a journal of the Society for Music Theory

Volume 13, Number 1, March 2007

Commentary on Matthew W. Butterfield's "The Power of Anacrusis"

Fernando Benadon

KEYWORDS: rhythm, groove, expressive timing, Herbie Hancock, Chameleon, music

ABSTRACT: I offer some perspectives on one portion of Matthew W. Butterfield's "The Power of Anacrusis: Engendered Feeling in Groove-Based Musics" (MTO 12.4). I specifically discuss his microtiming analysis of the main groove in Herbie Hancock's "Chameleon." I propose alternative ways of calculating timing deviations, suggesting that the measurement approach should reflect the listening process as closely as possible. I also discuss whether tiny timing discrepancies (under 10 milliseconds) serve an expressive role.

Received February 2007

---

[1] In his recent article "The Power of Anacrusis: Engendered Feeling in Groove-Based Musics" (MTO 12.4), Matthew W. Butterfield explores how Christopher Hasty's (1997) theory of metric projection may be expanded to include microtiming phenomena. Butterfield rightly insists that there is an important musical symbiosis that has been largely neglected by scholars: between *feel* at the sub-syntactical level and *structure* at the syntactical level. Butterfield supports his narrative with musical examples drawn from the jazz ride cymbal pattern, the basic rock drumbeat, and the main groove in Herbie Hancock's "Chameleon." These are accompanied by MIDI renditions that feature microtiming adjustments and help Butterfield drive his points convincingly.

[2] Toward the end of the article, Butterfield makes timing measurements of Herbie Hancock's recording of "Chameleon" to draw conclusions about rhythmic feel. He finds that slight delays in the bass and drums temper otherwise strongly anacrustic onsets and give rise to a more relaxed groove. My commentary focuses only on this portion of Butterfield's article. I do not address Butterfield's larger thesis—which I find highly compelling—regarding the effects of microtiming on metric projection. I hope that my observations will be welcomed by him and by readers who are interested in the subject of microrhythmic analysis.

[3] In order to show that timing delays are taking place in the unaccompanied bass line's "uh" (the end of beat 1), Butterfield relies on measure length: if it is m and the downbeat occurs at $t = 0$, then a metronomic onset of "uh" should occur on $t =$

(m/16)*3—that is, on the fourth subdivision slot (**Example 1**). As an alternative approach, Butterfield also looks at "projected bar length," using the previous bar instead of the current one as a frame of reference, since this is "what listeners may expect for an emerging measure on the basis of its predecessor" [par. 51]. Either way, he finds that the "uh" is delayed in three out of four instances, and qualifies the one exception as a possible "slight timing error" [par. 50].

[4] Measure length may not be the most appropriate metric for assessing the microtemporal placement of values as small as the sixteenth-note.(1) Why not try something more local? The three-note anacrustic group could work well as an alternate frame of reference. Butterfield himself recognizes that these eighth-note pickups "provide enough information to enable one to hear the ["uh"] . . . as a syncopation" [par. 44]. Using this framework—rather than measure length—as a predictor of beat size, one can determine whether the "uh" is early, late, or right on. Put differently, if y is greater than $x/2$ in **Example 2**, then the "uh" is late. The results of this calculation are consistent with Butterfield's: there are three delays and one anticipation.(2) Another way of assessing temporal deviation is to compare the durations of segments y and z. In a deadpan performance where y equals z, the "uh" occurs exactly halfway between the downbeat and the "and" of the second beat. If, instead, y is greater than z, then the "uh" may be heard as delayed. Again, this method of calculation corroborates Butterfield's findings.

[5] **Table 1** summarizes the different methods' results.(3) The first two columns contain the results of Example 2's calculations; the values in the second two columns are taken from Butterfield's Table 1. Positive and negative values denote delays and anticipations, respectively.

