



features

All that Jazz



Photo: M J Files/Redferns

It don't mean a thing if it ain't got that swing. But what is swing?

WHEN the musical *West Side Story* opened in London in 1958 the producers had a real problem. They didn't know who should occupy the drum stool. Leonard Bernstein's score was hard. And it was jazzy. At the time most of Britain's jazz drummers wouldn't do because they simply couldn't read music well enough. The classical percussionists, though flawless readers, also had an irredeemable failing. These "straight" musicians, as the jazz world calls them, just couldn't swing.

Swing is at the heart of jazz. It's what makes the difference between music you can't resist tapping your feet to and a tune that leaves you unmoved. Only now are scientists beginning to unravel the subtle secrets of swing. Even today, many drum instruction manuals lay down a rigid formula for swing, based on alternately lengthening and shortening certain notes according to a strict ratio, says Anders Friberg, a physicist at the Royal Institute of Technology in Stockholm, who's also a pianist. But these rules are misleading. "If you took them literally you would never learn to swing," says Friberg.

The fundamental rhythmic unit in jazz is the quarter note. When you tap your feet to the music you are marking out quarter notes--or crotchets as they are called in Britain. Superimposed on this basic beat are melodies. Often melody lines consist of eighth notes, which last half as long on average as a quarter note.

But no one plays music exactly as it is written, just as no two people would read a passage from a book the same way. If you want to hear music played exactly as written there are thousands of Midi files on the Net which are direct translations

of sheet music. And very tedious they are too--convincing proof that computers don't have a soul. Real musicians shorten one note, lengthen another, delay a third and accent notes. It is all part of creating an individual style.

In jazz this interpretation is taken to extremes--and the way jazz musicians play their eighth notes is one of the keys to swing. Faced with a row of eighth notes on a sheet of music a straight musician plays a series of more or less equal notes. A jazz musician plays the eighth notes alternately long and short. The long note coincides with the basic beat, the note clipped short is off the beat. There is a similar but less pronounced tendency to play notes long and short in folk and baroque music as well as in popular music.

Many drum instruction books say that the long eighth note should be twice as long as the short one. But you simply can't lay down a rigid formula for swing, says Friberg. It all depends on the tempo of the piece you are playing. Although professional musicians are largely aware of these complexities--or can at least feel how to swing--inexperienced musicians may not be so lucky. Friberg points out that many contemporary rock drummers may pick up bad habits because they practise keeping time by playing with drum machines, which may rely on the simplistic swing formula.

Friberg measured the ratio between the long and short notes, the swing ratio, of four drummers on a series of commercial recordings. They included some of the best drummers in jazz, such as Tony Williams who played with Miles Davis on the *My Funny Valentine* album, Jack DeJohnette, part of Keith Jarrett's trio and Jeff Watts, who played with Wynton Marsalis.

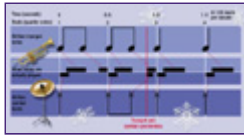
Friberg used a frequency analysis program to pick out the distinctive audio signal of the drummer's ride cymbal from a series of 10-second samples from the records. In modern jazz, drummers normally play a pattern of quarter notes and eighth notes on this cymbal with their right hand. He found the drummers varied their swing ratio according to the tempo of the piece. At slow tempos the long eighth notes were played extremely long and the short notes clipped so short that they were virtually sixteenth notes. But at faster tempos the eighth notes were practically even. The received wisdom of a 2 to 1 swing ratio was only true at a medium-fast tempo of about 200 quarter-note beats per minute. "The swing ratio has a more or less linear relationship with tempo," says Friberg.

Although this relationship between the swing ratio and tempo held true for every drummer, there were some notable stylistic differences. "Tony Williams, for example, has the longest swing ratios," says Friberg. This is partly his style. But jazz is also a cooperative style of music--you have to fit in with those around you. "It's partly a matter of who he is playing with," says Friberg.

Friberg backed up his findings by creating a computer-generated version of a jazz trio playing the *Yardbird Suite*, a theme written by Charlie Parker. He then played the piece back to a panel of 34 people at different tempos and asked them to adjust the swing ratio. He found that the listeners also preferred larger swing ratios at slow tempos while at fast tempos the ratio was closer to 1.

