Cryptic Audiodiversity and the Dissonant Perfect Unison

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> *"After a certain high level of technical skill is achieved, science and art tend to coalesce in esthetics, plasticity, and form."*
>
> *– Albert Einstein*

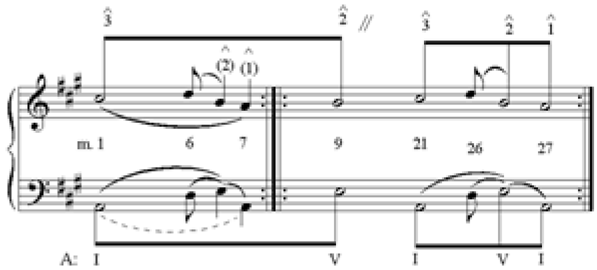
[1] For the past decade, scientists have been investigating a genetic phenomenon known as cryptic biodiversity (Beheregaray and Caccone 2007; García-París et al. 2000). Armed with the latest advances in DNA testing, researchers now know that two organisms sharing identical outward appearances may in fact be entirely different species—as genetically divergent as cats and dogs. The extent of cryptic biodiversity is just beginning to be appreciated, and studies have demonstrated its presence amongst amphibians, birds, mammals, reptiles, fungi, and plants. As the number of recognized species continues to grow, cryptic biodiversity will have a major impact on our perception of the endangered species list. Some scientists fear that the continual announcement of new species may diminish the desire to protect those already at risk of extinction.

[2] Although music theorists need not contend with such life-or-death matters, the concept of cryptic biodiversity resonates in musical analysis as well, where "seeing is believing" can be a hazardous *modus operandi*. Tonal music is a contextual art; the meaning of any pitch, harmony, or key depends on its surroundings—both immediate and long-range. The way something looks and the manner in which it operates do not necessarily correspond. Nor is the function of a musical entity limited to a single role based on its external façade. The remainder of this essay will illustrate examples of what I

refer to as cryptic audiodiversity: musical objects that possess similar or identical surface visages, yet act in dissimilar ways. This preliminary study will culminate with a direct musical equivalent of cryptic biodiversity, a species of dissonant perfect unison that, to my knowledge, has not been addressed by music theorists.(1)

[3] Consider the Trio from the third movement of Mozart's Symphony no. 35 in D major, K. 385. Allen Cadwallader and David Gagné provide an illuminating account of this work in *Analysis of Tonal Music* (2007, 221–224, 381 n. 10) (see **Example 1**). What if one were to assert that measures 1–8 and 21–28, which are near carbon copies of one another, should be depicted with the same graphic symbols? One can counter this argument from two perspectives. From an analytical point of view, these passages represent different points in the overall structure of the composition. Motion of

Example 1. Mozart, Symphony no. 35, K. 385, III, Trio (after Cadwallader/Gagné)



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the *Urlinie* to scale-degree one represents more than melodic closure—it represents structural closure, and these two concepts are not synonymous. From a performance angle, measures 1–8 and 21–28 need not be played in exactly the same manner, even though they are virtual duplicates. They do not possess equal amounts of closure, nor must one apply the same amount of *ritenuto* and dynamic tapering to the ends of both passages.[2]

[4] Therefore, interpreting measures 1–8 and 21–28 depends not only on their own content, but, just as importantly on the presence or absence of subsequent events.[3] (In this case the Trio can be viewed as an independent composition, and the return to the Menuetto can be considered a separate structure.) It is also true that what does or does not precede a repeated excerpt may strongly influence one's hearing of it. At the onset of Schubert's Moment Musical, D. 780 no. 6, the bass states the structural tonic immediately, initiating several measures of tonic prolongation (see **Example 2a**). When the same music returns after the Trio, it is no longer preceded by a blank slate. Instead, one hears it in relation to the subdominant key area of the Trio (see **Example 2b**). Not only does the D♭ major Trio effect a large-scale key scheme that mimics the composition's initial

bass tones, it also transforms the meaning of the A♭ major harmony that initiates the da capo statement of the Allegretto (see **Example 2c**). Now the upbeat tonic chord is enveloped by D♭ sonorities that are stronger both metrically and agogically. The stable A♭ major harmony that began the composition is transformed into a contrapuntal chord in the da capo, one that supports a passing tone, C, on its path toward B♭. From the last measure of the Trio to the second measure of the Allegretto, the tonic upbeat fulfills an ornamental role within a IV-(I)-II^6_5 progression, an expression of the 5-6 technique that plays a central part in Schubert's piece.[4] Contrary to the initial statement of the Allegretto, partial harmonic solidity in the da capo is not achieved until I^6 enters in measures 3–4.[5]

ple 2a. Schubert, Moment Musical, D. 780 no. 6

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Example 2b. Schubert, Moment Musical, D. 780 no. 6

