

## Timbre-Harmony in the Opening of Tristan Murail's *Désintégrations*

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**Abstract.** Tristan Murail cites two features of his analysis of a C1 piano sound as important to timbral-harmonic structure in *Désintégrations*. First, he observes that since no partial corresponds to the fundamental, the perception of C1 as the gestalt pitch of this sound is illusory. Second, he identifies “formantic zones”—regions of the spectrum which are relatively louder than the surrounding partials—that contribute to our emergent perception of timbral quality. Proceeding from these observations, Murail deploys two convergent series of timbre-harmonies in the opening of *Désintégrations*. One is populated by timbre-harmonies whose pitch content is drawn from an A#0 harmonic spectrum, whereas the other is similarly derived from a C#2 harmonic spectrum. The perceptual tendency to divine a “virtual” fundamental when the fundamental is not present allows us to perceive an “A#0-ness” or a “C#2-ness” for each timbre-harmony that supports the perception of each series as independent. However, this independence is undermined by an additional limiting factor: the pitches in every timbre-harmony correspond to partials within the “formantic zones” identified by Murail in his analysis and thus reflect, however imperfectly, different flavors of the same timbral quality. In this presentation, I will consider the extent to which the independence of each series is undermined by factors that foreshadow their eventual convergence. I will discuss parallels between the influence of virtual fundamentals and formants on the structure of Murail’s timbre-harmonies and Tenney’s assertion that “a mistuned interval will still carry the same harmonic sense as the accurately tuned interval does, although its timbral quality will be different.” Finally, I will discuss how the details of Murail’s compositional procedure in the opening of *Désintégrations* reflect Murail’s broader attitude towards timbre and harmony as detailed in his published writings.

Many, if not all of us, have internalized the idea, suggested by our esteemed keynote speaker, that the aesthetic we broadly understand as “spectralism” arises from a particular attitude towards composition<sup>1</sup> rather than from an adherence to a standardized set of compositional techniques. Though this nebulous characterization of “spectralism” is accurate, it presents a challenge in understanding the epistemology of spectral music summarized by Joshua Fineberg as a need “to form an image of the overall trend” via careful consideration of “recurring themes and ideas.”<sup>2</sup> In this paper, I explore the conflation of timbre and harmony—one such “recurring theme” that is, to my ears, essential to both an intellectual understanding and aesthetic appreciation of spectral music.

I have chosen to anchor my discussion in the compositional logic and emergent perceptual qualities of the opening of Tristan Murail’s *Désintégrations*. Out of respect for the French language, I will pronounce the title in American English rather than running the risk of committing aural violence on the true title of an aesthetic accomplishment I hold in high regard. My inability to do justice to the title aside, my choice of this work may seem odd. Murail has written that the “compositional elements” of

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<sup>1</sup> Tristan Murail, “Target Practice,” trans. Joshua Cody, *Contemporary Music Review* 24, no. 2/3 (2005): 152

<sup>2</sup> Joshua Fineberg, “Spectral Music,” *Contemporary Music Review* 19, no. 2 (2000): 1-2.

*Désintégrations* are more “easily perceived and isolated” than in later works in which “the structures are more interwoven and thus more difficult to analyze.”<sup>3</sup> Following from this, it may seem that I am after low-hanging analytical fruit, especially since Murail has largely explained the compositional logic behind the passage I intend to discuss. In the pursuit of an understanding of the porous perceptual boundary between timbre and harmony in spectral music, however, it is precisely the relative ease with which compositional elements are perceived in *Désintégrations* that makes this work an ideal reference point for my analytical comments—comments intended to push past the perceptual isolation of “compositional elements” to a discussion of how one’s experience of the opening gesture’s dramatic qualities might be shaped by interactions between compositional logic and innate tendencies of auditory perception.