The results are impressively consistent--and they also give a clue to the split-second accuracy that jazz musicians have to

achieve if they are going to keep the listeners tapping their feet. At a relatively slow tempo of 120 beats per minute most listeners prefer a swing ratio somewhere between 2.3 and 2.6.



Measure for measure: for a swinging performance, the first of each pair of eighth notes is played longer than the second. The melody line also hangs behind the cymbal beat, except for occasional off-the-beat synchronisation, which keeps the band together.

Part of the reason for this relationship between the swing ratio and tempo, says Friberg, may be that there is a limit to how fast musicians can play a note--and how easily listeners can distinguish individual notes. At medium tempos and above, the duration of the short eighth notes remained more or less constant at slightly under one-tenth of a second. The shortest melody notes in jazz have a similar minimum duration. Friberg thinks this should set a maximum practical tempo for jazz of around 320 beats per minute, and very few jazz recordings

approach this speed.

He points out that there's a limit to the speed listeners can process notes. When the tenor saxophonist John Coltrane made his first solo recordings in the late 1950s jazz critics began referring to his fast succession of notes as "sheets of sound". "This is what you hear if you don't hear the individual notes," says Friberg.

Just as jazz musicians have a standard repertoire of tunes, so there is a similar repertoire of jokes. One has a member of the audience asking: "How late does the band play?" to which the answer is: "About half a beat behind the drummer." That joke turns out to have more than a grain of truth in it.

In his latest research, Friberg went back to the same recordings and looked at the timing of soloists, such as Miles Davis, to see if they used the same swing ratios as the drummers. He found that the soloists' swing ratios also dropped as the tempo increased. More surprising was the fact that the drummer always played larger swing ratios than the soloist they were playing with. Even at slow tempos soloists rarely had swing ratios greater than 2 to 1.

The difference helps to explain why a soloist can seem to be so laid back on a particularly toe-tapping number. When playing a note that nominally coincides with the basic quarter-note beat, the soloist hangs back slightly. "The delay can be as much as 100 milliseconds at medium tempo," says Friberg.

This tendency to hang behind the beat goes back to the musical ancestors of jazz. In the introduction to the 1867 book *Slave Songs of the United States* Charles Ware, one of the editors, observed that when they were rowing a boat, the oars laid down the basic beat for the slaves' singing. "One noticeable thing about their boat songs was that they seemed often to be sung just a trifle behind time," he said.

Members of the audience synchronise with the band by tapping their feet to the basic beat. But musicians have a more subtle strategy. "If you generate a solo line with a computer and delay every note relative to the cymbal it sounds awful," says Friberg. "The funny thing," he adds, "is that there is a distinctive pattern that most musicians are not aware of. They synchronise on the short eighth note."

He says that this off-the-beat synchronisation of the soloist and the rhythm section is crucial in keeping the band from falling apart. Effectively the musicians synchronise their internal clocks every few beats throughout the piece. When the off-the-beat notes are synchronised, says Friberg, "you often don't realise the soloist is lagging".

So how did the producers of *West Side Story* resolve their drumming dilemma? Even after 42 years musicians still tell the story. At the time Britain's best jazz drummer was Phil Seaman, who was a good reader. But he had a problem. Or to be precise, two problems. One was alcohol and the other heroin. But after some dithering, the producers gave him the job. All went well until one matinee, when the regular conductor took the day off.

Seaman had a habit, half-affected, half-genuine, of appearing to doze when he wasn't playing--and during one pause in the music, his head began to nod. Fearing that he had dropped off and wary of his reputation, the conductor gestured frantically to the bass player to wake the dozing drummer. The bass player reached across and prodded Seaman with his bow. Startled, Seaman stood up and fell backwards over his drum stool, straight into the Chinese gong--which reverberated around the theatre and stopped the show.

Seaman stood up, cleared his throat, and announced: "Ladies and gentlemen, dinner is served." The management promptly sacked him.

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