Timely Negotiations: Formative Interactions in Cyclic Duets

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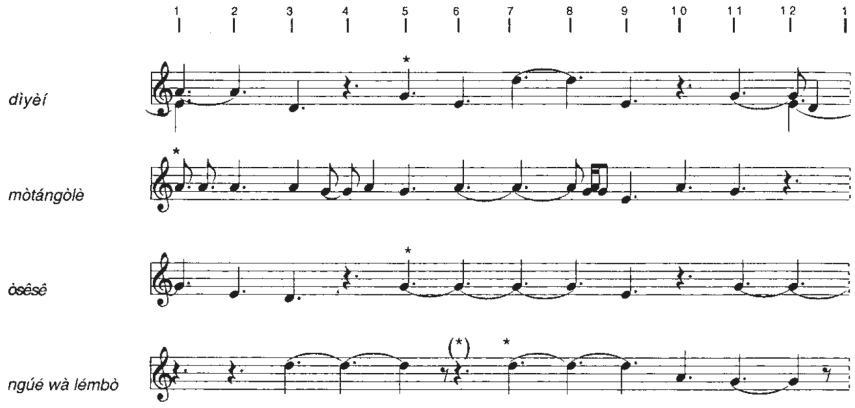
AMONG the treasures in the collection of *Analytical Studies in World Music*, edited by Michael Tenzer, is an essay about polyphonic songs of the Aka people in the Central African Republic. The author, Susanne Fürniss (2006), theorized and analyzed recordings collected in the field by Simha Arom. With dense textures of any number of rhythmically and melodically independent voices, these songs are very difficult to grasp. The same song may be performed by various ensembles, and it sounds quite different not only from ensemble to ensemble but also between two performances by the same ensemble. Moreover, the Aka have few words to explain their music. Nevertheless, through some ingenious methods Arom determined that "Aka counterpoint is based on four constituent parts. . . . For every song each of the parts has its own essential melodic pattern" (Fürniss 2006, 174; Arom 1991).

The essential patterns for a song Fürniss discussed are shown on Example 1 (which reproduces Example 5.11 in Fürniss [2006, 191]). They are repeated cycles, each twelve beats long; asterisks indicate the beat on which each part begins. The second staff shows the main tune, the *mòtángòlè*, which identifies the song. The other three parts are distinguished more by contour and timbre (yodeled or not) than by pitch collection or rhythm. The performers, whether solo or in ensemble, may sing these patterns exactly, but more commonly they improvise variants and cross-cut ad libitum among the parts.

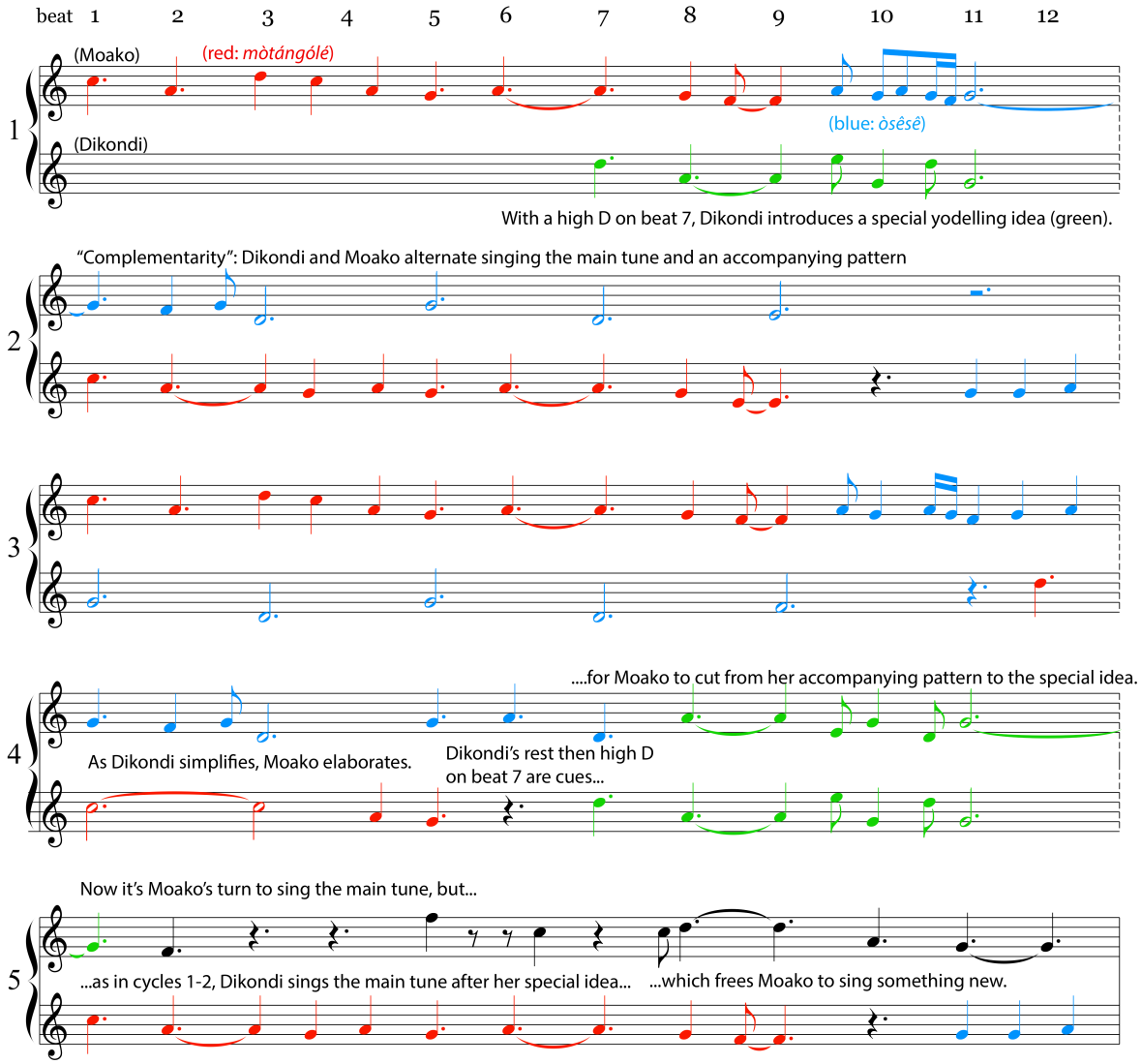
Example 2 represents the beginning of a particularly interesting version of the song, a duet sung by two young women, Moako and Dikondi. The transcription is essentially Fürniss's, but I have simplified the rhythms and added color to distinguish the essential parts and to indicate the improvisatory processes that I surmise. Each system shows a complete cycle. The



Example 1. Essential patterns for the Aka duet "Dìkòbò dámù dá sòmbé" (Fürniss 2006, 191, Ex. 5.11).

mòtángòlè is always present, albeit in a slightly different version than shown in Example 1. For a recording of the first five cycles, please refer to Audio Example 1.

In support of her assertion that "the responsiveness of each singer to what the other sings determines the trajectory of each one's melody," Fürniss (2016, 196) observes two types of cooperation between the singers. One is what she calls their "complementary" behavior. During cycles 2 to 4, whenever one singer presents the *mòtángòlè*, shown in red, the other singer presents another essential pattern called the *òsêsê*, shown in blue. With each successive cycle the performers alternate these patterns. I would add that complementarity also seems to manifest in how they balance ornamentation. Dikondi sings simpler versions than Moako does; for instance, the second time she sings the *mòtángòlè,* during cycle 4, she barely outlines it. Perhaps in compensation, as Dikondi simplifies, Moako increasingly embellishes; for



Example 2. "Dìkòbò . . ." cycles 1–5, with annotations showing interactions (based on Fürniss 2006).

instance, the version of the *òsêsê* she sings in cycle 4 is more elaborate than the one she sang in cycle 2.