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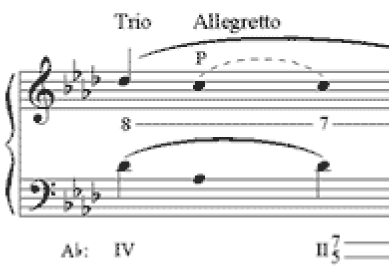
Example 2c. Schubert, Moment Musical, D. 780 no. 6



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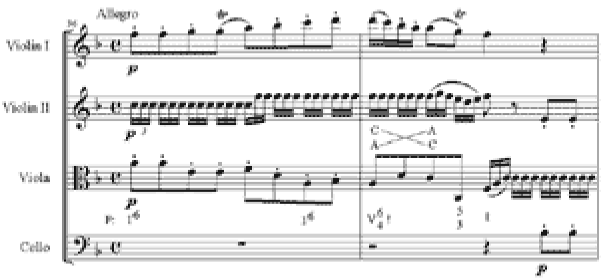
[5] Large quantities of intervening material are not required for similar-looking objects to portray dissimilar functions. In the opening movement of Mozart's String Quartet in D minor, K. 421, several instances of "I^6" appear within the close proximity of a four-measure span (see **Example 3**). Relatively stable first-inversion tonic harmonies occur twice in both measures 36 and 38. The latter harmony in each measure closely resembles its ensuing downbeat, with the only visual distinction being decorative suspensions of scale-degree six in the melody. Upon closer inspection, however, the "I^6" chords in measures 37 and 39 have an altogether different function from their predecessors. These downbeats initiate functional voice-exchanges with the following

beats in the outer voices, binding them together and suggesting that they share corresponding harmonic functions. The downbeats of measures 37 and 39, disguised as I^6 harmonies, possess dominant function in the form of inverted cadential $^6_4$chords.[6] Along with the voice exchanges, this reading is supported by harmonic syntax (predominant harmonies occur at the ends of measures 36 and 38), as well as the strong metric placement of the inverted cadential $^6_4$chords. In many situations, composers use inverted cadential $^6_4$chords to avoid problematic voice leading.[7] In this instance, using traditional cadential $^6_4$chords with scale-degree five in the bass would produce empty fourths on the downbeats of measures 37 and 39.[8]

Example 3. Mozart, String Quartet in D minor, K. 421, I



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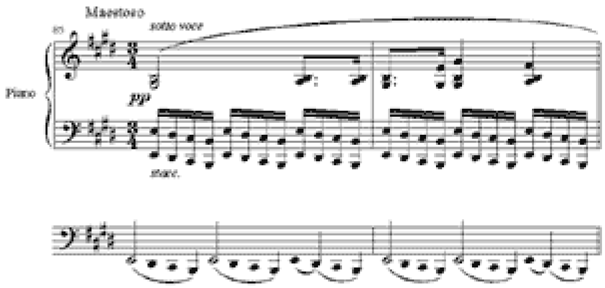
Example 4. Chopin, Polonaise in A-flat major, op. 53



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[6] Unlike the previous examples, Chopin's Polonaise in A-flat major, op. 53, illustrates that intervening material is not a prerequisite in order to express cryptic audiodiversity. Adjacent entities can exhibit distinct functions even when they have congruent exteriors (see **Example 4**). An elementary change from tonic to dominant harmony is sufficient to transform the meaning of the pitches that constitute Chopin's famous left hand ostinato. While the functions of C♯ (passing tone) and B (chordal skip) remain constant, E alternates between a stable chord tone and a dissonant appoggiatura, and D♯ begins as a passing tone and becomes a chord tone when dominant harmony arrives. Likewise, metrical placement and motivic factors distinguish the middleground function of upbeats from their ensuing downbeats in the first two measures of Brahms's Waltz in E major, op. 39 no. 5. The anacruses express the primary harmonies at those moments, whereas

the downbeats serve as dissonant suspensions with respect to the prevailing harmonies in measures 1 and 2 (see **Example 5**).