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Murail often equates harmony and timbre by referring to perceptions that emerge as a result of specific pitch relationships,<sup>4</sup> but any assumption that this is broadly characteristic of his compositional practice would be reductive in the extreme. Individual pitch structures—aurally striking though they may be—are not very significant unless considered in light of their contributions to the dynamism of the work as a whole.<sup>5</sup> It is much more accurate to say that Murail’s music dramatizes the dichotomy between our ability to perceive a group of frequencies as a unified manifestation of a common source<sup>6</sup> and our ability to hear these same frequencies as individual sounds.<sup>7</sup> Murail demonstrates this dichotomy by referring to a “beautiful cello sound”—a familiar aural stimulus whose spectral content is particularly rich and allows

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<sup>3</sup> Tristan Murail, "Villeneuve-lès-Avignon Conferences, Centre Acanthes, 9-11 and 13 July 1992," trans. Aaron Berkowitz and Joshua Fineberg, *Contemporary Music Review* 24, no. 2/3 (2005): 211.

<sup>4</sup> Tristan Murail, “After-thoughts,” *Contemporary Music Review* 24, no. 2/3 (2005): 272. “There are often striking sonorities in ‘spectral’ pieces that many people attribute to some arcane craft of orchestration we have developed. They do not understand that those sonorities are in fact created through the harmonies, the notes, the *pitches* [Murail’s emphasis]. Or, rather, that pitch structures and orchestration have become one and the same thing.”

<sup>5</sup> cf., Murail, “Target Practice,” 152. “To properly find a place in the ‘spectral’ universe, it is not enough to align a few harmonic series, neatly packed; above all, one must have a certain new kind awareness of the musical phenomenon.”

<sup>6</sup> cf. Albert S. Bregman, *Auditory Scene Analysis* (Cambridge: MIT Press, 1990), 232-250. Consider, especially Bregman’s characterization of “harmonicity,” “fusion,” and the gestalt psychological principle of “common fate.”

<sup>7</sup> cf. McAdams, “Spectral Fusion,” 280. Consider especially McAdams’ distinction between “synthetic” and “analytic” listening.

one to easily “focus [his or her] ear” so as to perceive either “unitary timbre” or “multi-dimensional harmony.”<sup>8</sup>

The distinction Murail draws between timbre as “unitary” and harmony as “multi-dimensional” is important, but possibly misleading. Psychoacoustic accounts of unified timbral perception rely on a variety of acoustic correlates.<sup>9</sup> Conversely, language applied to the subject of harmony confuses the issue in a similar way. Consider, for example, harmonies referred to in the singular: “a chord,” “a sonority,” “a harmony.”<sup>10</sup> Though these terms are often used for convenience, their prevalence highlights the lack of clarity inherent to broad categorical distinctions between perceptions of timbre and harmony. Murail’s boldly stated distinction, however, is part of what makes his “beautiful cello sound” so compelling. One is able to grasp the essence of what he means to convey precisely because he has evoked a clean break between two modes of perception. As compelling as Murail’s cello is, however, it does not reflect the fact that he does not maintain the same distinction between timbre and harmony in practice.

One particular aspect of Murail’s compositional practice sheds light on the ambiguity central to his conception of how timbre and harmony coexist within his music. He writes that many of his works “are built on structures that are not direct spectral observations,” instead relying on “harmonies conceived outside the domain of equal temperament [...] placing us in a domain where harmony and timbre are more or less the same thing.”<sup>11</sup> Murail refers to this type of harmonic/timbral conflation as “frequential harmony” and, taken out of context, one might assume that micro-intervals are all that is needed to erode

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<sup>8</sup> Tristan Murail, “Villeneuve-lès-Avignon Conferences, Centre Acanthes, 9-11 and 13 July 1992,” trans. Aaron Berkowitz and Joshua Fineberg, *Contemporary Music Review* 24, no. 2/3 (2005): 190. Murail seems to favor the example of the cello in particular (cf. Murail, Tristan, “Spectra and Sprites,” trans. Tod Machover, *Contemporary Music Review* 24, no. 2/3 (2005): 138).

<sup>9</sup> For instance, Stephen McAdams and Bruno L. Giordano, “The Perception of Musical Timbre,” in *The Oxford Handbook of Music Psychology*, ed. Susan Hallam, Ian Cross, and Michael Thaut (Oxford: Oxford University Press, 2009), 78. At the end of this brief summary of psychoacoustic research concerning timbral perception, McAdams and Giordano generalize a link between the unified perception of timbre and the spectral content of a sound as a “combination of perceptual dimensions” that “often have quantifiable acoustic correlates.”