[6] The reader may wonder as to the need for introducing these two additional measurement approaches, which point to roughly the same conclusions as Butterfield's methods. I do so in order to underscore the importance of ecological validity in the testing of timing-related hypotheses. When trying to determine whether a listener hears a slight timing deviation, a scenario that involves local timing comparisons seems more realistic than one that does not. This distinction could prove decisive in other contexts, even though in this particular case all approaches lead to the same outcome.

[7] The above results support Butterfield's assertion that the bass line's "uh" tends to be played late. But are the delays *heard* as being played late? Butterfield states that these timing deviations give rise to a "laid back" [par. 47] rhythmic feel. To investigate this impression, we can compare the original recording (**Audio Example 1a**) with edited versions in which the placement of the "uh" was shifted to compensate for any delays or anticipations. I tweaked Audio Examples **1b** and **1c** by cutting-and-pasting bits of silence to rectify the three delays and one anticipation as indicated by Butterfield's "Timing" and "Projected Timing" values, respectively.(4) Audio Examples **1d** and **1e** were similarly edited, this time according to the above x-y and y-z calculations, respectively.

[8] To my ears, many of the timing differences between the original and its clones are imperceptible. I think that the main reason for this lack of perceptual distinction is the absence of onsets on beats 2 and 3, which would serve as helpful perceptual anchors. Another reason may be the small size of the delays. As I discuss later, perhaps extremely small magnitudes of duration are being afforded undue interpretive significance.

[9] One could quote Butterfield and propose that

> if we are indeed able to distinguish and recognize such timing patterns, . . . it is not because we register their differences consciously—the discrepancies are really quite small and often difficult to quantify. It is rather because we experience in them different qualities of feeling. [par. 36]

Yes, unaided by computers, the details are difficult to quantify.(5) Sometimes the details are consciously registrable. When they are not, we can invoke "qualities of feeling": subliminal yet meaningful phenomena that stir the listener without her being able to put her finger on them, exactly. This view might represent the *je ne sais quoi* side of expressive timing. But even though the subtle timing patterns are not always registered consciously, the quality of feeling itself should be. I would not be able to guess in a blindfold test which of the above five versions of the "Chameleon" bassline is the original, much less say which one has "a more relaxed quality that just feels more at ease" [par. 45].

[10] Though not directly stated, the concept of "qualities of feeling" is central to Honing (2006).[(6)] He presented listeners with pairs of recordings of the same piece: an unaltered version and another version that was either time-stretched or -compressed to match the tempo of the unaltered version. Listeners had to identify the unaltered recording. According to Honing's *timing is tempo-specific* hypothesis, listeners did well on this task because

> expressive timing in music performance . . . is intrinsically related to global tempo. When expressive timing is simply scaled to another tempo (i.e., slowed down or sped up proportionally), the performance might sound awkward or unnatural and, hence, easier to identify as a tempo-transformed version. (p. 781)

Honing does not address the question of whether the naturalness of non-transformed excerpts is heard consciously or felt subliminally, although the article's tone leans toward the latter. The participants' judgments appear to have been more intuitive than explicitly analytical: "X had a more natural feeling," "X sounds like it is tripping over itself," and so on (footnote 5).[(7)]

[11] By contrast, expressive timing can be conceptualized as a more overt and consciously perceptible feature—a status enjoyed by many other aspects of musical expressivity from pitch bends to *subito pianos*. According to Keil (1966), for instance, expressive timing "may be seen as a device for holding our attention and increasing our involvement so that a single phrase . . . will have maximum impact," such as when a soloist's "phrasing is consistently behind the pulse and then for one dramatic instant squarely on top of it" (p. 346).

[12] I want to emphasize that these two views of expressive timing (conscious and subliminal) are perfectly compatible. They both place equal trust on listeners' acuities, and they both see expressive timing as a rhythmic manipulation that heightens the emotional impact of the music. I am drawing attention to how the role of perception can shape discussions of expressive timing, particularly when it is not clear whether the microtiming data reflect a consciously perceptible process or a more hidden effect. (Clearly, individual listening abilities can influence the saliency of the effect.) Either way, the expressive timing should be sorely missed if removed. Otherwise, where is the expression?

