

## REPRESENTATIONS OF DECAY IN THE WORKS OF CAT HOPE

Stuart James and Lindsay Vickery

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**Abstract:** This article considers the ‘representation of decay’ in selected concert works by the Australian composer Cat Hope. It draws on a mixed-method research methodology, comparing the conceptual aspects of Hope’s oeuvre with analyses of studio and live recordings of Hope’s work and discussing how such ideas of ‘decay’ may play out in the sonic world. Two forms of spectral analysis are employed: firstly the analysis of spectral parameters *roughness*, *noisiness*, *brightness*, *pitch*, and *centroid*, and secondly a visualisation of the music as a spectrogram. The data for the spectral analyses are derived from Alexander Harker’s spectral descriptor tools for MaxMSP which record a value for each parameter every 25 milliseconds. At times, values are normalised within a range of 0 and 1, as representative of how listeners experience parametrical changes (i.e. dynamics, in relative terms rather than absolutes in relation to other sounds in the work). Importantly, perception of noisiness is more acute at frequencies in which the auditory critical bands are wider, below 250 Hz (roughly below middle C), precisely the upper range specified by Hope to define instruments suitable for the Australian Bass Orchestra.

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Cat Hope is currently the Head of the Sir Zelman Cowan School of Music at Monash University in Melbourne, Australia, and she has built a successful portfolio career split between her work as a composer, sound and noise artist, performer, and academic. Hope’s music is conceptually driven; her concert music is notated as graphic scores, and often features aleatoric elements, drone, noise, glissandi and explorations of low frequency sound.<sup>1</sup> In 2017 *Gramophone* described Hope as ‘one of Australia’s most exciting and individual creative voices ... a remarkable composer’,<sup>2</sup> and Gerardo Scheige described her work as a ‘dense yet airy, seemingly endless streams of sound ... exquisite listening pleasure of fleeting descending sound streams’.<sup>3</sup>

<sup>1</sup> Cat Hope, on [www.cathope.com/](http://www.cathope.com/) (accessed 5 September 2018).

<sup>2</sup> Gramophone. ‘HOPE Ephemeral Rivers’, [www.gramophone.co.uk/review/hope-ephemeral-rivers](http://www.gramophone.co.uk/review/hope-ephemeral-rivers) (accessed 5 September 2018).

<sup>3</sup> Gerardo Scheige. ‘Ephemeral Rivers’. *Neue Zeitschrift für Musik* 2018/04. <https://en.schott-music.com/shop/neue-zeitschrift-fur-musik-2018-04-no374795.html> (accessed 5 September 2018).

### Hope's Approach to the Score

I had been making 'sound drawings' for years, I just couldn't work out how to make them scores for performance – they were more drawings of sounds in my head. *Kingdom Come* was a clunky attempt at drawing texture for musicians to follow. I was passionate about making a score for musicians that hardly ever get to read scores – electronics performers. I realise now that I am very passionate about engaging with scores as a way of making music, as opposed to, say, open improvisation or studio-based composition. Working with Decibel, and the ideas everyone contributes there, made the realisation of these 'sound drawings' a reality, through the foundation of the 'scoreplayer' idea, and once that happened, I wrote lots of pieces as I had found not only the right (graphic) scoring framework, but the right mechanism to make reading it possible.<sup>4</sup>

Perhaps the most striking element of Hope's concert works since 2008 is her approach to the score. Often comprising curving coloured lines and geometric shapes, her scores have a stark clarity that draws more from the languages of visual art, design and architecture than from common practice music notation. The conventions of music notation are largely abandoned and replaced by more heuristic semantic associations such as spatial height to frequency and size to amplitude. The visual language of Hope's works is tailored to her musical language which predominantly focuses on continuous changes of line, texture and timbre over extended temporal spans and rarely upon rhythmic or pitched minutiae.

