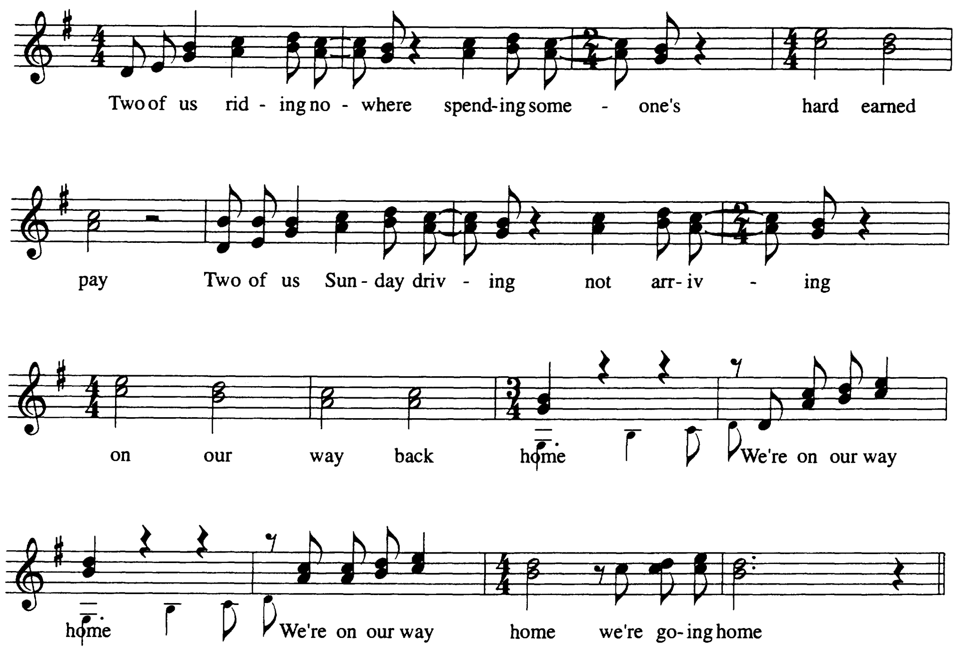
Example 15. Spin Doctors, 'Two Princes'

line on the bottom (the guitar and bass drum follow the rhythm of the bass); this basic pattern repeats a number of times. The deep structures of the two lines are quite simple and indeed rather similar; without any syncopations, the texture would seem quite dull and square. However, both lines are in fact highly syncopated, and syncopated in different ways (essentially each one is syncopated where the other is not), creating a rich and satisfying counterpoint.

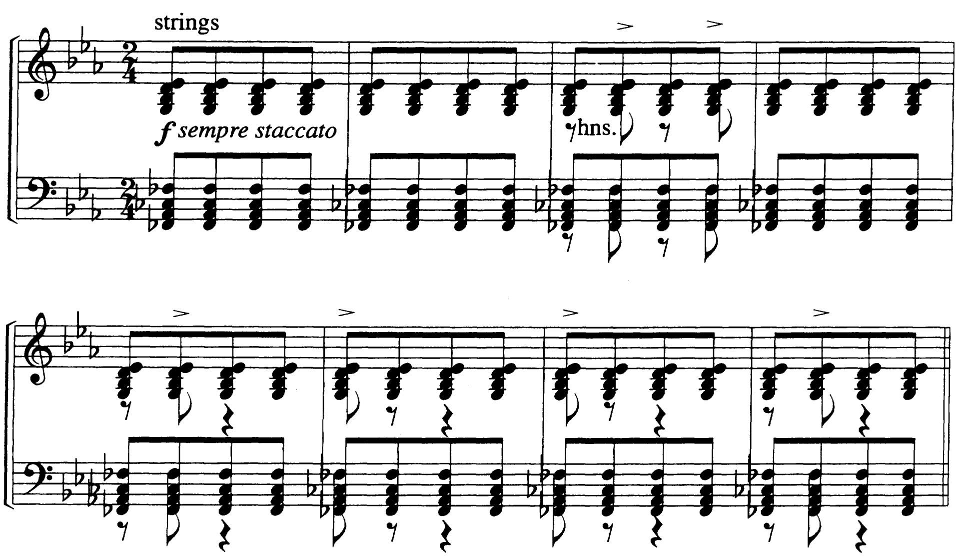
The variety of rock rhythm is apparent also in cases where a single melodic line is repeated with different lyrics. Here, it is often the case that the syncopations of the melody vary slightly from one repetition of the line to another (although the deep structure normally stays the same); 'Let It Be' is an example of this. In such cases, however, I would argue that the goal is not so much variety, but, rather, fitting the melody to the rhythm of the lyrics in the optimal way. Even if two lines have the same stress pattern, the most natural rhythms for them may not be the same. As linguists have shown, the normal rhythm of speech does not accord all syllables equal length; for example, vowels preceding voiced consonants ('bed') are longer than those preceding unvoiced consonants ('bet'), and some consonant clusters take longer to say than others (Garman 1988, p. 222). Syncopation allows the surface rhythms of a melody to be adjusted to each line of text.