<sup>10</sup> cf. Olivier Messiaen, “The Technique of my Musical Language,” trans. John Satterfield (Paris: Alphonse Leduc, 1944), 51. Messiaen’s famous reference to a “gentle cascade of blue-orange chords” in his *Quatuor pour le fin du temps* presents a rather interesting example. It is not surprising that some spectral composers have embraced Messiaen as a “proto-spectralist” (e.g., Harvey, “Spectralism,” 14, and Murail, “Villeneuve,” 195).

<sup>11</sup> Murail, “Afterthoughts,” 272.

the boundaries between timbral and harmonic perception. Micro-intervals, most often experienced through the less-than-fully-cognizant experience of overtones, could be perceptual cues that suggest the need for a more malleable type of listening—one that embraces both the “unitary” and the “multidimensional”—to help cope with the incorporation of relatively unfamiliar stimuli.

Murail makes it clear that “frequencial harmony” is more than an intuitive deployment of micro-intervals. The presence of micro-intervals in spectral music is insignificant in comparison to the emergent sensations they evoke through their approximation of frequencial relationships essential to our perception of timbre. In light of this, Murail’s assertion that the affective power of “spectral structures” is rooted in a “plasticity” which allows them to “endure various treatments or tortures with their identities intact” takes on a special significance.<sup>12</sup> Though “intact” may be a bit of an overstatement, one might sum up Murail’s aesthetic as an engagement with an array of incomplete yet affectively powerful impressions of timbre which inform and enrich the harmonic domain in his music. With this flexible conception as a guide, let us now consider compositional logic in *Désintégrations*.

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In the opening of *Désintégrations*, Murail deploys two concurrent series of timbre-harmonies. One of these series is populated by timbre-harmonies whose pitch content is drawn from a quarter-tone approximated harmonic spectrum with an A#0 fundamental, while the other is made up of timbre-harmonies similarly derived from a harmonic spectrum with a C#2 fundamental.<sup>13</sup> Although Fig. 1 does little to show how these series form a musical gesture, the identity of each series as a unit depends on the plasticity of our perception. While it is true that spectra conceived as sets of pitches are imprecise realizations of frequencial structures, recall that such structures are able to “endure various treatments or tortures with their identities intact.” It is this more-or-less intact identity—an emergent perception reliant on some timbral characteristics being audibly preserved when partials are translated into pitches—that is central to the experience of this music.

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<sup>12</sup> Murail, “Target Practice,” 151.

<sup>13</sup> Murail, “Villeneuve,” 214.

Figure 1: Two series of timbre-harmonies from the opening of *Désintégrations* and their relation to two harmonic spectra

**A#0 Harmonic Spectrum**

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

a)

**A#0 series of timbre-harmonies**

[7, 11, 13, 21, 29, 36] [7, 13, 21, 29, 36] [5, 7, 13, 20, 29] [6, 7, 11, 13, 19] [5, 7, 11, 20, 29] [7, 9, 11, 13, 17, 19] [5, 7, 9, 11, 13, 20] [6, 7, 11, 13, 19, 23] [4, 7, 11, 19, 21, 29] [2, 7, 11, 13, 20, 29, 37] [2, 7, 11, 13, 17, 21, 22, 37] [1, 5, 7, 13, 17, 21, 22]

*f* *mf* *mp* *p* *f* *f* *mf* *mp* *p* *mp* *mf* *f* (8vb)

**C#2 Harmonic Spectrum**

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

c)

**C#2 series of timbre-harmonies**

[5, 7, 9, 11, 13] [5, 7, 9, 11, 12, 13, 15] [7, 9, 11, 12, 13, 15, 19] [5, 7, 9, 11, 13, 15, 19] [7, 9, 11, 12, 15, 21] [5, 7, 9, 11, 19] [4, 5, 9, 11, 13, 15] [2, 5, 7, 9, 11, 12, 13] [5, 7, 9, 11, 13] [5, 7, 9, 13, 15] [7, 9, 11, 12, 13, 15, 19] [5, 7, 9, 11, 12, 13] [4, 7, 9, 11, 17] [2, 5, 9, 11, 13] [1, 5, 7, 9, 11, 12, 13]