Example 5. Brahms, Waltz in E major, op. 39 no. 5

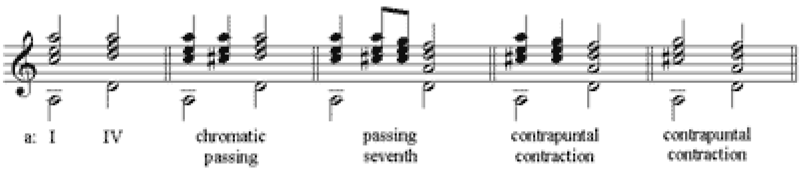
(click to enlarge and see the rest)

Example 6. Mendelssohn, Violin Concerto in E minor, op. 64 (1845), II

(click to enlarge)

[7] Cryptic audiodiversity applies not only to closely resembling material recurring after varying amounts of time, but also to the dimension of structural hierarchy. Separated by the conceptual distance of structural levels, the same object can adopt contrasting characteristics according to its position relative to the surface and the *Ursatz*. In the ternary-form second movement of Mendelssohn's Violin Concerto in E minor, op. 64, the tonality of the outer sections, C major, is unambiguous. Meanwhile, the key and mode of the middle section is, at least initially, less clear (see **Example 6**). The first harmonic sonority in measure 52 might suggest that the middle section is in A major, and the content of the entire measure might imply the key of D minor. In reality, A minor represents the tonal core of this section, but demonstrating this is not a straightforward task. For example, within the middle section's twenty-seven measures, there are only two fleeting statements of root-position A minor triads (in measures 58 and 67). It may seem audacious to begin an A minor section with a triad in the parallel major, but at a deeper level the A major triad stands for a root-position A minor tonic harmony that has been contrapuntally embellished and contracted into a single gesture (see **Example 7**).[(9)] Accordingly, the same object displays contrary characteristics at different structural levels: on the surface, the downbeat of measure 52 appears as a major triad that is rapidly transformed into a dominant seventh chord; at a deeper level, this sonority represents a stable A minor tonic triad.

Example 7. Progressive embellishment of I-IV in A minor



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Example 8. Mendelssohn, Violin Concerto in E minor, op. 64 (1844), II

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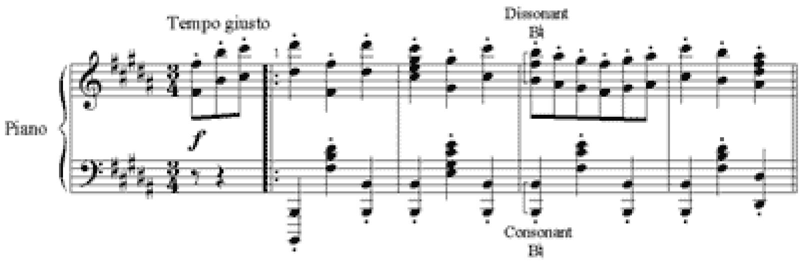
[8] This interpretation is not mere idle speculation—one gains the impression that Mendelssohn composed the passage with similar thoughts in mind, as suggested by an earlier version of the Concerto, edited by R. Larry Todd and recently published by Bärenreiter (Mendelssohn-Bartholdy 2007). The 1844 draft features the very A minor harmony that constitutes the genesis for the A major chord used in the final product one year later (see **Example 8**). If both versions are sensible, the 1845 score more effectively accentuates common ground between distinct formal sections. First, the primary themes of the outer and inner sections feature motion from E to F, and the 1845 version allows both measures 9 and 52 to begin with major triads. Second, the A major and D minor sonorities in measure 52 recall similar progressions in measures 19–22. And third, by choosing an A major triad, the middle section begins with a familiar sonority. Starting with the A minor triad of the 1844 draft is somewhat jarring because this harmony has yet to appear in the second movement.

[9] What remains is to investigate more literal manifestations of cryptic audiodiversity, in which nearly identical objects occur simultaneously yet still demonstrate highly contrasting characteristics. Let us start with one of the most stable of all

Example 9. Brahms, Waltz in B major, op. 39 no. 1



intervals, the perfect octave. A consistent thread in its description is the concept of *equivalence*. Thus Allen Forte (1974, 7) writes: “The notes which form the 8^{ve} always have the same letter name. One of the most fundamental axioms of tonal music is that notes which bear the same name are equivalent.... A note which stands at the interval of an 8^{ve} from another note and which has the same letter name is regarded as a duplication or 8^{ve} *doubling* of that note, not as an additional and different chordal element.” And, according to Rameau (1722, 11), the “...octave has only those properties communicated to it by the fundamental sound which generated it.... If one sound forms a perfect consonance with the fundamental sound, it will also form a perfect consonance with its octave; if another forms an imperfect consonance or a dissonance on the one hand, it will also form an imperfect consonance or a dissonance on the other....” Nevertheless, even this bedrock of musical stability can be