Another striking feature of Hope's scores is her avoidance of absolute pitch specification in favour of relative pitch in performance. Aside from a few instances in which lines cross one another at implied pitches, the performers are free to realise the material in any range, given that the range remains fixed for the duration of the work. Colour is generally used to specify instrumentation and forms of shading and transparency to indicate timbral qualities. In a small number of works, beginning with *Sub Aerial* (2015), Hope crosses the boundary from pitch/duration to gesture specification, using graphic shapes to define the spatial movements of percussionists in relation to their instruments.<sup>5</sup>

By contrast the temporal parameter is determined to a large degree by the medium in which the scores are presented. Since 2008, Hope's scores have predominantly been read by performers as a continuous scroll: first as a video (*Kingdom Come* (2008)), then in customised software (*In the Cut* (2009)) and since 2010 (*Longing*) in a purpose-built iPad application, the Decibel Scoreplayer. This allows for robust synchronisation of scores across multiple iPads and thus the possibility of precise temporal coordination of large ensembles performing scores with few rhythmic cue points and long continuous changes of pitch and timbre. By 2012 (*Juanita Nielson*) the app also allowed for innovation in formal structure by providing synchronised but nonlinear playback of the score. The most ambitious work composed for the Scoreplayer to date, Hope's opera *Speechless* (2017), allowed not only synchronised presentation of a score to a 30-piece orchestra, a 30-voice choir and four soloists, but – during the workshop period – the development of capabilities allowing continuous updating of edits to the score across the iPad network.<sup>6</sup>

<sup>4</sup> Cat Hope, interviewed by Stuart James in correspondence between Melbourne and Perth, 4 September 2018.

<sup>5</sup> Lindsay Vickery, Louise Devenish, Stuart James and Cat Hope, 'Expanded percussion notation in recent works by Cat Hope, Stuart James and Lindsay Vickery'. *Contemporary Music Review* 36/1–2 (2017), pp. 15–35.

<sup>6</sup> Cat Hope, Aaron Wyatt and Dan Thorpe, 'Scoring an Animated Notation Opera – the Decibel Score Player and the Role of the Digital Copyist in "Speechless"', *Tenor 2018 Conference*, Concordia University, Montréal, 24–26 May 2018, pp. 193–200.

As Hope's conception of the score evolved, she experimented with a number of graphical platforms before establishing Adobe Illustrator as the ideal medium in 2010. The combination of dedicated graphics software and Hope's clear-cut notational approach allows the composer to view each work both at the performer's level of moment to moment detail as well as a totality – a visual rendering of a sonic object – in a manner that is far less accessible to composers employing traditional notation.

### Low Frequency and Metaphor in Hope's Concert Music (2008–2017)

Over a decade of writing graphic scores (2008–2017), Hope's catalogue included a total of 46 works, comprising of 14 works for acoustic and/or amplified instruments, 29 works for acoustic instruments and electronics, and three electronic works.<sup>7</sup> Of the works for acoustic instruments and electronics, nine are for acoustic instruments and fixed media (partition concrete), eight are for acoustic instruments and live electronic processing, and 12 are for acoustic instruments and electronic instruments including turntables,<sup>8</sup> AM radios,<sup>9</sup> theremins,<sup>10</sup> e-bows,<sup>11</sup> low bass keyboards or synthesizers,<sup>12</sup> and other electronics such as a computer-generated score,<sup>13</sup> and carving knives with Piezo contact microphones attached.<sup>14</sup> Speaking of her music, Hope suggests:

All my music has a connection to low frequency sound – either conceptually or actually – my songs were all written on the bass, my noise music focused on low sounds and even the music I write for acoustic/electronic combinations features low frequency in its design or actual range. My recent series of instruments with low tones explores the relationship between pure low tones with more complex acoustic sound more intimately.<sup>15</sup>

For years, low frequencies have been firmly embedded as a conscious aspect of Hope's artistic work. In the late 1990s she lived in Europe and, after teaching herself to sing and play bass guitar, performed solo songs in Catania, Italy,<sup>16</sup> later forming a three-piece pop band Gata Negra (1999–2006).<sup>17</sup> Hope also formed the duo Lux Mammoth (2000–2004) with bass player Al Smith, an ensemble which experimented with domestic noises such as vacuum cleaners and power tools to create performances of extreme volume, particularly in the low frequencies, creating an experience 'felt by the body rather than the ears and head'.<sup>18</sup> Since then Hope has frequently

<sup>7</sup> The total of 46 does not include collaborative works or installations.

<sup>8</sup> *In the Cut* (2009) and *Black Eels* (2012).