*f* *mf* *mp* *p* *p* *mf* *f* (*f*) *f* *mf* (*mp*) *p* *mp* *mf* *f*

One might sense a parallel between Murail's use of harmonic spectra as reservoirs for the derivation of timbre-harmonies and the notion of "harmonic fields."<sup>14</sup> However, Murail's use of spectra as de facto harmonic fields is particularly salient due to certain aspects of auditory perception. Psychoacoustic research suggests that our ability to discern the pitch of a sound emerges from a subconscious grouping of frequencies according to an ingrained referential pattern—the harmonic series. With the harmonic series as a referential structure, we are able to divine a gestalt sense of pitch for combinations of frequencies if the relationships between them sufficiently approximate the frequential relationships of the harmonic series.<sup>15</sup> Furthermore, our cognitive pattern matching tendency allows us to

<sup>14</sup> For a recent example of this analytical perspective see Richard Hermann, "Berio's Harmonic Fields and Counterpoint in the *Sequenzas* with Special Attention to that of the Violin" (paper presented at the annual meeting for the Rocky Mountain Society for Music Theory, Albuquerque, New Mexico, April 22-23, 2016).

<sup>15</sup> cf., Robert Hasegawa, "Gérard Grisey and the 'Nature' of Harmony," *Music Analysis* 28, no. ii-iii (2009): 355.

fill in the gaps and hear a fundamental even when it is not present. This “virtual” fundamental perception is essential to spectral music since its emergence relies on an instinctive cognitive mechanism that allows us to group sounds together into fused gestalt perceptions.

However, virtual fundamentals emerge from a tendency to translate frequencies into pitches rather than from any innate sensitivity to timbre. It is not that our mental template relies on a set of frequencial relationships. Rather, our ingrained sensitivity to harmonic relationships between frequencies has endowed us with a set of referential just intervals. James Tenney hypothesizes that “a mistuned interval [within certain limits] will still carry the same *harmonic sense* [Tenney’s emphasis] as the accurately-tuned interval does, although its *timbral quality* [my emphasis] will be different.”<sup>16</sup> Robert Hasegawa extends this point further by pointing out that “our tolerance for mistuned intervals is evident in the historical development of temperaments: the essential harmonic meaning of the just interval remains, even when it is heard only in an approximate, tempered version.”<sup>17</sup>

A tolerance for inaccuracy when divining a virtual fundamental suggests a three-stage account of the cognitive process that supports this perception. First, groups of frequencies are translated into a set of pitch intervals. Second, these intervals are mapped onto a referential set of just intervals analogous to the frequencial relationships between partials in the harmonic series. Finally, the emergent perception of a virtual fundamental—reliant on the “harmonic sense” of the intervals—is colored by the accuracy of our subconscious translation in a way that shapes our perception of “timbral quality.”<sup>18</sup>

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<sup>16</sup> James Tenney, “The Several Dimensions of Pitch,” in *The Ratio Book: a Documentation of the Ratio Symposium, Royal Conservatory, The Hague 14-16 December 1992*, ed. Clarence Barlow (Cologne: Feedback Studio Verlag, 1992), 110.

<sup>17</sup> Hasegawa, “Gérard Grisey and the ‘Nature’ of Harmony,” 356

<sup>18</sup> I have had the opportunity to perform with a Zydeco band fronted by an accordion player who brings two instruments to every gig. One is a “Cajun” diatonic accordion tuned to A4=440Hz, while the other is a “keyboard” accordion tuned to A4=442Hz. One might assume that this sudden shift in tuning as instruments are changed between songs would present a vexing logistical difficulty. However, in performance, the guitarist does not adjust the tuning of his instrument accordingly. Instead, he tends to play nearer to the bridge when the accordion player uses his 442 instrument in order to match a gestalt sense of increased brightness in the sound. While this strategy might not work in the context of a more timbrally homogenous ensemble (e.g., a string quartet) wherein the mistuning would be more salient, in a timbrally diverse zydeco band, this slight inconsistency lends the overall sound an effervescent quality that is quite thrilling.