At the end of cycle 4, shown in green, the singers cooperate in a very different way: rather than complement each other they sing together the same series of notes and rhythms, with Moako substituting low E and D for Dikondi's high E and D. Assuming this cooperation was not planned in advance (Fürniss says such planning is not characteristic of Aka singing), how does Moako know so quickly what and when to sing? I speculate that she recognizes an established cue. The material they sing sounds special—it derives from the *dìyéì* part, which features a high D on beat 7 and includes a distinctive rhythm of yodeling. Dikondi entered during cycle 1 with this very idea, as a lead-in to singing the main tune in cycle 2. In cycle 4, Dikondi again takes her turn to sing the main tune. But she cuts it off prematurely to catch a breath, then on beat 7 she sings the high D that signals the beginning of the special idea. Meanwhile, Moako has been singing the accompanimental *òsêsê*. Perhaps responding to Dikondi's rest and high D, she cuts the *òsêsê* short and proceeds to double the special idea.

Dikondi's decision to reintroduce the special idea in this particular cycle necessitates some changes to their established complementation behavior. According to the pattern of alternation to this point, we might expect cycle 5 to be Moako's turn to state the main tune. However, as in cycles 1 to 2, Dikondi uses the special idea to prepare her own statement of it. This frees Moako to pursue new material, as is dramatically evident by her rests and unprecedented leaps into her upper register.

Consequently, we may perceive a kind of form in the beginning of this duet. The first four cycles, featuring the consistent alternation among two parts, constitute a large section. The special idea first enables the alternation by preparing for Dikonki's turn to sing the *mòtángòlè* in cycle 2. But then it becomes an agent of disruption when she reprises it at the end of cycle 4. Moako's doubling of this idea and her changes in cycle 5 mark this moment as the beginning of a new phase of their collaboration.

The remainder of this recording rewards close scrutiny, but my main purpose in presenting this partial analysis is to demonstrate how special a texture is this cyclic duet for two equal voices. As the sparsest of all multi-voice combinations, it facilitates tracking each voice separately and switching attention back and forth between them, especially when they differ in pitch, register, timbre, or rhythm. Therefore, we may be inclined to regard the voices as independent and equally deserving of our attention. Such polyphonic parity makes the equal-voice duet much different in effect from melody-and-accompaniment textures in which one voice repeats a short pattern while the other plays a longer, more variegated line. Although one can hear melodies interacting with cyclical accompaniment patterns in rich ways, the components of that texture seem to be qualitatively different from each other, with the accompaniment sounding more neutral, background, automatic, and relatively free from moment-to-moment choice. Equal-voice duets, in contrast, foreground the agency of both performers. Each seems actively involved and endowed with the ability to choose and alter

courses of musical action, so their interactions consequently appear more salient and livelier—qualities that I have brought out in the analysis of the Aka duet.

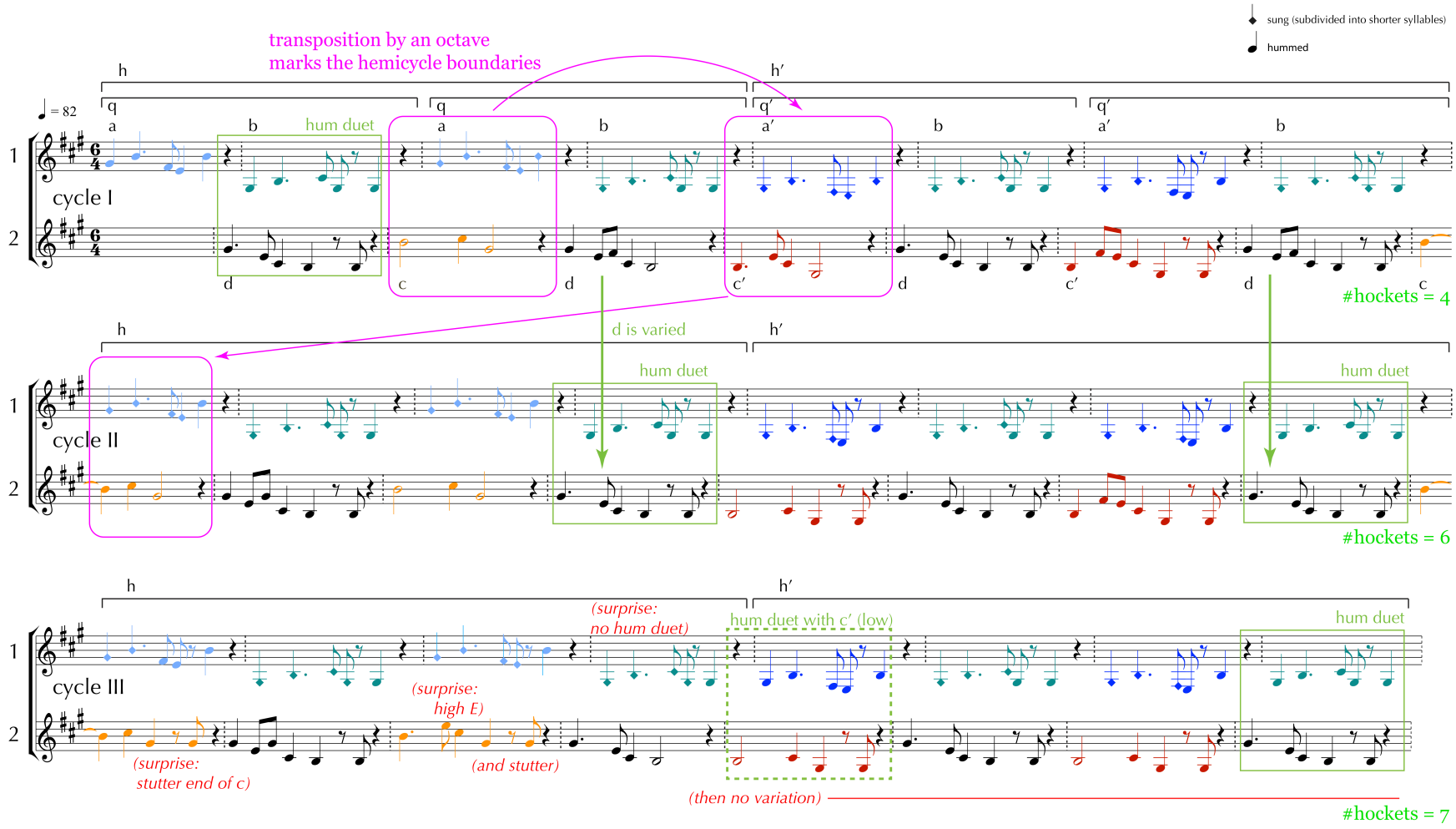
Somewhat counterintuitively, this agency is most vivid when both voices are based on repeating cycles. The cycle establishes veridical expectations that particular events will recur at particular moments (Huron 2006, 231). In such a context, variants and deviations become obvious. They seem like deliberate decisions, thus enhancing the perceived independence and agency of the performers. Indeed, in cyclic textures we are more apt to notice differences in other musical dimensions besides pitch: in timbre, in timing, and in grouping structure (for example, a lengthening or abbreviation of a cycle).

While cycles offer distinct opportunities to showcase agency and interaction, they also pose some aesthetic challenges. If there is no pattern or consistency to the variants, the music may feel disorienting or static, bereft of direction across consecutive cycles. More generally, since a cycle is expected to repeat immediately and continuously, it is difficult to achieve convincing closure for cyclic duets without resorting to such clichés as the pop-music fadeout. Both problems of stasis and closure can be addressed, however, by deliberately controlling the variations to give them direction, grouping structure, and a sense of return.