<sup>9</sup> *The Possible Stories of Harry Power* (2010), *Miss Fortune X* (2012), *Her Pockets Full of Inertia* (2014), *Broken Approach* (2014), *Fourth Estate* (2015), *Sub Aerial* (2015) and *Speechless* (2017).

<sup>10</sup> *Empire* (2010), *Wall Drawing* (2014) and *Speechless* (2017).

<sup>11</sup> *Miss Fortune X* (2012) and *Fourth Estate* (2015). Hope has explained how she enjoys the use of the e-bow with the acoustic piano, effectively transforming the instrument into a sustaining 'sine tone generator in a big box'. Cat Hope, interviewed by Lindsay Vickery in Perth, May 2014.

<sup>12</sup> *Her Pockets Full of Inertia* (2014), *Erst* (2015) and *Speechless* (2017).

<sup>13</sup> *The Possible Stories of Harry Power* (2010).

<sup>14</sup> *Kuklinski's Dream* (2010).

<sup>15</sup> Cat Hope, interviewed by Stuart James in correspondence between Melbourne and Perth, 4 September 2018.

<sup>16</sup> Cat Hope, 'Gata Negra (1999–2006)', on [www.cathope.com/gata-negra.html](http://www.cathope.com/gata-negra.html) (accessed 5 September 2018).

<sup>17</sup> RTRFM92.1. 'The Land That Time Forgot: Gata Negra', at <http://rtrfm.com.au/story/the-land-that-time-forgot-gata-negra/> (accessed 5 September 2018).

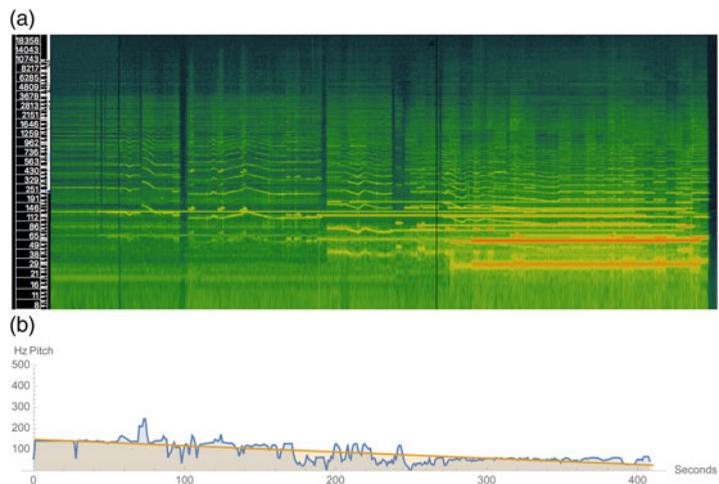
<sup>18</sup> Lindsay Vickery. 'The Western Edge: Some Recent Electronic Music from Western Australia'. *Organised Sound* 6/1 (2001), pp. 69–74.

formed ensembles of low instruments, such as the Australian Bass Orchestra and Abe Sada. In her graphically scored work, Hope regularly uses acoustic instruments with low tessitura, including *In the Cut* (2009), *Liminum* (2012), *The Lowest Drawer* (2013), *Signals Directorate* (2014), *Dynamic Architecture 1* (2015), *Pure* (2014–16), and *Marking Time* (2016) (see Figure 1). This approach reached its height in Hope's operatic work *Speechless* (2017), where she combines the Australian Bass Orchestra with a low string section, bass wind section, bass brass section, and bass drums. Not limiting such explorations of low frequency to acoustic instruments, Hope also regularly explores electronically generated infrasonic and subsonic sounds such as pitch shifted timbres projected through bass amplifiers in *Cruel and Usual* (2012), and sinusoidal 'subtones' projected through subwoofers featured in *Erst* (2015), *Pure* (2014–2016), *Shadow* (2016), *Tone Being* (2016), and *Black Tide* (2017). In an interview with Lindsay Vickery in 2014, Hope describes this interest in infrasonics and bass frequencies:

The attraction to me is the possibility of music composition being more than just arrangements of 'notes', and something more visceral and sensual, about the experimenting with the possibilities of the quality of sound. Rhythm and harmony are over-rated to me. And low frequency sound provides some clear opportunities to do this.<sup>19</sup>

Figure 1:

(a) A spectrogram of the studio recording of *The Lowest Drawer* (2013)<sup>20</sup> showing most of the spectral energy sitting below 150 Hz; (b) A 'pitch' analysis, plotted in seconds through the length of the studio recording with a least squares regression trend line showing a pitch descent from 147.72 Hz through to 26.03 Hz.