The ability to perceive a fundamental for a given combination of partials allows us to perceive diverse elements as a single perceptual object, but does not reflect our ability to appreciate the more ephemeral timbral qualities of sound. One's perception of a fundamental relies on a cognitive processing of frequencial relationships as pitch intervals, but excludes any consideration of the dynamic relationships between partials. The relative amplitudes of partials—at a given moment and as they change over time—have a profound influence on our perception of timbre.<sup>19</sup> Thus, the sense of fusion provided by our ability to divine a fundamental is not a perceptual end in itself since it accounts only for a gestalt “harmonic” identity and does not fully account for our simultaneous perception of a unified timbral quality.

While some inaccuracy is inherent to virtual fundamental perception, there remains an ingrained referential structure against which our auditory perceptions can be discussed in relatively concrete terms. Although the accuracy with which each referential interval is expressed in a given timbre-harmony affects our perception of timbral quality, this perception is affected further by the relative amplitudes of partials—a feature that is more difficult to discuss as quantifiably related to our perceptions. However, precise measurements of amplitude are of questionable significance out of context. In an idealized spectrum—a “sawtooth” wave, for example—the amplitudes of partials in the spectrum are proportional to the amplitude of the fundamental.<sup>20</sup> However, in instrumental sounds, simple amplitude proportions are obfuscated by “formants”—regions of the spectrum which are relatively louder than the surrounding partials.<sup>21</sup> “When physical bodies vibrate,” writes Fineberg, “they act, to a certain degree as filters, emphasizing certain bands of frequencies and attenuating others [...] formants are one of the main clues that allow us to hear that the high notes and low notes of an instrument come from the same source.”<sup>22</sup> In other words, the fixed construction of an instrument lends that instrument's sound an identifiable timbral

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<sup>19</sup> Joshua Fineberg, “Guide to the Basic Concepts and Techniques of Spectral Music,” *Contemporary Music Review* 19, no. 2 (2000): 86.

<sup>20</sup> “Chapter 4: Synthesis,” Indiana University, accessed December 1, 2016 [http://www.indiana.edu/~emusic/etext/synthesis/chapter4\\_waveforms.shtml](http://www.indiana.edu/~emusic/etext/synthesis/chapter4_waveforms.shtml). The amplitude of a specific partial in a sawtooth wave = one over the partial number)

<sup>21</sup> Murail, “Villeneuve,” 190.

<sup>22</sup> Fineberg, “Guide,” 87.

quality that is preserved to some degree regardless of pitch by affecting the relative amplitude of partials in a predictable way.

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With the influence of virtual fundamentals and formants in mind, let us reconsider Murail's derivation of timbre-harmonies from the opening of *Désintégrations*. Murail cites his analysis of a C1 played on the piano as important to his conception of harmony in the work,<sup>23</sup> specifically in that his analysis revealed two curious features.<sup>24</sup> First, since there is no partial that corresponds to the fundamental, the perception of C1 as the pitch of this sound is virtual.<sup>25</sup> When we hear pitches in combination, we may—to reiterate Murail's cello example—"focus" our ears either towards the perception of individual chord members or towards the perception of a gestalt identity for the sonority as a whole. Theoretically, this identity may be expressed by a variety of specific pitch combinations if they are drawn from the same harmonic field. However, these relationships are more easily perceived if the harmonic field itself conveys a gestalt sensation to which each combination may be audibly related. Subsets of the harmonic spectrum on A#0, for example, convey different flavors of "A#0-ness" even if the fundamental frequency is "missing."

Another feature of Murail's analysis of the C1 piano sound are the identifiable "formantic zones." In other words, the piano acts as a filter that emphasizes some partials while attenuating others. Since formants are an important factor in our perception of instrumental timbre, one could argue that an emphasis on these partials is necessary to convey something of a "pianistic" timbral quality. With this in mind, consider that the pitches of each timbre-harmony from the opening of *Désintégrations* are constrained to reflect the formantic zones identified in Murail's analysis. The only exceptions to this constraint come at the end of each series when Murail includes a pitch that corresponds to the

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<sup>23</sup> Murail, "Villeneuve," 211-212.

<sup>24</sup> *ibid.*, 191-192.

<sup>25</sup> *ibid.*, 191

fundamental—concrete realizations of gestalt pitch identities that had been perceived only virtually to this point in each series.