Fürniss explains how a texture of two independently cycling but interacting voices is especially well suited to the Aka's conception of musical structure. But it is not unique to them; indeed, examples from many traditional cultures have been recorded. In some instances, as in the Aka duet, the musicians may be heard coordinating their variations to forge large-scale musical form and process out of what would otherwise be uniform or randomly varied repetition. This paper analyzes three recorded performances that illustrate the potential of such equal-voice cyclic duets to support formative interactions. As the Aka duet involves variation of pitch, either substituting isolated pitches or cross-cutting between relatively fixed essential parts, I have chosen the following examples to demonstrate how voices may jointly negotiate other musical dimensions: timbre, timing, and grouping structure. I aim not to classify interactions systematically, but rather to appreciate how diverse musical cultures coordinate these dimensions, through close analysis that brings out a distinctive organization for each piece.[1]

In the first item, transcribed in Example 3, the performers modulate timbre and rhythm along with pitch to set up and accomplish formal articulations and closure. It is an 'Are'are funeral lamentation, called "Aamamata," from the village of Hauhari'i on Malaita, one of the Solomon Islands. The scholarly apparatus in the liner notes (Zemp 1996, 64) names a specific

1. The voice accommodations I consider here are just a small set of the conceivable types. A general framework for classifying musical interactions may be found in Brinner (1995). These may be regarded as instances of even more general sorts of collective communicative processes. For instance, Clark (1996) theorizes speech acts as joint activities, an approach Kaastra (2008) adapts to analyze the processes of performing a Takemitsu flute duet. My approach here focuses more narrowly on interactions audible in the recorded trace of each item, whether they are scripted by a score or other fixed exemplar, or are improvised in the moment.



Example 3. Funeral lamentation, "Aamamata" (Solomon Islands). Transcribed and annotated by John Roeder.

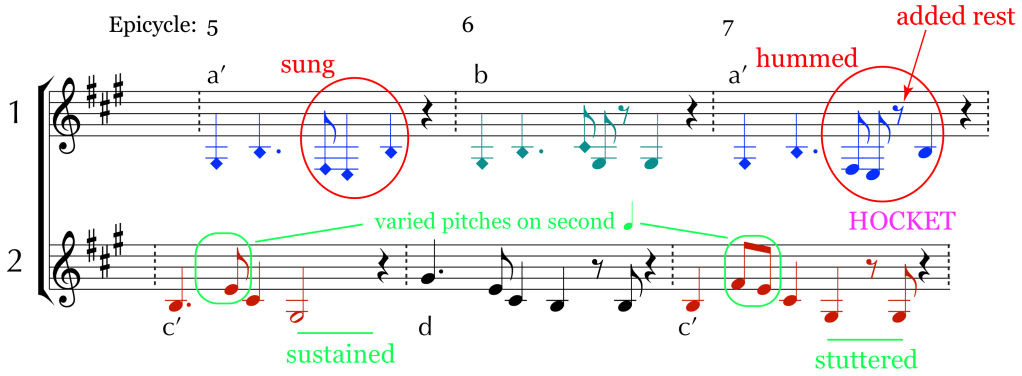
individual as its composer, suggesting that it has a relatively fixed form that analysis of this recording can bring out.

Voice 1 states a long pitch-and-rhythmic cycle three times, shown respectively on the three systems of Example 3, as may be heard in Audio Example 2. Dashed bar lines indicate the articulation of each cycle into eight iterations of a six-beat rhythm, which I will call an epicycle. The iterations are grouped by pitch patterns into a pair of motives, labeled a and b. The first pair is repeated, then the pair repeats twice more but with motive a transposed down an octave (I label that version as a'). The other singer, Voice 2, also presents three long pitch cycles, each defined by four pairs of alternating six-beat motives, labeled c and d on the transcription. As in Voice 1, the first of each pair shifts an octave lower midway through the cycle (I label the shifted version as c').

Apart from the octave transpositions, the repetitions are not exact. The singers adjust their motives subtly in pitch, timbre, and rhythm. I will first survey the variants and then consider how the voices cooperate.

Voice 1 varies timbre and rhythm by alternating words and humming. In the transcription, diamond noteheads indicate pitches on which she rapidly recites text (in sixteenth notes), while regular noteheads indicate hummed pitches with their actual durations. These graphics make evident that she hums her first two epicycles but then begins many of the following epicycles with words. Often near the end of a texted epicycle, such as epicycle 7 in cycle I, her words dissolve into a hum. When they do, she changes rhythm as well as timbre by inserting a rest before the final epicycle pitch. This change is apparent in Example 4, an excerpt from cycle I, which points out the differences between the a' motives in epicycles 5 and 7.

Voice 2 hums exclusively, never singing words. While her timbre therefore remains relatively constant, she varies motives c and d in two other ways: their second quarter note can have different pitches, and their final event can either be held (as a half note) or stuttered—that is, broken into two durations (quarter and eighth) separated by an eighth-note rest. When



Example 4. Timbral and rhythmic epicycle variations during the first cycle of "Aamamata."

Voice 2 stutters while Voice 1 inserts a rest before her own final hummed pitch, as at the end of epicycle 7, the two voices hocket precisely.

Although these variations in pitch, timbre, and timing may seem subtle, their aural salience is enhanced by the constant recycling of the brief motives that invites us to focus on comparing what we are now hearing with what we have just been hearing regularly. Moreover, the sparse duet texture makes it possible both to concentrate on the voices individually and also to appreciate their combination.

As we attend to these variations, we may perceive the voices acting jointly to give an engaging shape to what would otherwise be static repetition. The annotations on Example 3 spotlight these processes. Most obviously, the simultaneous octave transpositions of motives a and c every four epicycles segment the long cycle into halves, which I therefore label as "hemicycles," and the return of motives a and c to the higher register marks the beginning of the long-cycle repetitions. The beginning of the last long cycle is also marked by two unprecedented alterations to the high version of motive c: the stuttering of its final duration, and the sole appearance of the highest pitch, E5, in the song. Perhaps to compensate for this relatively disruptive activity, Voice 2, in the second half of cycle III, exactly repeats c'+d in their simplest versions. By satisfying expectations these literal repetitions may be heard to create stability after the surprising variation.

Some other processes that arise from the voices' interactions cut across the otherwise symmetric grouping structure. For example, the number of hockets in each cycle increases as the song proceeds (there are four instances in cycle I, six in cycle II, and seven in cycle III). Also, the placement of Voice 1's humming in relation to the motives in Voice 2 creates another dynamic shape for the performance. This is suggested by the placement on the score of the green boxes labeled "hum duet." The two voices start by humming together. Then for a long time Voice 1 sings words, extending past the end of the first long cycle and so blurring the cycle boundary. During cycle II, the voices hum together twice, each time at the end of a hemicycle. As they do, Voice 2 alters its motives from the corresponding moment during cycle I. The changes are telling because they make the hum duet precisely the same as it was at the start of cycle I.

Now consider the end of the first hemicycle of cycle III, shown in the middle of the third system. We might expect the voices to hum together as they did at the end of the two hemicycles of long cycle II. If we do, we may be surprised that Voice 1 does not hum; its variant unsettles this hemicycle as did the changes that Voice 2 just made to motive c. As if in immediate compensation for its omission, Voice 1 hums the entire next epicycle, just as both singers shift their motives to the lower octave. This is the sole instance of a hum duet in which Voice 2 performs c' in its lowest register. The singers give audible dynamic emphasis to this moment, as if some goal has been achieved. At the end of cycle III, they hum together again, exactly as they did at the beginning of the piece and at the end of the second cycle. The return and repeat created by these interactions of timbre, pitch, and rhythm, along with the stability

of the exact repetition noted above, may be heard to give convincing closure to the end of the third cycle.