Low frequency is not the only binding aspect of Hope's graphic scores. In her programme notes she often suggests the use of metaphor:

I got interested in codes inside my music ... *Black Disciples* (2015), *Speechless* (2017), *Their Lives are Stripped of Meaning* (2018) and *The Pleasure Garden of Post Truth* (2018) all have political text in the music, that you can't 'hear' but is there. Other works had political 'titles'. *Juanita Nielsen* was a dedication piece, to a real person ... Material is almost always reflected metaphorically in the score – that is the entire premise of my work, I'd say. There are few

<sup>19</sup> Cat Hope, interviewed by Lindsay Vickery in Perth, May 2014.

<sup>20</sup> Cat Hope, *The Lowest Drawer*, on *Tuned Darker*. Listen|Hear Collective, 2015.

exceptions. The use of radio in *Fourth Estate* links strongly to that title (radio static returns in several pieces – it is the ultimate textural material, and a real juxtaposition to my other favourite electronic sound, the sine tone). The colour sampling in *Bravo Compound* and *Speechless, Great White* (old white mens music), *The Earth Defeats me* (the long notes look stationary in the scoreplayer, a reflection on how time and seasons (including climate change) passes so slowly it seems like it is standing still to us), and recent pieces such as *The Pleasure Garden of Post Truth* (instrument sampling as post truth), *The End of Reality* (concrete as ‘fake real’).<sup>21</sup>

Hope’s programme notes also often discuss social injustices that impact on the socially vulnerable: the immigration of refugees in Australia in *Marking Time* (2016), the consequence of declining bee populations due to colony collapse in *Erst* (2015), racism in Australia in *Smoothing the Pillow of the Dying Race* (2016), the monopolisation of the media, editorialised media reporting and political bias in *Fourth Estate* (2014), the ‘great white dead men of music history and women’s struggle to find a place in that history’<sup>22</sup> in *Great White* (2016), and the vulnerability of children in four separate works *Cruel and Usual* (2011), *Bravo Compound* (2015), *Marking Time* (2016) and *Speechless* (2017). These works might be seen as a protest, but they also serve to raise awareness about important world issues in the hope of a changing societal world-view. In an interview Hope describes her thoughts about such issues:

I am concerned about politics and social justice, and feel an obligation to cover this in my artwork somehow, but don’t like it to be explicit. In some works, I only apply the idea of darkness, uncontrollability (*Juanita Nielsen* (2012)) or try to represent a situation with music in a rather abstract, imaginative way.<sup>23</sup>

In the programme notes for *Cruel and Usual* (2011), Hope describes her concerns about solitary confinement in US prisons:

*Cruel and Usual* is a work inspired by an article by the Al Jazeera news service that discusses the use of solitary confinement in US prisons as incarceration rates explode in the USA. In some cases, prisoners have remained in solitary for over 38 years, or may even be children, and the reasons for going in there are not always clear or legitimate. This kind of confinement is known as ‘no touch torture’ by some.<sup>24</sup>

Such themes also extend to injustices such as espionage and organised crime: from an unsolved case of disappearance in *Juanita Nielsen* (2012), to government surveillance in *Signals Directorate* (2014), to a reflection on the final moments of the victims of Mafia hitman Richard “The Iceman” Kuklinski (1935–2006) in *Kuklinski’s Dream* (2011). Hope says:

I have an interest in organised crime and the customs embedded in it, so that tends to come up. I am curious to try and ‘paint’ these interests sonically somehow, or at least my idea of them . . . I like to make pieces that rely on a concept in their design, so I will draw aspects from a trajectory, life or situation’.<sup>25</sup>

Hope clarifies this process, explaining that she will

<sup>21</sup> Cat Hope, interviewed by Stuart James in correspondence between Melbourne and Perth, September 4, 2018.

<sup>22</sup> Cat Hope, ‘Great White (2016)’, [www.cathope.com/great-white-2016.html](http://www.cathope.com/great-white-2016.html) (accessed 5 September 2018).

<sup>23</sup> Cat Hope, interviewed by Lindsay Vickery in Perth, May 2014.