The basic model of syncopation proposed above is quite a simple one, and many of its uses are quite straightforward. However, syncopation also has the potential for more ambitious and complex uses, and these are sometimes found in rock as well. One such use occurs in cases of metrical shift from one structure to another. If we consider the surface rhythm of a melody such as 'Let It Be', we find that in a number of cases stressed events occur three beats apart: for example, 'FIND my SELF'. We might think of this as implying a latent triple metre in the song, which may or may not be exploited. In some cases, this latent triple metre is exploited and there is an actual move to triple metre; and in cases where this happens, the fact that the triple metre has been anticipated by the syncopated rhythms of the duple metre section makes the transition smoother than it might otherwise be. The Beatles' song 'Two of Us' provides an example (Example 16). As usual, the syncopations in the duple metre section here feature stressed syllables three quavers apart ('SPEND-ing SOME-one's'). When the transition to triple metre occurs, it seems rather natural and seamless; in part, I think, this is because it has been subtly anticipated by the syncopated rhythms of the duple section.[4] (Three other elegant examples of duple-triple shift are found in Led Zeppelin's 'The Ocean', Rush's 'Entre Nous' and Soundgarden's 'Spoon Man'.)

A further use of syncopation is in situations of metrical ambiguity. While metrical ambiguity is not common in most kinds of rock, there are cases where it arises, and, here, syncopations can play an important part. I would argue that the way metrical ambiguity is perceived in rock is rather different from other kinds of music. In Stravinsky, for example, we are not generally expecting syncopations of the kind discussed here; that is, we are not expecting stressed events that conflict with a continuing metrical pattern (which is not to say that this phenomenon *never* occurs in Stravinsky). Thus we tend to simply realign the metre with every stressed event that comes along, as in the famous passage in Example 17 from the *Rite of Spring*. It seems to me that the way one hears this is with a new bar starting on every accented chord.[5] With rock, however, where there is a norm of stressed events occurring against some continuing metrical structure, there is a tendency to hear irregular passages in this way as well. An example of this is found in the melody

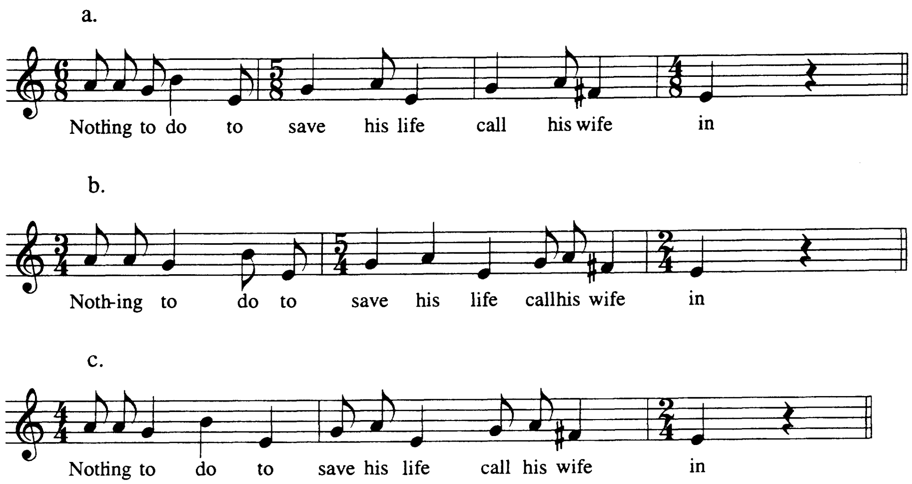


Example 16. The Beatles, 'Two of Us'