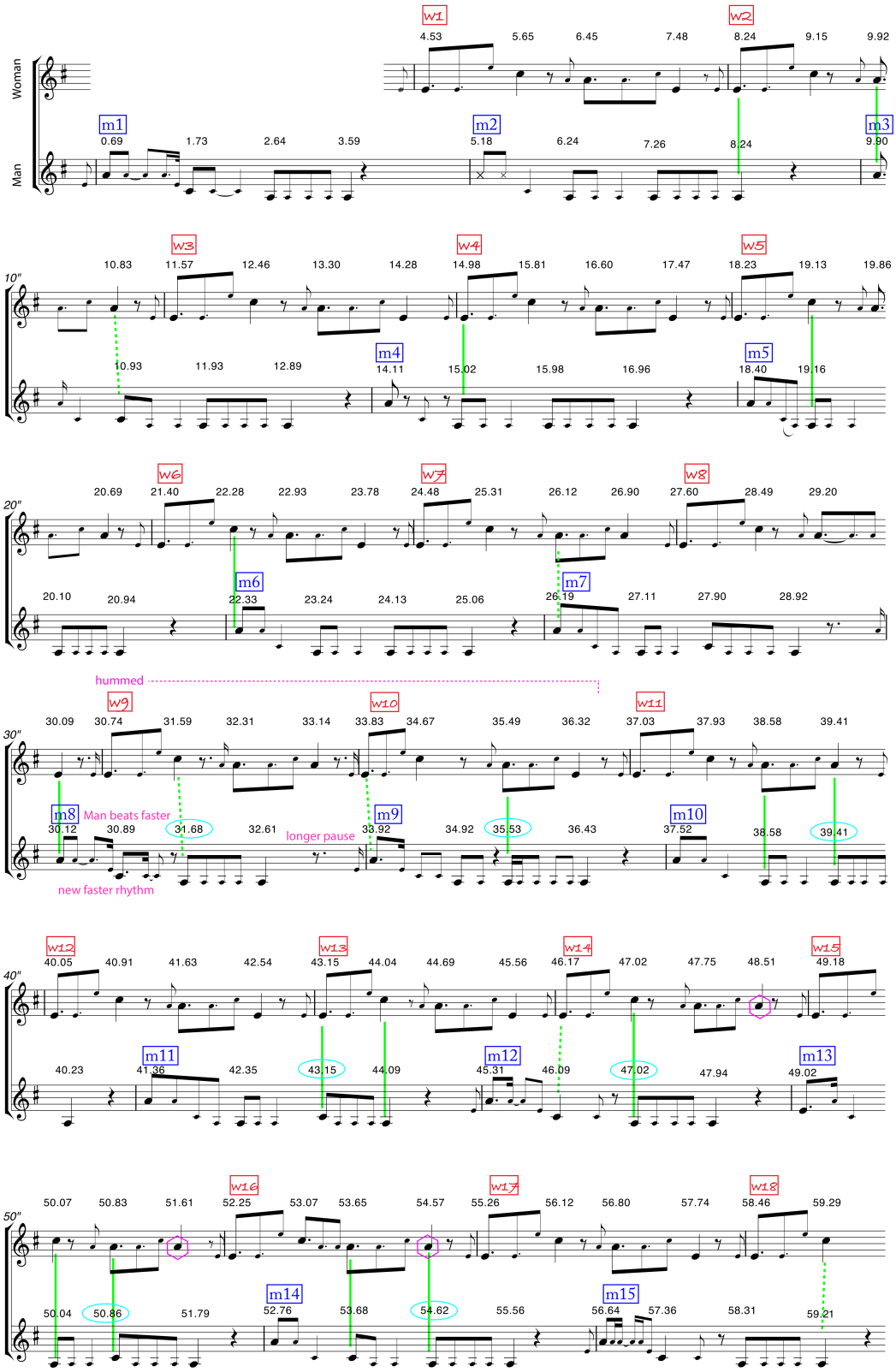
Another dimension in which cyclic duetters may accommodate each other is timing. Many cycles possess a fixed rhythm that leads the listener to expect not only specific kinds of events but also the precise times at which those events will appear. These veridical expectations make obvious any delay or early arrival. In the hothouse of an equal-voice cyclic duet, such alterations may create temporal discrepancies when the voices are expected to attack together or, conversely, create simultaneities of attack at unexpected moments. Such interactions may be expressive locally or may participate in larger-scale formative processes.

For an example, let us consider a social dance song of the Jívaro, the famous headhunting tribe (also known as the Shuar) of eastern Ecuador (Harner 1972). They fiercely fought off colonization, so at the time this recording was made, in the mid-1950s, their traditional music was still relatively intact. In this performance, a man and a woman sing different flirtatious lyrics to each other. (The man compares himself to a handsome parrot, and the woman calls attention to her fragrance; a translation is provided in Harner [1973].) Most of the duet is transcribed in Example 5, and the entire recording is provided as Audio Example 3.

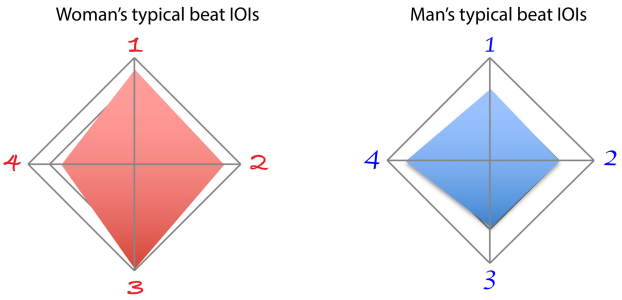
Taken separately, each of their parts constantly recycles a simple melody organized along four accented events that I take to articulate beats. On the transcription, the beginning of each cycle is indicated by a red "w" in the woman's part or blue "m" in the man's part, followed by an ordinal number. The woman's cycle appears in two versions, nearly identical except for their last pitch; compare cycles w1 and w2. The beginning of the man's cycle varies more, but it has a contour distinct from the woman's melody, with its high pitch on its first beat; most of his cycles end with the same rhythm and pitches, often setting the same words (not shown).

Their duet is especially fascinating because not only are their melodies different, but so are their tempos. The woman, starting slightly after the man, completes 25 cycles in the time the man completes about 20, with their tempos averaging about 76 and 62 bpm respectively. Moreover, neither of their beats is regular. The radar charts in Example 6 represent, for a typical cycle of each voice, the lengths of the four beats by the distances of the four corners of the diamond from its center. The asymmetry of the diamonds indicates the non-isochrony of the accented events. The woman's cycle has longer first and third beats and a shorter fourth beat. In contrast, the man's cycle features a noticeably longer fourth beat. In the transcription the larger noteheads, which show the accented pitches, are positioned proportionately to their onset times, which are displayed adjacently; the smaller noteheads, representing off-beat pitches that I will not discuss, are positioned more approximately.

Considering the different tempos and differently irregular beats, it is hard to imagine how the singers could fit their parts together at all. Yet since they clearly coordinate their pitches, sharing a three-pitch-class collection I have transcribed as {A, C♯, E}, it appears that they are not simply superimposing completely different songs. Indeed, an examination of how



Example 5. Jívaro (Shuar) social dance duet. Transcribed and annotated by John Roeder.

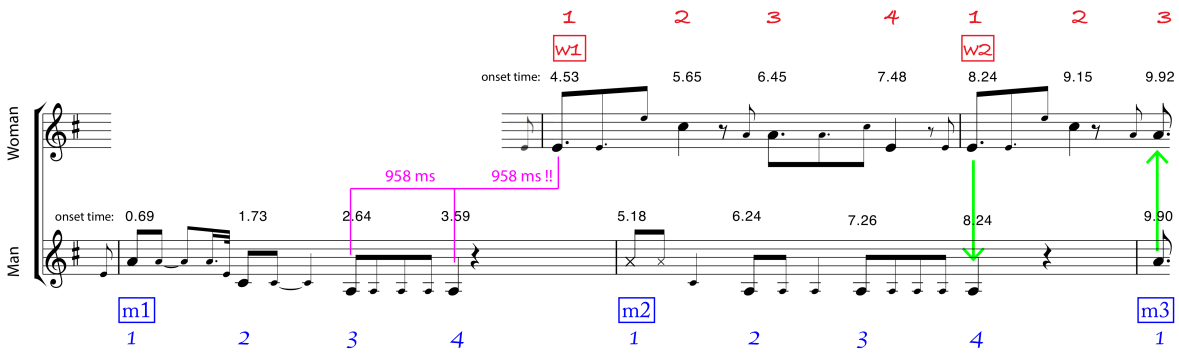


Example 6. Non-isochronous interonset intervals between accented events in the Jívaro cycles.

they time their respective events with respect to each other strongly suggests they are listening, adjusting, and even collaborating to give a larger shape to their duet.