[13] These questions also pertain to Butterfield's interpretation of the drummer's snare backbeats in "Chameleon" (see his Table 2). To study these, Butterfield anchors his measurements onto the hi-hat's steady eighth-notes. (My own measurements largely agree with his.) The first backbeat, which lies on the same subdivision slot as the bass' "uh," exhibits consistent delays, most of which lie in the range of 20–40 ms. The second backbeat (on beat 4) undergoes much smaller delays, usually amounting to about 3–5 ms, never more than 10 ms. According to Butterfield, these figures support the claim that the backbeats are delayed.

[14] I think that the first backbeat can be characterized as delayed, but not the second one. I say this because deviations of 20–40 ms seem large enough to be expressive, whereas deviations of about 5 ms are not only impossible to detect,[(8)] but also devilishly tricky to pinpoint with confidence. Butterfield's Audio Example 3 / Transcription 3 simulates a 9 ms delay in the two "Chameleon" backbeats. At the risk of comparing MIDI apples with acoustic oranges, we could use the value of 9 ms as a point of reference. I can hear the simulation's second backbeat delay very clearly, mostly because it causes a flam with the deadpan bass. The first backbeat delay is much less obvious but still perceptible, suggesting perhaps a lower ceiling of about 10 ms for this drum groove's delays to take effect.[(9)] This threshold may also hold for other $\frac{4}{4}$ backbeat grooves. Butterfield's Audio Example 1 / Transcription 1 simulates an "in the pocket," 11 ms delay in the jazz ride cymbal pattern. "In listening to this example myself," he writes, "I find it difficult to perceive backbeat delay in the pocket pattern" [par. 39]. The similarly delayed rock snare backbeats in his Audio Example 2 / Transcription 2 "are easier to hear than in the swing example, perhaps because of the greater timbral distinction between the bass and snare drums" [par. 42].

[15] I am all for backing up our listening impressions with precise timing measurements, but viewing 3–6 ms discrepancies in the second backbeat of "Chameleon" as expressively timed qualifies as wishful thinking. That we are able to measure minute imperfections (of rhythm, of intonation, of timbre) resulting from human production does not mean that they are automatically expressive in nature. The question of how large a timing discrepancy is needed for listeners to take notice is still up in the air, mostly because the answer depends on numerous factors such as expertise, tempo, texture, contour, timbre, and—as Butterfield explains—on whether we look at delays or anticipations [par. 39]. Prögler (1995) notes that discrepancies

"of 10 or more milliseconds are generally audible, but this also depends on tempo" (footnote 11). Collier and Collier (2002) question whether deviations smaller than 30 ms (in Louis Armstrong's playing) can be detected by "even well-trained observers," and doubt that such discrepancies "could have been part of some intentional musical scheme" (p. 481). In Benadon (2006), timing comparisons involve differences of at least 20 ms.[(10)]

[16] Incidentally, Butterfield's Table 1 data show that the three-note pickups to measures 2 through 4 are played consistently "on top" by about 20 ms. This would mean, according to his line of thought and interpretation of magnitudes, that these pickups are less relaxed and more nervous. I think they sound as metronomic as is humanly possible.

[17] In closing, I share Butterfield's evident passion for the topic and I admire his thoroughness and elegance of presentation. I applaud him for skillfully integrating two seldom reconciled aspects of rhythm: feel and structure. My commentary offers three additional perspectives on his assessments. First, regarding the "uh" in the unaccompanied bassline, I present what I believe to be more ecologically valid measurement approaches; these support Butterfield's own findings, although I am not sure that the timing deviations of the "uh" are truly expressive. Second, regarding the first backbeat in the drums, I concur that they are delayed and most likely expressively significant. Third, regarding the second backbeat in the drums, I believe that delays of under 10 ms are too small to be either heard (or felt) or reliably measured in the context of a musical performance. Throughout, I seek to point out that some of Butterfield's interpretations of the timing data may be placing too much of an emphasis on possibly undetectable deviations, a practice that may steer future studies of this kind towards an unrealistic conception of rhythm perception.