Example 17. Stravinsky, 'Dance of the Adolescents', from Rite of Spring

of the Beatles' 'Good Morning Good Morning' (Example 18a). We have a repeated phrase of 10 beats in length; thus there is no possibility of simply hearing this with a regular duple metre throughout.[6] What kind of metre do we hear here? One possibility is a totally unsyncopated hearing, with every stressed syllable starting a new measure; this is shown in Example 18a. But there are other possibilities too; one might hear the syllables 'do', 'life', and 'call' as syncopated at the quaver level,



Example 18. The Beatles, 'Good Morning, Good Morning'

leading to the deep structure shown in Example 18b. Or one might go further and hear the syllable 'save' as syncopated at the crotchet level, implying the deep structure in Example 18c. I believe that all three of these hearings are part of my perception of the passage. In any case, the main point here is that rock encourages us to try to keep a metrical structure going even when there are stressed events that (on the surface) conflict with it; in genuinely irregular passages such as this one, this can create metrical situations of considerable complexity and richness.

In short, while the basic principle behind syncopation in rock is fairly simple, it offers a number of possibilities for extension and development; as I have tried to show, composers and performers have exploited these possibilities, thereby adding to the vitality and richness of the style.

Conclusions

At first thought, rock syncopations appear to present a challenge to *GTTM*'s theory of metre fill. Rock songs feature pervasive metrical conflicts, where the metrical implications of the melodic rhythm and text-setting appear to conflict with those of the accompaniment; yet these passages do not seem metrically unstable or ambiguous. I have argued, however, that it is not necessary to posit a much greater degree of metrical conflict in rock, nor is it necessary to introduce fundamentally different preference rules. Rather, rock syncopations can be explained through the introduction of one simple (though rather fundamental) extension of *GTTM*: a 'deep structure' in which syncopations have been resolved. Once this extension is accepted, the phenomena of rock syncopation fit nicely with *GTTM*, in that rock songs generally feature a strong and consistent metrical structure in the manner predicted by the theory. The fact that settings of text which are judged as metrically unstable by the model (such as Example 4) tend to sound 'ungrammatical' can be taken as further confirmation of the model. In some ways, it is the deep structure of a melody that seems more important; it is the direct input to metrical and harmonic processing, and may also serve as the representation of melodies in long-term memory. On the other hand, the surface structure is important too; it contributes to the rhythmic interest and variety of melodies, allows for melodic rhythms to be closely tailored to each line of text, and plays an important role in cases of metrical shift and ambiguity.