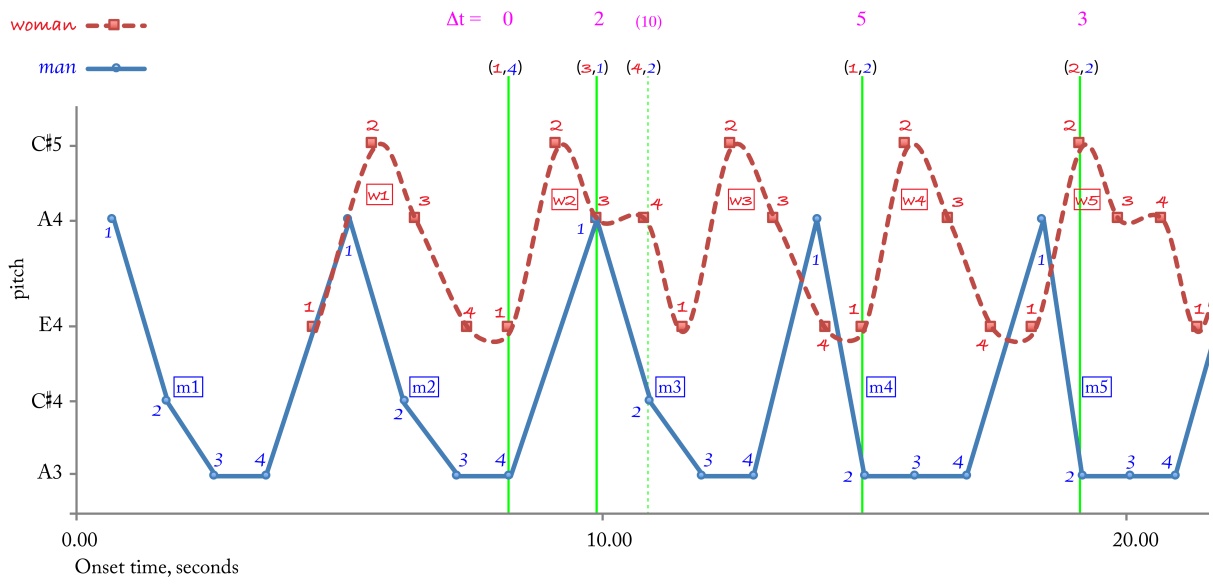
Temporal coordination appears immediately, as suggested by the annotations on Example 7. The voices begin as if they will be in the same tempo: the woman places her first beat exactly when it would occur based on the time between the last two beats of the man's first cycle, 958 milliseconds (ms). Moreover, although she does not place the remaining beats of her first cycle on his beats, she does place the first beat of her second cycle precisely on the fourth beat of his second cycle. He reciprocates by placing the first beat of his third cycle on the third beat of her second cycle, a moment especially marked because they sing the same pitch. Both of these actions seem plausibly intentional: during the long interonset interval at the end of each cycle, each singer can orient to the other's beat. These negotiations are evident in Audio Example 4, which contains the first ten seconds of the performance.

In the discussion to follow I will point out the interactions on a more abstract representation of the music that plots the pitch and onset time of each beat-event in the woman's and man's parts on red and blue curves, respectively. In this way Example 8 represents the first two systems of Example 5.[2] In both the plot and the transcription, green vertical lines



Example 7. Coordination of timing during the opening of the Jívaro duet.

2. The lines connecting the beat-dots in Example 8 do not represent the intervening pitches; they simply clarify the repeating contours of the cycles.



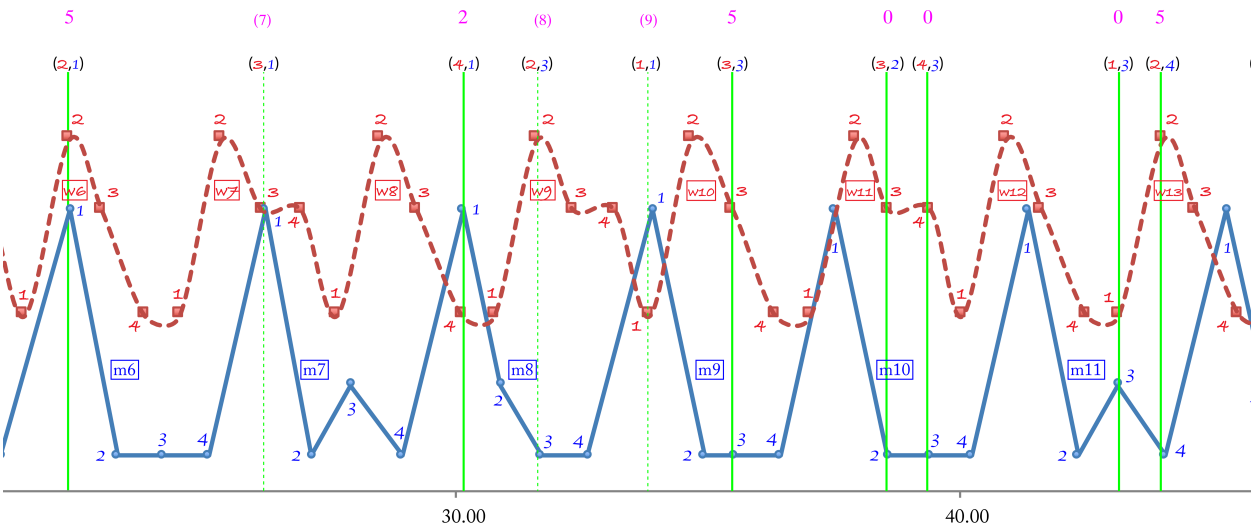
Example 8. Pitch-time plot of woman's (red) and man's (blue) cycles, showing (near-)simultaneities (green), during the first 22 seconds of the Jívaro duet.

mark the occasions when the two performers place their beats essentially at the same moment: the solid lines indicate an onset difference of five ms or less, and dashed lines indicate a difference of six to ten ms. Such near-coincidences are indistinguishable from simultaneities.[3] At the top of each green line appears an ordered pair that indicates the beats that are coinciding at that moment as well as the exact time difference in milliseconds, shown in magenta. For example, these annotations specify that at 8.24" the woman's beat 1 and the man's beat 4 exactly coincide, and that just before 10" the woman's beat 3 and the man's beat 1 appear within two ms of each other.

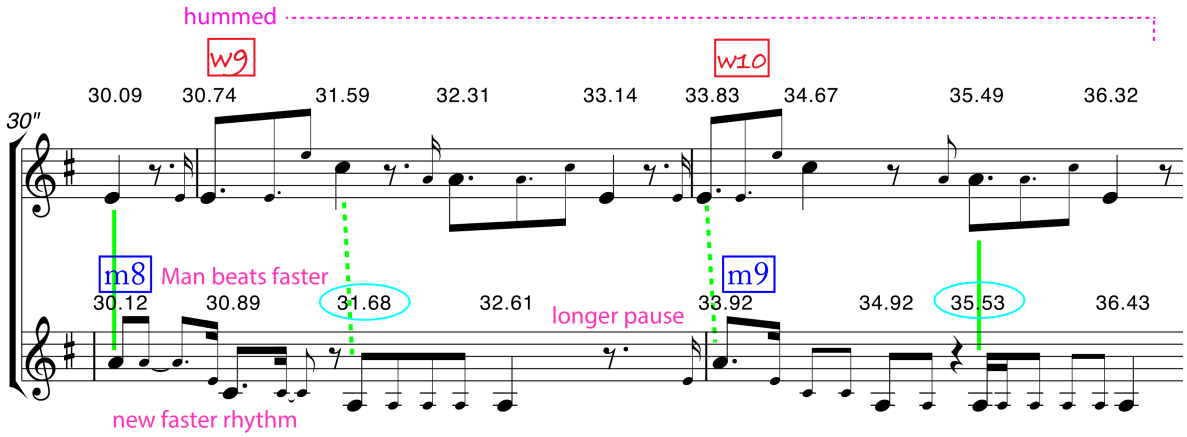
After these opening interactions, as shown by the green lines on the right of Example 8, the man places the second beat of three consecutive cycles, m3 to m5, on a woman's beat—a different beat each time, since she is now singing at a faster tempo. (Audio Example 5 contains this passage.)