<sup>24</sup> Cat Hope, *Cruel and Usual* (2011), [www.cathope.com/cruel-and-usual-2012.html](http://www.cathope.com/cruel-and-usual-2012.html) (accessed 5 September 2018).

<sup>25</sup> Cat Hope, interviewed by Lindsay Vickery in Perth, May 2014.

try to represent a situation with music in a rather abstract, imaginative way. I like to think I start a piece of music like a painting – get some materials, and an idea – musical or a situation – and the result may be a representation that is not recognizable to all, or an abstraction.<sup>26</sup>

This kind of process is realised in different ways throughout Hope's oeuvre. In *Kuklinski's Dream* (2011), she uses Kuklinski's signature at the time of his imprisonment as a musical notation in parts of the score. Hope uses graphical artefacts or symbols taken from real events, such as the use of images and colours from the graphs generated by the organisation the Signals Directorate, in the work of the same name (2014). In *Speechless* (2017), the score draws thematic material from the 2014 Human Rights Commission report on 'The Forgotten Children: National Inquiry into Children in Immigration Detention',<sup>27</sup> and explores 'how wordless music – vocal and instrumental – can empower text that is hidden or suppressed'.<sup>28</sup> In *Bravo Compound* (2015), Hope displays a drawing made by one of the children on Christmas Island detention centre: the drawing itself is not 'performed' but the parts for the instrumental performers would appear to be derived from this drawing. In *Platinum Fox* (2012) Hope explores pitch profiles and silhouettes of the fox as a point of inspiration and departure. In a different way, Hope expresses an idea through metaphor such as the use of radio static to express the visual noise in the picture of 'Miss Fortune X', or the use of drones, long notes with minimal change, that act as a 'descriptive metaphor for the lives of these that may find themselves in these situations'.<sup>29</sup> Hope also explores the use of metaphor as a way of representing musical structure in works such as *The Possible Stories of Harry Power* (2010) and *Juanita Nielsen* (2012). Of the former Hope writes:

This piece is about versions. The written word (and note) is taken as fact, repeated throughout history. The oral story (or improvisation) is often expected to change as it passes though those who listen and retell it. When oral stories are written down in some point of history, they are likely to be different than how they started. In this work, there are a number of versions: composer versions, computer versions, player versions and combinations of all three. Written, listened to and 'spoken' versions.<sup>30</sup>

### Representations of Decay

The use of metaphor is also apparent in Hope's iconic work *In the Cut* (2009). She explains that the piece was inspired by 'the slow burning eroticism that accompanies the disintegration'<sup>31</sup> that takes place in Susanna Moore's novel *In the Cut*.<sup>32</sup> The programme notes refers to a decline and disintegration, and from the outset it would seem that notions of decay, disintegration and disappearance might be ongoing

<sup>26</sup> Cat Hope, interviewed by Lindsay Vickery in Perth, May 2014.

<sup>27</sup> The Australian Human Rights Commission, 'The Forgotten Children: National Inquiry into Children in Immigration Detention', [www.humanrights.gov.au/our-work/asylum-seekers-and-refugees/publications/forgotten-children-national-inquiry-children](http://www.humanrights.gov.au/our-work/asylum-seekers-and-refugees/publications/forgotten-children-national-inquiry-children) (accessed 5 September 2018).

<sup>28</sup> Cat Hope, 'Speechless: an experimental noise opera – in three acts, for four soloists, the Australian Bass Orchestra and choir', [www.cathope.com/speechless-2017.html](http://www.cathope.com/speechless-2017.html) (accessed 5 September 2018).

<sup>29</sup> Cat Hope, *Cruel and Usual* (2011), [www.cathope.com/cruel-and-usual-2012.html](http://www.cathope.com/cruel-and-usual-2012.html) (accessed 5 September 2018).

<sup>30</sup> Cat Hope, 'The Possible Stories of Harry Power', [www.cathope.com/the-possible-stories-of-harry-power-2009.html](http://www.cathope.com/the-possible-stories-of-harry-power-2009.html) (accessed 5 September 2018).

<sup>31</sup> Cat Hope, *In the Cut* (2009), [www.cathope.com/in-the-cut-2009.html](http://www.cathope.com/in-the-cut-2009.html) (accessed 5 September 2018).