The timbre-harmonies from the opening of *Désintégrations* may thus be conceived as expressing different shades of a pianistic timbral quality, while manifesting one of two prevailing gestalt pitch identities—A#0 and C#2. These gestalt pitch identities, as Murail attests, have been carefully chosen for their likelihood to merge and express the gestalt sensation of an occidental “bell sound”—a sound shaped by aesthetic preference to include an inharmonic partial approximately a minor-tenth above the fundamental of an otherwise harmonic spectrum.<sup>26</sup> Though the two fundamentals used in this passage reflect this minor-tenth relationship, the bell-like qualities expressed by these spectra in combination may be more comprehensively understood in relation to both a generalized model of a bell spectrum and a spectrum derived from the observations of a specific bell sound. By considering A#0 and C#2 harmonic series in combination and comparing them to two different bell spectra, we approach an appreciation of how Murail conflates timbre and harmony to establish the evocation a specific timbral quality as the timbral-harmonic goal for the opening gesture.

Figure 2 shows two quarter-tone approximated bell spectra with an A#0 “bourdon.”<sup>27</sup> One is a schematic spectrum that Murail presumably compiled from a variety of observations, and the other is an actual bell spectrum used by Jonathan Harvey as the basis for his well-known electroacoustic work *Mortuos plango, vivos voco*.<sup>28</sup>

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<sup>26</sup> Murail, “Villeneuve,” 200-201, 214. The stipulation that a “bell” spectrum features a “minor-tenth above the fundamental” is—as most features of “schematic” spectra are—a simplification. However, Murail is quite explicit that this very general observation was a significant factor in his choice of A#0 and C#2 as the fundamentals for the passage under discussion here. It seems that the interpolation of a minor-tenth within an otherwise harmonic spectrum is an important perceptual cue for the perception of “bell-ness”—an identity that remains intact to some degree despite the absence of other perceptual cues.

<sup>27</sup> Murail, “Villeneuve,” 201. This term, presumably borrowed from the preferred terminology of bell-makers, seems more appropriate than “fundamental” given that the resulting spectrum is not completely harmonic. However, in another sense, “fundamental” would be appropriate given that despite the relative inharmonicity of the spectrum a more or less clear sense of A#0 as the overall “pitch” of the bell remains salient.

<sup>28</sup> Murail, “Villeneuve,” 200, 203. The spectra as presented by Murail are transposed in Fig. 1.3 to align with the fundamentals used in the opening of *Désintégrations*.

Figure 2: Correspondences between A#0 bell spectra and the A#0 and C#2 harmonic spectra from the opening of *Désintégrations*

Alignment of pitches from the opening of *Désintégrations* with a schematic bell spectrum  
(F=A#0, 1/4-tone approx.)  
(adapted from Murail 2005, "Villeneuve" p. 200)

a)

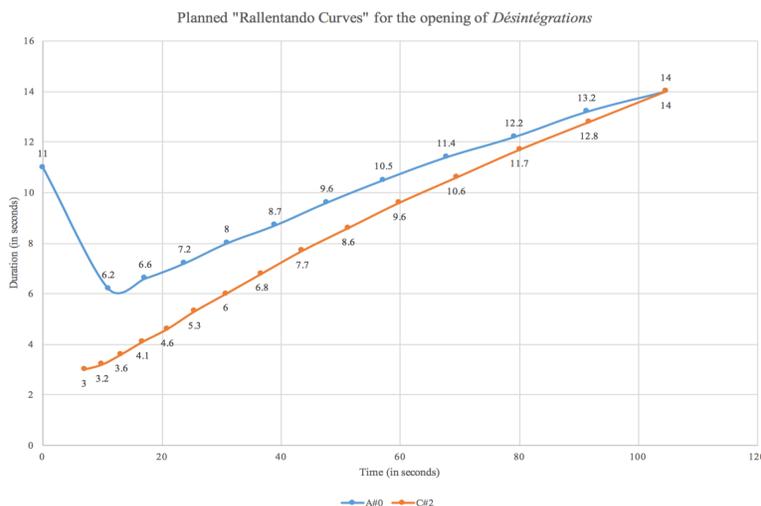
Alignment of pitches from the opening of *Désintégrations* with the bell spectrum used by Jonathan Harvey as the basis for *Mortuus plango, vivos voco* (F=A#0, 1/4-tone approx.)  
(adapted from Murail 2005, "Villeneuve" p. 203)

b)