Starting at about 22 seconds a new, even more cooperative pattern of behavior seems to emerge. It is apparent on Example 9 and Audio Example 6, which correspond to the transcription starting with cycle m6 on the third system of Example 5. The man places the first beats of four consecutive cycles (m6–m9) within nine ms of beats in the woman's cycles, which he has plenty of time to anticipate. The woman seems to notice, because at her ninth cycle she stops singing words and starts to hum, as shown in Example 10. When she does, the man

3. Psychoacoustical researchers report that non-simultaneity is very difficult to hear for notes whose onsets differ by less than 30 ms (Rasch 1968) and that 20 ms is the minimal difference in onset times needed to perceive the order of two sounds (Hirsch 1959). Huron (2016, 98) specifies that for parts in polyphony to have perceptual independence, the "onsets of intentionally distinct sounds should be separated by 100 milliseconds or more." I determined the onset times of the events in this song by inspecting the waveforms.



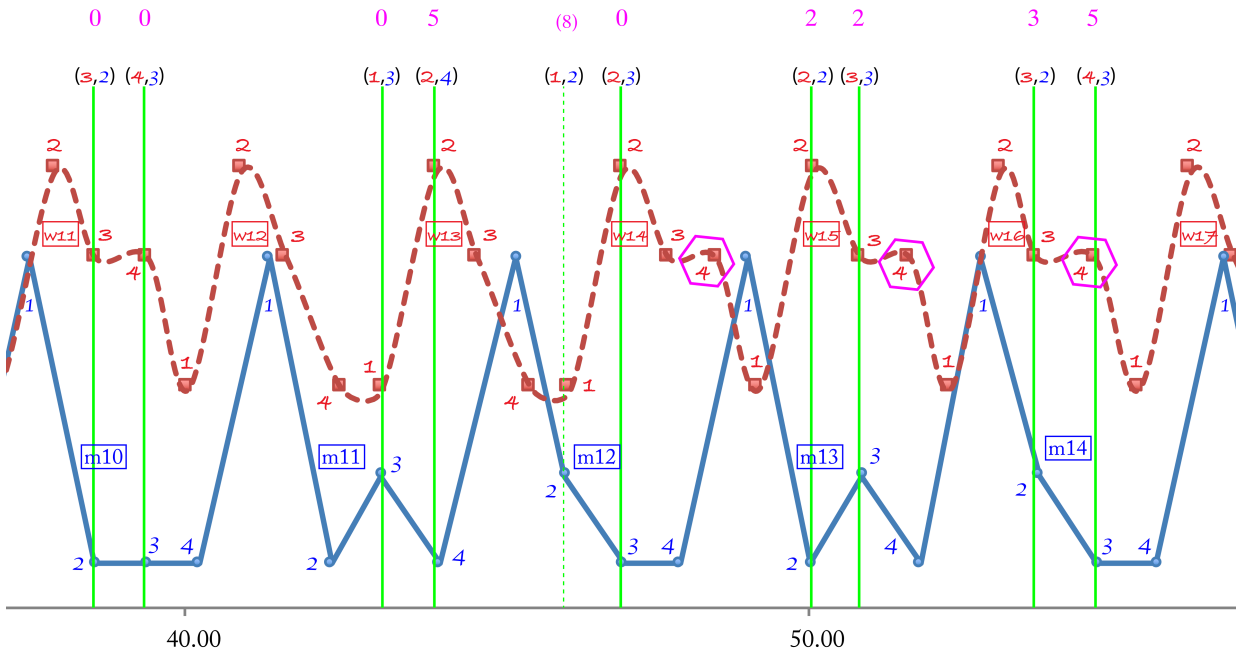
Example 9. Increasing synchronization during 22”–45” of the Jívaro duet.



Example 10. The woman’s response to the increasing synchronization.

speeds up his tempo to nearly match hers, using a new speedy rhythm that causes the first and third beats of his eighth cycle to fall on her fourth and second beats. For the same reason, the first and third beats of his ninth cycle coincide with the woman’s (still hummed) first and third beats. He takes an extra-long pause at the end of his eighth cycle to accomplish this synchronization, and to maintain his overall slower tempo.

These coincidences initiate a remarkable passage, m8 to m14, in which the man places the third beat of every cycle within five ms (except nine ms in cycle m8) of one of the woman’s beats. (Refer to Audio Example 7 which, overlapping with Audio Example 6, starts at the beginning of the fourth system of Example 5.) The times of these beats are circled in cyan on Example 5, and on the plot of this passage in Example 11 the third beats are marked with green vertical lines. The third beat is an important marker within the man’s cycle, for it is then that



Example 11. Repeated synchronization of man's third beats, and responding changes in the woman's fourth-beat events, during 37"–55" of the Jívaro duet.

he always begins to sing repeated text and does not vary the pitches and rhythms. The synchronization continues for seven consecutive cycles. It is too precise and persistent to happen by chance. Furthermore, in many of these cycles the man's second or fourth beat also coincides with a beat in the woman's cycle, that is, the voices share two consecutive beats. Recalling the difference in their overall tempos, this is only possible because their beats are not isochronous, so that the duration of a woman's long beat can match the duration of a man's short beat.

As this synchronization takes hold, the woman introduces an unprecedented and intensifying change, indicated on Examples 11 and 5 by the magenta hexagons: three times in a row she sings the version of her cycle that ends on the higher pitch. The voices nearly synchronize consecutive beats again during the man's eighteenth cycle, but for about 10 seconds afterwards there is little synchronization until in their very last cycles (not shown on the transcription), when they place their first and second beats within 10 ms of each other, then stop.

It is tempting to dismiss these synchronizations as the result of subconscious involuntary entrainment. But the singers proceed at different tempos, and there are never more than two consecutive shared beats, so these seem intentional and selective. It is almost impossible that so many could happen by chance.[4] Moreover, the changes that the singers introduce into their

4. Two metronomes set to the singers' average tempos cannot place their ticks within 10 ms of each other more than four out of 100 of the faster beats, no matter how their first beats are offset. (Mathematically, the situation can be described as follows: Given the periods MP and WP (in ms) of the male and female beats, respectively, and

cycles as their attacks begin to coincide suggests that they are aware of their special temporal relationships. The varying kinds and degrees of synchronization, together with the changing pitch materials, humming, and text, give a decidedly non-cyclical form to the performance as a whole.