<sup>32</sup> Susanna Moore, *In the Cut* (Sydney: Pan MacMillan, 2003).

threads in Hope's oeuvre. In a 2014 interview she expresses her increasing fascination with descent and disappearance:

Recently I have also been working with the concepts of 'low ends': downward movement, disappearing sounds, extended ranges – like *In the Cut* (2009) and *Sogno 102* (2013). In these works, the sounds are not always very low, but it's that turn of direction, or assertion of the sounds themselves, that interests me.<sup>33</sup>

Thematically, 'decay' may be evident in the explicit choice of words used in titles, such as the related concepts 'broken' and 'degradation' in the titles *Broken Approach* (2014) and *Stella Degradation* (2012). The installation *Sound of Decay* (2013) suggests this even more directly; it was developed with Rob Muir and presents visitors with a decaying cane toad inside a desiccator, microphones inserted into its body. Hope explains:

Decay can be a sudden, long, visible or invisible process. It may take place across time or in forms that are difficult for our human senses to comprehend. In *Sound of Decay*, a computer program is configured to 'listen' to the inside of the desiccator. It processes the sounds to bring them into an audio frequency range we may comprehend and groups them together to avoid long periods of silence. Extremely low and soft sounds, the most common sounds generated by decay, are usually inaudible to the human ear. Here they are amplified and pitched up into the range of human hearing. The desiccator provides a perfect auditorium, complete with stage, for our listening.<sup>34</sup>

From a different perspective, the musicologist Jonathan Cross describes decay in a musical context as demonstrated through the dissolution of linearity, pitch and timbre, as 'instruments (and instrumentalists) pushed to their extremes', 'the coming together of high and low',<sup>35</sup> with an emphasis on perceived 'roughness'. Within the field of psychoacoustics, Pantelis Vassilakis and Roger Kendall define roughness as

one of the perceptual manifestations of interference and, in the physical frame of reference it is usually described as a function of a signal's amplitude envelope (i.e. amplitude fluctuation rate and depth) and corresponding spectral distribution. As such, auditory roughness can also be considered an attribute of timbre.<sup>36</sup>

The term was originally used in 1885 by Helmholtz to describe the buzzing, harsh, raspy sound quality of narrow harmonic intervals.<sup>37</sup>

Hope's explorations of decay as a concept manifest themselves in a number of different ways. Hope's work *In the Cut* (2009) (see [Example 1](#)) is an exemplar of such qualities. The work undergoes a steady descent in pitch, ultimately impacting the physical nature of sound reproduction, and causing a significant shift in the timbral qualities reproduced. Its roughness also shows a clear distinction between the extremely rough qualities that emerge within the last few seconds of the work and those sounds just prior to this sonic disintegration. [Figure 2a](#), [2b](#), and [2c](#) show some of the relevant parameters, most notably revealing the mediation or transformation of one state to another, from a pitched line to a noisy texture.

<sup>33</sup> Cat Hope, interviewed by Lindsay Vickery in Perth, May 2014.

<sup>34</sup> Cat Hope, *Sound of Decay* (2013), [www.cathope.com/sounds-of-decay-2013.html](http://www.cathope.com/sounds-of-decay-2013.html) (accessed 5 September 2018). Please note: the website includes images of the decaying toad.

<sup>35</sup> Jonathan Cross, *The Stravinsky Legacy* (Cambridge: Cambridge University Press, 1998), pp. 20–21.

<sup>36</sup> Pantelis N. Vassilakis and Roger A. Kendall, 'Psychoacoustic and Cognitive Aspects of Auditory Roughness: Definitions, Models, and Applications', *Human Vision and Electronic Imaging XV* (Bellingham, WA: International Society for Optics and Photonics, 2010), available online at [www.spiedigitallibrary.org/conference-proceedings-of-spie](http://www.spiedigitallibrary.org/conference-proceedings-of-spie), accessed 5 September 2018.

<sup>37</sup> Hermann von Helmholtz, *On the Sensations of Tone as a Physiological Basis for the Theory of Music* (1885), trans. A.J. Ellis (New York: Dover Publications, 1954).

Example 1:

Cat Hope, graphical score for *In the Cut* (2009).