Fernando Benadon
American University
fernando@american.edu

Works Cited

Benadon, F. 2006. Slicing the Beat: Jazz Eighth-Notes as Expressive Microrhythm. *Ethnomusicology* 50(1), 73–98.

Collier, G. L., and J. L. Collier. 2002. A Study of Timing in Two Louis Armstrong Solos. *Music Perception* 19(3), 463–483.

Friberg, A., and J. Sundberg. 1995. Time Discrimination in a Monotonic, Isochronous Sequence. *Journal of the Acoustical Society of America* 98, 2524–2531.

Friberg, A., and A. Sundström. 2002. Swing Ratios and Ensemble Timing in Jazz Performance: Evidence for a Common Rhythmic Pattern. *Music Perception* 19(3), 333–349.

Hasty, C. 1997. *Meter as Rhythm*. New York: Oxford University Press.

Honing, H. 2006. Evidence for Tempo-Specific Timing in Music Using a Web-Based Experimental Setup. *Journal of Experimental Psychology: Human Perception and Performance* 32(3), 780–786.

Keil, C. 1966. Motion and Feeling Through Music. *The Journal of Aesthetics and Art Criticism* 24(3), 337–349.

Prögler, J. A. 1995. Searching for Swing: Participatory Discrepancies in the Jazz Rhythm Section. *Ethnomusicology* 39(1), 21–54.

Repp, B. H., and G. Knoblich. 2004. Perceiving Action Identity: How Pianists Recognize Their Own Performances. *Psychological Science* 15(9), 604–609.

Footnotes

1. Collier and Collier (2002) also use measure length as a reference. However, the tempos of their selections are about twice

as fast as "Chameleon" (so their bars are shorter).
Return to text

2. All my calculations are derived from Butterfield's timing data; see his Table 1.
Return to text

3. The values in columns one and four of the first row are the same (6 ms) because Butterfield used a variant of the x-y method to calculate the projected length of bar 1.
Return to text

4. I did this by cutting and pasting blocks of silence from one side of the "uh" to the other side of it. For example, for the first measure of Audio Example 1b, I dragged a 13 ms 12 block of silence from the left of the "uh" to its right, thus undoing the delay and creating a deadpan attack. Similarly with measures 2 (12 ms) and 4 (13 ms). In measure 3, the transfer of silence went from right to left in order to undo the 10 ms anticipation. Notice that this procedure alters neither bar length nor the placement of all other onsets.
Return to text

5. Hence Collier and Collier's (2002) concluding admonition that "analyses of the details of jazz rhythm by the unaided ear should be viewed with suspicion" (p. 482).
Return to text

6. See also Repp and Knoblich (2004).
Return to text

7. As Honing explains, these quotes were collected during an earlier pilot study.
Return to text

8. I am referring to "real world" performances, of course. In controlled laboratory experiments that use simple stimuli, smaller deviations are more easily detected. See Friberg and Sundberg (1995).
Return to text

9. Tweaking the original recording of "Chameleon" to investigate whether the backbeat deviations are indeed expressive is not easy, unfortunately. The first backbeat is snugly meshed with the bass and too close to the hi-hat on beat 2, impeding the kind of clean edits that were possible with the earlier audio examples—at least in the hands of this amateur technician.
Return to text

10. That article also shows that "swing ratios" are not "on average . . . about 1.7:1" [par. 18], but usually lower. It also urges us to rethink Friberg and Sundström's (2002) claim, echoed by Butterfield, that "the 'swing ratio' . . . varies widely with tempo" [par. 18].
Return to text

Prepared by Brent Yorgason, Managing Editor and Tahirih Motazedian, Editorial Assistant