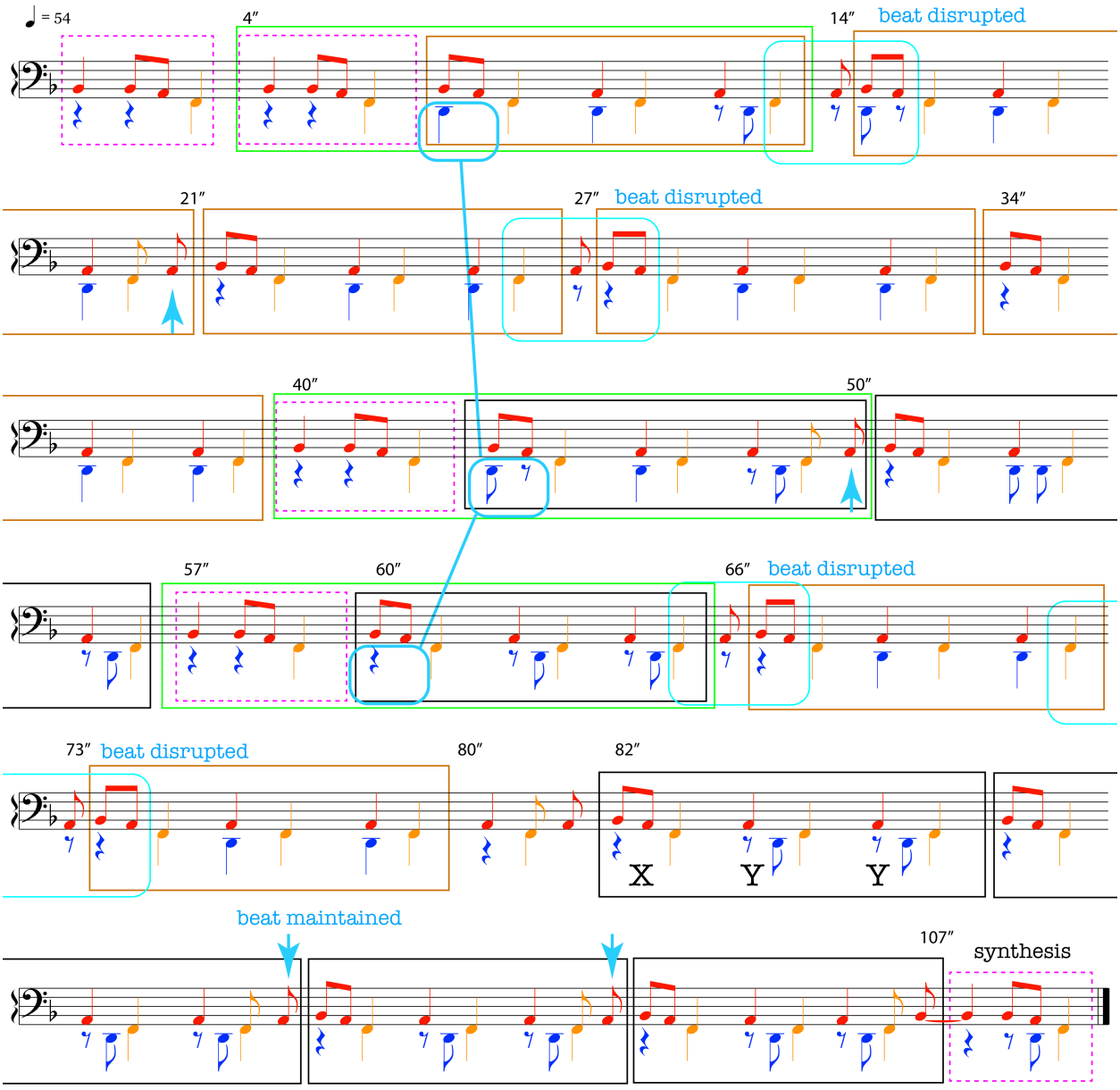
To supplement the examples just discussed, in which the performers accommodated each other by adjusting pitch, timbre, and timing while maintaining a fixed number of essential events in their cycles, my last analysis examines how cyclic duettists interact when one of them varies grouping structure, by adding extra events and increasing the cycle length. It is a recording of an ensemble of single-pitched bamboo clarinets, called *tule*, played by members of the Wayãpi people in French Guyana for a village celebration. The piece is called "Tamanuwa," meaning "the giant anteater." (The growly pitches, noisy reeds, and lumbering tempo vividly evoke the eponymous animal.) My annotated transcription is given as Example 12. The number of players is difficult to ascertain from the recording, but ethnographic commentary provides a helpful description of the all-male ensemble (Beaudet 1997, 91, 102). A "master" player, holding two *tule*, plays the pitches I transcribe in red noteheads as B♭2 and A2. Another musician plays the lowest pitch, D2, shown in blue, and the F2, shown in orange, is played by ten (or more) players.[5] Shoulder to shoulder, all dance in lockstep to the beat they create as they play.[6] Since the F2 always directly follows the A2 and the D2, and the latter two pitches sometimes sound together, I will treat the texture as consisting of a higher leading voice (playing B♭ and A) and a lower following voice (playing F and D)—effectively, an equal-voice cyclic duet.

The identity of their coordinated cycle does not become evident immediately, due to some variation that I will discuss below, but towards the end appear four nearly exact repetitions of the pattern boxed in black. This passage may be heard in Audio Example 8. It consists of two related cells. First, constituting what I call cell X, the leader plays B♭2 and A2 on successive half beats while the follower rests, and on the next beat the follower plays a buzzing F2. Then come two statements of what I call cell Y, in which the leader plays A2 on the beat, and a half beat later the follower plays an offbeat D2 as an anacrusis to an F2 played on the

an Offset (in ms) between their first beats. For n an integer such that 1 < n ≤ 100, for how many values of n is |(n*WP + Offset) mod MP | ≤ 10 ms?) There are 28 such exact-or-near coincidences in this performance (comprising 100 beats in the woman's faster song), of which 18 are within the even more stringent window of 5 ms. One does not need a detailed statistical analysis to recognize that so many synchronizations could not arise by chance.

5. Beaudet (1997, 102) transcribes what he regards as the three "*court motifs* [brief motives]" of the piece, but not the whole recorded performance. Our transcriptions differ in two other respects as well. I represent the sounds with different 12-tone-equal-tempered pitches, maintaining the perfect fifth simultaneity but showing the highest pitch as a semitone from the next highest pitch, rather than a whole tone. More consequentially, I represent the faster notes in the upper part as regular eighths, rather than as the triplet eighths that Beaudet shows. This seems to me to be the only possible way to account for the consistent beat I hear maintained from 82" to 107", and for the placement of the low note at 14". As I explain in the main text, a consequence of my reading is that these fast notes can sometimes be heard to disrupt the established beat and meter, an effect that Beaudet does not mention in his very brief description of this item.

6. A video of a performance of another *tule* ensemble piece, clearly depicting the instrumentation and binary dance meter, may be viewed at https://youtu.be/IK-Jacn7460. (Thanks to Adam King for pointing me to it.)



Example 12. "Tamanuwa [the giant anteater]" (Wayãpi, French Guyana). Transcribed and annotated by John Roeder.

next beat. The cycle has a distinctive beginning, the B♭2 soloed by the leader in the X cell, during which the follower must remember not to play the offbeat D2. The follower can easily anticipate when X will happen: after two consecutive statements of cell Y. Thus, each part plays its own distinctive pitch and rhythmic role in the polyphony, and the cycling maintains a steady beat—indeed, a duple meter, since X and Y are two beats long.

The dark boxes on Example 12 show that most of the time the parts collaborate to repeat this XYY cycle. However, at many moments appear variants that are interesting not only for the

interactions they involve between the parts, but also for how they create a distinctive form for what might have been simply a constant, exactly reiterated groove.