Since these correspondences form sufficiently large subsets of these bell spectra to be heard as bell-like, it comes as no surprise that a blend of these timbre-harmonies is the ultimate timbral-harmonic goal of the opening gesture of *Désintégrations*. These correspondences do not, however, suggest a temporal process that would facilitate a sense of arrival at this goal. Figure 3 shows a graph of Murail's plan for the temporal process that governs the opening gesture of *Désintégrations*.<sup>29</sup> The component onsets of each timbral-harmonic series—A#0 in blue, C#2 in red—are plotted along what Murail conceives as “rallentando curves” during which the interonset durations between successive timbre-harmonies in each series increase.

<sup>29</sup> Murail, “Villeneuve,” 215. The graph as represented in Fig. 4 has been adapted from the handwritten graph provided by the composer.

Figure 3: A graph of Murail's precompositional plan for the temporal process that governs the opening gesture of *Désintégrations*



Three significant features of the process are apparent when represented in this way. First, the initial timbre-harmony in the A#0 series is an outlier. This timbre-harmony signals the true beginning of the work after a ten-second electronic introduction and precedes the beginning of the temporal process under consideration here. However, since this event establishes a boundary between the introduction and the first directed process of the piece, it seems inappropriate to exclude it completely from consideration.<sup>30</sup> Second, onsets in both series do not coincide until each series has reached a fourteen-second durational goal. Third, the onset density decreases over the course of the process. Although some of the onsets are close to one another, there are fewer onsets per second at the end of the process than at the beginning. In other words, a more-or-less unified sensation of deceleration leading to a timbral-harmonic goal is realized through the deployment of two convergent rallentando curves.

Given the adherence to two harmonic spectra in this passage, it is worth noting that Murail highlights their inherent ambiguity in his preface to the score. Although Murail is clearly referring to the work as a whole when he writes that spectra “only serve as a model for the construction of timbres or harmonies (in any case I make little distinction between these two notions)” this statement seems

<sup>30</sup> Murail does not include the first timbre-harmony in the A#0 series in his graph. Murail's account of the process begins seven seconds later with the onset of the first C#0 timbre-harmony.

especially appropriate to the specifics of the opening gesture. Each timbre-harmony expresses both a harmonic sense and a timbral quality and an understanding of this duality is essential to an understanding of why Murail makes “little distinction between” timbre and harmony.

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The harmonic sense of pitch structures in *Désintégrations* supports the perception of a virtual fundamental for each timbre-harmony. Furthermore, each timbre-harmony expresses one of two virtual fundamentals that help establish the identity of the two series of timbre-harmonies in relation to one another. The timbral quality expressed by each timbre-harmony, however, undermines the perception of a unique identity for each series. In addition to the differences in perceived timbral quality that emerge from “mistunings” in relation to an ingrained set of referential just intervals, all the timbre-harmonies from the opening are constrained by the formantic zones identified by Murail in his analysis of a piano sound, and thus are limited to pitches that correspond to partials most likely to support the perception of a pianistic timbral quality. However, since the timbre harmonies from the opening are formed from a number of different subsets of partials within the formantic zones, the timbral quality expressed by each series is unstable at best and is more likely to elide the boundaries between the series than reify them as independent perceptual streams.

Although Murail makes “little distinction” between timbre and harmony in this work, the contributions of harmonic sense and timbral quality to the experience of this excerpt are not equivalent when viewed in relation to its ultimate timbral-harmonic goal—the fusion of two harmonic spectra into a roughly tintinnabulous timbral identity that carries some cultural weight. In sum, a distinction between series of timbre-harmonies is obscured by the fact that both series express a variety of timbral qualities relatable to a prevailing sense of “piano-ness.” The timbral dissolution of the harmonic distinction between the series foreshadows an arrival at a unified sonority that expresses a bell-like quality into which the ephemeral pianistic timbral quality of each series is subsumed.