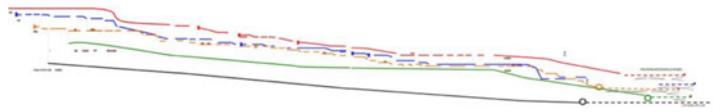


Figure 2a:

'Pitch' (in seconds) through the length of the studio recording of *In the Cut* (2009),<sup>38</sup> with a descending trend line.

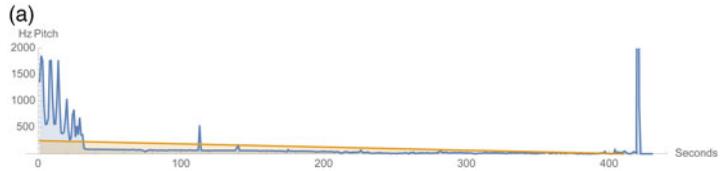


Figure 2b:

'Roughness' (in seconds) through the length of the studio recording of *In the Cut* (2009), with a rising trend line.

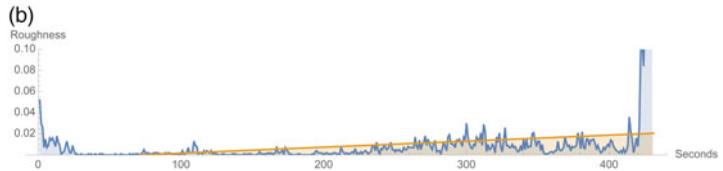
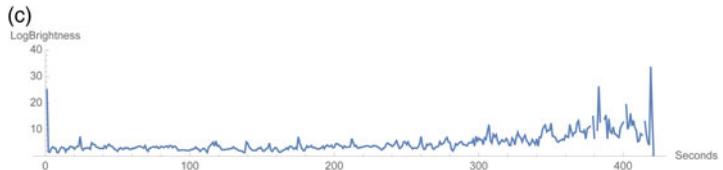


Figure 2c:

'Brightness' (in seconds) through the length of the studio recording of *In the Cut* (2009).



The work's steady descent in pitch also impacts the timbre of the instruments and a roughness emerges at the end of the work as the instruments are pushed to their registral extremities. A signal analysis of the studio recording of *In the Cut* also revealed an increase in the brightness toward the end of work that correlates with the increase in roughness.<sup>39</sup> Spectral brightness is a measure of the spectral centroid, that is, how high centre of weight is above the fundamental in the frequencies that are present. In effect it indicates a spectrum's centre of mass. For example, the brightness of a sine tone is low, as all of its energy is concentrated at a single frequency, whereas a rich, complex sound (such as a ring modulated piano tone), would be expected to have a high brightness value. It is affected by loudness in acoustic instruments because more harmonics are present at higher dynamics.

Whilst *In the Cut* 'is a study in decline, in particular pitch decline, and the decline of structure and melody',<sup>40</sup> it is possible to trace a lineage in Hope's works that also explore a pitch decline such as *Stella Degradation* (2012), *The Lowest Drawer* (2013), *Sogno 102* (2013), *Her Pockets Full of Inertia* (2015), *Dynamic Architecture 1* (2015), *Shadow*

<sup>38</sup> Cat Hope, *In the Cut*, on *Disintegration: MutatioN*. HellosQare Records, 2010, CD.

<sup>39</sup> Utilising Alex Harker's signal analysis tools in the descriptor-object for MaxMSP. Solutions to the analyses were plotted in Mathematica. Refer to Alexander Harker. 'Software'. AlexanderJHarker.com. <http://www.alexanderjharker.co.uk/Software.html> (accessed 5 September 2018).

<sup>40</sup> Cat Hope, *In the Cut* (2009), [www.cathope.com/in-the-cut-2009.html](http://www.cathope.com/in-the-cut-2009.html) (accessed 5 September 2018).

(2016), *Black Tide* (2017) and a section in *Speechless* (2017). Such a process is rarely discussed in Hope's programme notes, but there is an explicit reference to such a process in *Shadow* (2016) where Hope explains that 'the first notes are the highest, and [the] piece descends in pitch down the page'.<sup>41</sup>

Of all the scores within Hope's oeuvre *Stella Degradation* (2012) is arguably the one that most clearly articulates such a downward incline and, like *In the Cut* (2009), mediates between gestures of lines and contrasted noisy gestures where the musical materials momentarily implode. This transition occurs four times in varying intensities and density. **Example 2** shows the original graphic score of the work; it can be seen how analogous this is to the spectrogram analysis of the recording in **Figure 3a**. **Figure 3b** confirms the overall descent in pitch, although it is interesting to note here that the pitch detection algorithm tends to fall down for the noisier passages. A noise ratio analysis, as provided in **Figure 3c** confirms the noisy transitions that emerge at times through the duration of the work.