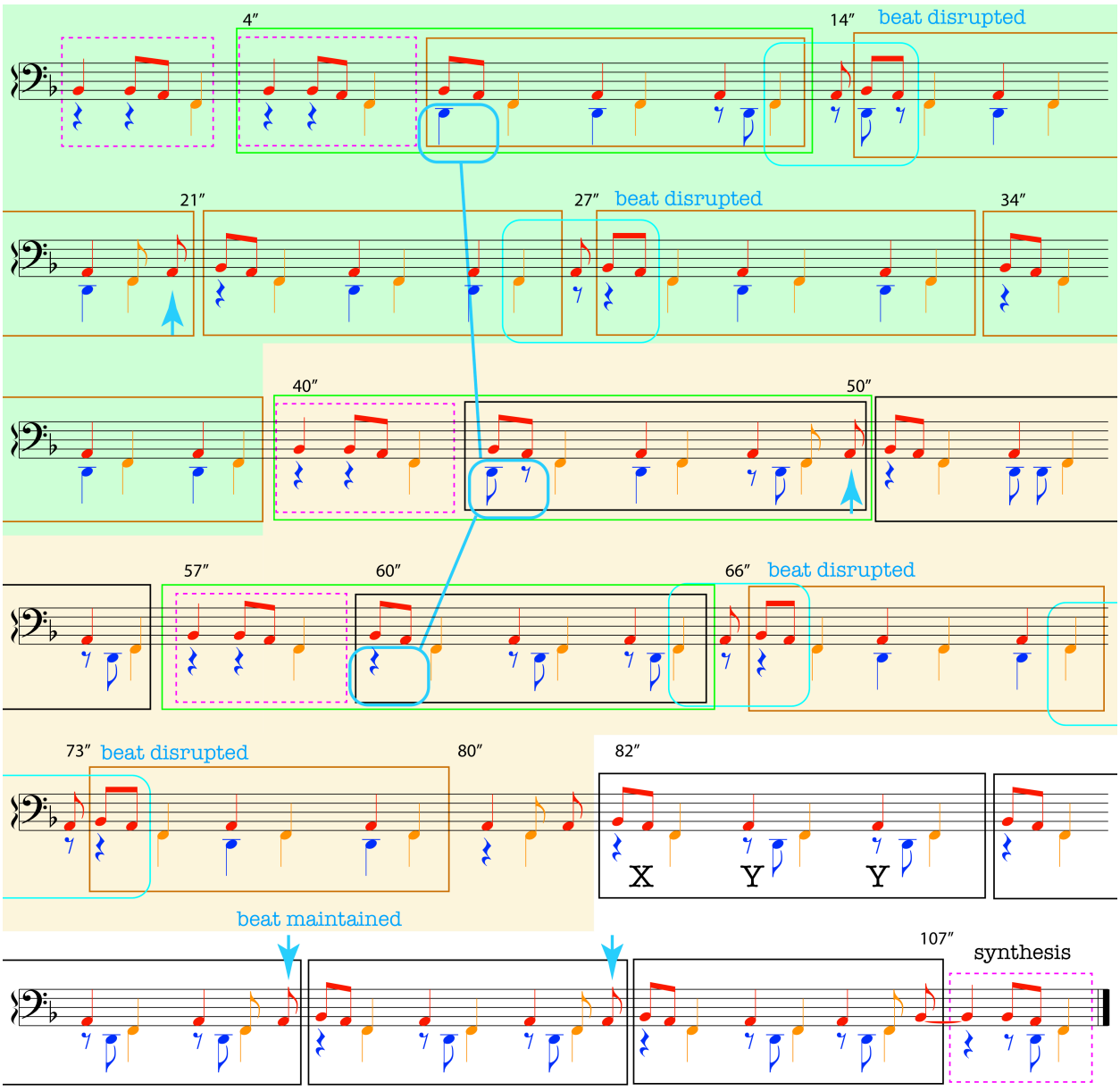
The variants fall into some broad classes. In one, the leader adds an A2 to the end of the second statement of cell Y, in two different ways. He can play this added pitch on the offbeat, then play the expected B♭2 on the following beat, as on the last system of Example 12, when the cycle is consistent. This version does not disrupt the steady beat of the groove and requires no accommodation from the follower. Blue arrows indicate all instances of this change. Sporadically, however, the leader waits a half beat longer before adding the A2, so that pitch appears on the established beat. Yet he still plays the same gesture, A2-B♭2-A2, in the same quick rhythm. Clear examples are at 66" and 73" on Example 12, which can be heard during 60" to 75", excerpted in Audio Example 9. The delay disrupts the beat, and it demands some reaction from the follower, who must play F2 a half beat later than usual.

The leader also introduces asymmetry through another class of variant, to which I will refer as the "call." It involves stating the X cell without the following Ys and preceded by a full-beat-long B♭2. On Example 12 are indicated with magenta boxes all five instances of the call. Two of them occur as the first and last cells of the performance, but the timing of the others is irregular and perhaps at the whim of the leader. In any case, the follower can cope with any unpredictability: since they normally do not play on the first beat of X, they can simply wait an extra beat to play D2 when the leader decides to sustain B♭2 longer than a half beat.

In another class of variant to the XYY cycle, indicated by the brown boxes on Example 12, the follower attacks D2s on rather than off the beat. While this action makes the beat heavier, it does not demand any accommodation from the leader. Rather, it seems to be part of the follower's accommodation, in that it always happens right after the leader has disrupted the beat by delaying his added A2. Compare the situations at 50" and 66". It also happens during the first statement of the cycle at about 6"; in fact, the follower even adds an on-beat D2 under the leader's B♭2. I understand the appearance of this variant, then, as the follower's attempt to restore the ensemble's duple meter after the leader has disrupted it either through the three-beat call or through delaying the next cycle by a half beat.

The calls also seem to entail some other modifications of the follower's behavior in a way that creates a sense of progressive change. Note that each call except the first and last is followed by a statement of the XYY cycle. Green boxes on Example 12 show that association. Consider how the follower places its D2s during these cycles. On the first beat of X, it plays a full-beat-long D2 the first time, a half-beat D2 cut off by a rest the second time, and a full-beat's rest the third time. Audio Example 10 juxtaposes these three passages for comparison. It seems as if the more repetitions of the cycle there have been, the less imperative the follower feels to re-establish the beat after the call.

More generally, through all these interactions the two voices collaborate to shape the entire performance, as suggested by the shading in Example 13. (The complete recording is given as Audio Example 11.) The statements of the call break up the repetition of the normative



Example 13. Phases of interaction in "Tamanuwa."

XYY cycle, creating distinct sections. In the first section, the leader unpredictably adds calls and half-beat delays, and the follower reacts by placing the low notes on the beat. Then comes a middle section in which the call appears twice in close succession, then the leader adds a half-beat delay to two consecutive statements of the cycle. Thereafter, however, the leader introduces no further disruptions, and the follower ceases playing D2 on the beat. Overall, the players may be heard to achieve a balance between form and process: they seem to have a fixed ostinato in mind, as evidenced by the many reiterations of it, but there is some degree of leeway so that when the leader delays, or adds an extra cell, the follower is able to alter its

contributions and even keep the ensemble pointed towards the eventual steady groove into which it settles at the end.

Interactions even afford hearing a kind of closure during the final call at 107". The leader brings in the B♭2 a half beat early, the first time that has ever happened. It suggests that the beat will be disrupted, as during some previous statements of the groove, but this time by omitting a half beat rather than adding one. However, in another surprise, the leader treats this B♭2 as a syncopation by holding it an extra half beat then moving to the A2 on the offbeat as it has done during previous calls. As it changes to the A2, the follower opts to play an offbeat D2, which has occurred during the groove but never previously during the call. In other words, the concerted unprecedented actions of the two voices achieve a synthesis of the call and the groove at this moment, and so it seems like an appropriate moment for them to stop.

In their diversity, the four examples I have discussed above attest that there is something special about equal-voice cyclic duets. In each there is a negotiation, in which the performers seem to sense the possibilities for coordinated variation. It is interesting to analyze how different musical cultures take advantage of these special properties and invent interactions that create large-scale form.

One may appreciate these inventions as ways of systematically organizing polyphony that are different from the principles of counterpoint that were cultivated for centuries in European art music. Western counterpoint constrains meter and simultaneity intervals and melodic motion; it is a systematic, generic control that does not necessarily require repetition, and it requires notation for its full working out. In these un-notated non-Western pieces, in contrast, the constraints are created contextually, differently for every piece, by virtue of the particular cycles that the voices reiterate. The cycles, not some external system, become the referential process against which the events are understood and their variations are evaluated.

As special as this texture is, however, it does not call for a novel analytical method or bespoke theoretical concepts. Indeed, in each case I have simply considered all features of the events (pitch, timbre, timing, grouping), processed the data, and sought patterns. Are the formal patterns I have described intended by the musicians, or meaningful to the insiders of these cultures? I have emphasized the agency and interaction of the performers, but it is unlikely that these societies regard individuals in the same way as a modern Westerner would. So, it is probably impossible to answer that question, involving as it does not only the tension of emic and etic perspectives but also compositional intent, which is problematic even in Western music analysis. Nevertheless, from such analyses we can gain a better theoretical appreciation of musical possibilities of cycles, and of the different sorts of cycle variations that world musicians employ.

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