A few further points are warranted about the methodology and assumptions of this paper. As mentioned earlier, the current paper differs from much traditional music theory, in that the musical objects under investigation are recordings rather than scores. This does not, I believe, fundamentally weaken the conclusions I have drawn here, but it does lead to some further questions. First, any transcription of a rock song into conventional notation assumes that it implies an underlying 'score': a representation of quantised notes and durations. This seems a reasonable assumption, although given that there is generally no explicit score for rock songs, it is perhaps more debatable in rock than in classical music. Of course, the durational values implied by my transcriptions are somewhat simplified: the actual durations may deviate from these values, sometimes, no doubt, in musically important ways, just as rubato and other aspects of expressive timing are important aspects of classical music. In that I am representing the syncopations in my transcriptions, I am in effect treating them as part of the 'piece' rather than an aspect of expressive timing; but this assumption might be questioned. In classical music, 'expressive timing' usually implies aspects of timing that are controlled by the performer rather than the composer. In rock, however, the composer–performer distinction is much less clear-cut than in classical music. Determining the actual notes of a piece, the implied 'score', if there is one, is often a collaborative effort of several people, for example, the members of a band; and these individuals are also frequently the primary performers of the song. In this case, the distinction between composition and performance, and the question of where syncopation lies in this scheme, seems rather arbitrary. Another, related, question concerns the stability of syncopations over different performances of a song. I have regarded the (most well-known) recorded versions of these songs as their definitive performances; but one wonders to what extent the melody of a song is rendered consistently by the singer, or whether there are subtle variations between performances in the way syncopations are applied. If so, it may be misleading, at least from the point of view of production, to regard a single rendition of, for example, 'Let It Be' as *the* definitive performance; perhaps it is simply one performance which happened to be recorded. (Returning to the previous point this might be a reason for considering syncopation more an aspect of performance rather than of composition.) But beyond that, this consideration is not really problematic for my argument here; indeed, if it turned out that singers tended to vary the syncopations of a melody while preserving the deep structure, this would be further evidence for the model I have proposed.

A question naturally arises as to whether the model proposed here might be applicable to other kinds of music. In principle it seems relevant to other genres of recent popular music where syncopation is important, such as jazz and much Caribbean and Latin American popular music, although this is an area for further research. A parallel might also be drawn with traditional African music. Many rhythmic patterns can be found in African music, particularly those based on 8-beat or 16-beat phrases, which seem rather similar to rock rhythms. For example, the rhythm of the melody in Example 19 (from Nketia 1974) might easily be found in a rock melody. However, we must be cautious here. There is a broad consensus that much African music is 'metrical' in the most basic sense, in that it is built on an (often implicit) framework of equally spaced beats; it is widely agreed, also, that

Example 19. African (Kasem) folk melody, from Nketia (1974, p. 153)

much of the rhythmic richness of African music lies in the way rhythmic events conflict with this framework (Nketia 1974; Chernoff 1979; Agawu 1995; Rahn 1996). But this does not necessarily imply that events on weaks beats are to be understood as syncopations, that is, as displaced events which belong on some other beat. Some studies have pointed to quite different ways of understanding African rhythms; for example, in terms of additive rather than divisive structures (Nketia 1974), or in terms of their set-theoretical and intervallic properties (Rahn 1996). Agawu suggests, furthermore, that the alignment between word stress and metrical accent, of central importance in the current model, is much less rigid in African music (1995, p. 192). Thorough discussion of this issue is well beyond the scope of this paper; suffice it to say that the superficial similarity between some African rhythms and rock rhythms does not necessarily imply that the same models are applicable.

By focusing on relatively basic and low-level aspects of musical perception, I certainly do not wish to imply that the cultural meanings of rock music, and its implications for issues of politics, economics, gender, race, and so on, are unimportant. It goes without saying that a full understanding of rock requires consideration of these social and cultural aspects. Whether the observations about syncopation offered here would yield any insight into these aspects is an open question. What I have tried to show is that low-level aspects of musical perception such as rhythm and metre can be examined and understood on their own terms, and that they are interesting and complex enough to deserve careful study and attention.

Endnotes

1. For examples of such criticism, see Tagg (1982, pp. 40–3) and Shepherd (1982, pp. 145–9).
2. The idea of explaining rock syncopations as transformations of a underlying structure is briefly discussed by Middleton (1990, pp. 212–13).
3. Halle and Lerdahl (1993) offer a proposal for incorporating text-setting into the *GTTM* theory. Halle and Lerdahl's model is based on the same principle as my MPR 11, that is, that stressed syllables should coincide with strong beats; however, their model is more complex than is necessary for our purposes here.
4. In fact, this example is somewhat complex. The latent triple metre of 'SPEND-ing SOME-one's' is really 6/8 rather than 3/4 (since the accents are three quavers apart). This is made explicit by the guitar line in the first 3/4 bar, which likewise implies 6/8; this, in turn, smooths the way for the 3/4 bars that follow.
5. The subsequent bars establish the notated 2/4 metre much more clearly. (This metre is also suggested by the previous passage, but only very weakly.)
6. The accompaniment gives us little guidance here. The guitar and bass chords emphasise the syllables 'Noth', 'do', 'save', and 'in'. The drums maintain a regular crotchet pulse, which seems to favour either hearing B or C over hearing A.