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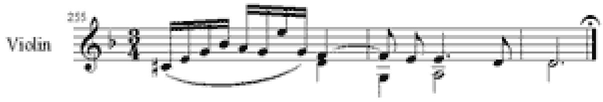
Example 10. J. S. Bach, Violin Partita no. 2 in D minor, BWV 1004, Chaconne



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Example 11. J. S. Bach, Chorale no. 35

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transformed into a dissonant entity when situated in the proper context. Brahms features a dissonant perfect octave at the beginning of the Waltz in B major, op. 39 no. 1 (see **Example 9**). The bass voice reiterates a consonant tonic pedal until the last beat of measure 4, while the remaining upper parts unfold an ornamental tonic-predominant-dominant-tonic progression above the pedal. In measure 3, the melodic B-naturals reside within the sphere of decorative dominant harmony, not the underlying tonic pedal. The perfect octave between the two hands is dissonant: scale-degree one in the left hand articulates stable tonic harmony, and the same pitch classes in the right hand serve as dissonant accented passing tones.

[10] Cited at least as far back as the eighteenth century (Bach 1762, 297), the concept of a dissonant perfect octave is not a new discovery. What appears to be overlooked, however, is that similar events can undermine the seemingly fixed properties of the perfect unison. It is well understood that both tones in a perfect unison can be concordant with their surroundings, as demonstrated by the final measure of J. S. Bach's Chaconne from the Violin Partita no. 2 in D minor, BWV 1004, or they can clash with their environs, as seen in the third measure of Bach's Chorale no. 35 ("Gott des Himmels und der Erden") (see **Examples 10 and 11**).(10) In the words of Allen Forte, one might conclude that a

fundamental axiom of tonal music is that the two tones of a perfect unison will have the same function respective to their context—either both are consonant or both are dissonant. This notion of unison equivalence is taken a step further by Zarlino (1558, 24), Mattheson (Harriss 1969, 216, 797), C. P. E. Bach (Bach 1762, 183–184), and Schoenberg (Schoenberg 1970, 1), all of whom assert that perfect unisons do not even qualify as an interval.

[11] Due to the overarching sentiment that perfect unisons "stand in the relation of absolute equality" (Fux 1725, 38), it makes sense that few, if any, have wondered if a perfect unison can be discordant with itself. It would seem that some musical properties must remain steadfast, no matter what the context. Even so, the question deserves to be asked: can one tone of a perfect unison be consonant while its twin, sounding the very same pitch, seeks resolution?(11) It turns out that it is indeed possible, and it is fitting that J. S. Bach would be the one to demonstrate this ingenious contrapuntal sleight-of-hand and marvelous example of cryptic audiodiversity. In the Preludio from the Solo Violin Partita no. 3 in E major, BWV 1006, Bach emphasizes an explicit tonic pedal at the onset of a bariolage passage in measure 13.(12) Eight measures later, he initiates a series of 7-6 suspensions that encircles the tonic pedal (see **Example 12**). Although the pedal is situated in a middle voice, it functions as the bass and renders the entire passage a composing-out of tonic harmony. As the sequence of 7-6 suspensions nears its conclusion, something remarkable occurs in measure 27: E♮ sounds in two voices (one voice emanates from the violin's A-string and the other from its open E-string), and while the latter represents the consonant tonic pedal, the former is the seventh in a dissonant 7-6 suspension. This perfect unison is thus discordant with itself and requires descending stepwise resolution to a minor second; as such, it is a true instance of cryptic audiodiversity.(13)

[12] It is understandable if no one has previously noticed this

Example 12. J. S. Bach, Violin Partita no. 3 in E major, BWV 1006, Preludio odd form of unison. Due to its apparent simplicity, there should be no compelling reason to investigate aspects of the perfect unison—one would long think it a closed book. Furthermore, the dissonant perfect unison shown in Example 12 is based on a unique contrapuntal situation. Whether it can be generated within dissimilar contexts is still to be determined (at

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least, no such examples have crossed my mind). The dissonant perfect unison in J. S. Bach's Preludio underscores the limitless flexibility of our tonal language and represents a veritable sonic depiction of cryptic biodiversity.[(14)] Indeed, it is a continual source of inspiration to observe how seemingly crystallized musical elements can be rendered malleable and molded in an endless variety of ways when placed in the hands of a master composer.