References

Agawu, K. 1995. *African Rhythm* (Cambridge)
Bowman, R. 1995. 'The Stax sound: musicological analysis', *Popular Music, 14*, pp. 285–320
Chernoff, J.M. *1979. African Rhythm and African Sensibility* (Chicago)

Deliege, I. 1987. 'Grouping conditions in listening to music: an approach to Lerdahl and Jackendoff's grouping preference rules', *Music Perception*, 4, pp. 325–60
Dogil, G. 1984. 'On the evaluation measure for prosodic phonology', *Linguistics*, 22, pp. 281–311
Dowling, W.J. 1978. 'Scale and contour: two components of a theory of memory for melodies', *Psychological Review*, 85, pp. 341–54
Garman, M. 1988. *Psycholinguistics* (Cambridge).
Halle, J. and Lerdahl, F. 1993. 'A generative text-setting model', *Current Musicology*, 55, pp. 3–23
Hawkins, S. 1992. 'Prince: harmonic analysis of Anna Stesia', *Popular Music*, 11, pp. 325–35
Komar, A.J. 1971. *Theory of Suspensions* (Princeton, NJ)
Krumhansl, C.L. 1979. 'The psychological representation of musical pitch in a tonal context', *Cognitive Psychology*, 11, pp. 346–74
1990. *Cognitive Foundations of Musical Pitch* (New York)
Lerdahl, F. 1988. 'Tonal pitch space', *Music Perception*, 5, pp. 315–510
Lerdahl, F. and Jackendoff, R. 1983. A *Generative Theory of Tonal Music* (Cambridge, MA)
Lester, J. 1986. *The Rhythms of Tonal Music* (Carbondale, IL)
Meyer, L.B. 1973. *Explaining Music* (Berkeley, CA)
Middleton, R. 1990. *Studying Popular Music* (Milton Keynes)
Moore, A. 1992. 'Patterns of harmony'. *Popular Music*, 11, pp. 73–106
1993. *Rock: The Primary* Text (Buckingham)
1995. 'The so-called "flattened seventh" in rock', *Popular Music*, 14, pp. 185–201
Narmour, E. 1990. *The Analysis and Cognition of Basic Melodic Structures: The Implication–Realization Model* (Chicago)
Nketia, J.H.K. 1974. *The Music of Africa* (New York)
Palmer, C. and Krumhansl, C.L. 1987. 'Pitch and temporal contributions to musical phrase perception: effects of harmony, performance timing, and familiarity'. *Perception & Psychophysics*, 41 pp. 505–18
Parncutt, R. 1994. 'A perceptual model of pulse salience and metrical accent in musical rhythms', *Music Perception*, 11, pp. 409–64
Rahn, J. 1996. 'Turning the analysis around: African-derived rhythms and Europe-derived music theory', *Black Music Research Journal*, 16, pp. 71–89
Rosner, B.S. and Meyer, L.B. 1986. 'The perceptual roles of melodic process, contour, and form', *Music Perception*, 4, pp. 1–39
Schachter, C. 1980. 'Rhythm and linear analysis: durational reduction', in *The Music Forum* 4, ed. F. Salzer (New York)
Shepherd, J. 1982. 'A theoretical model for the socio-musicological analysis of popular musics', *Popular Music*, 2, pp. 145–77
Tagg, P. 1982. 'Analysing popular music: theory, method, and practice', *Popular. Music*, 2, pp. 37–68
Temperley, D. 1997. 'An algorithm for harmonic analysis', *Music Perception*, 15, pp. 31–68
Walser, R. 1992. 'Eruptions: heavy metal appropriations of classical virtuosity', *Popular Music*, 11, pp. 263–308
Winkler, P. 1978. 'Towards a theory of pop harmony.' *In Theory Only*, 4, pp. 3–26