Example 2:

Cat Hope, graphical score for *Stella Degradation* (2012).

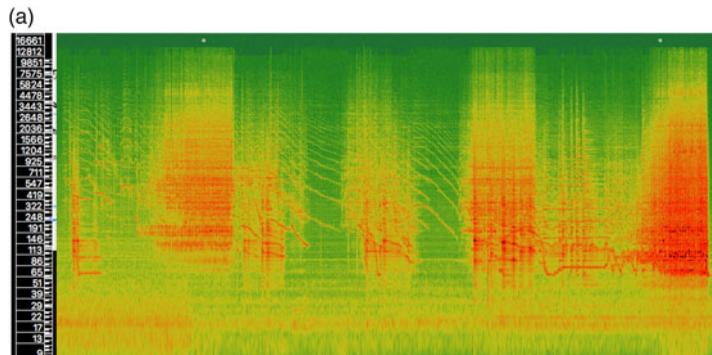


Figure 3a:

A spectrogram of a live recording of *Stella Degradation* (2012) performed by ensemble Sound Stream.

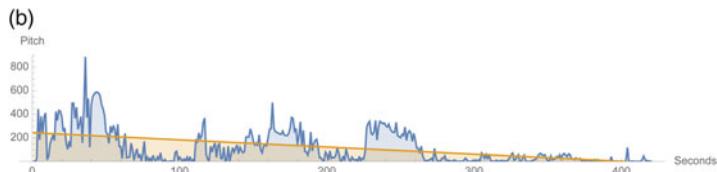


Figure 3b:

'Pitch' (in seconds) through the length of the live recording of *Stella Degradation* (2012), with a descending trend line.

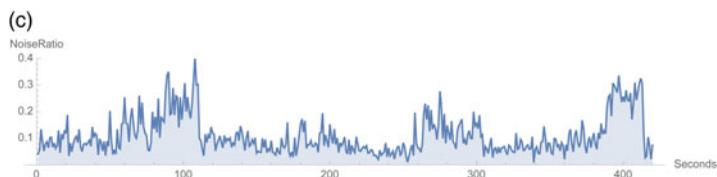


Figure 3c:

The 'noise ratio' (in seconds) through the length of the live recording of *Stella Degradation* (2012).

<sup>41</sup> Cat Hope, *Shadow* (2016), [www.cathope.com/shadow-2016.html](http://www.cathope.com/shadow-2016.html) (accessed 5 September 2018).

The notion of decay might also be observed in the way electronic processing is used in a number of Hope's concert works. As she says:

I love working with the idea of the snapshot or sample of some element of a sound. You can see that developing throughout works starting with *Kuklinski's Dream* (where the actual sound of the instrument is sampled, then altered later) then *Cruel and Usual* (when the sound is distorted through bass amplifiers) and into the works that feature sine tones, *The Lowest Drawer* and *Sogno 102*. Over time, the nature of the original instrument is gone, and it becomes more of a contrast between the clean, harmonic-less tone, and the complex acoustic instrument timbre.<sup>42</sup>

This interest in 'transformation' and 'distortion', albeit expressed here in more subtle ways, could be seen as a degradation of the original instrument as these sounds are overtaken by the electronically derived components of the sound world.

In this work the string players are sampled at certain small moments of the piece, and 'translated' into much lower ranges instantaneously, which fade out or grow, and are sometimes 'distorted'.<sup>43</sup>

Hope also describes a transformation, facilitated through the use of electronics in her work *The Lowest Drawer* (2013) (see [Example 3](#)), where the original timbral nature of the acoustic instruments is lost:

The instruments are sampled and replicated with sine tones, and they stack up like a chest of drawers, each holding a pitch moment of the acoustic instrument in them stable while the piece unfolds. But the timbral nature of the instrument is lost, and as they pile up, even the pitch is difficult to discern. The drawers are then closed, but the lowest tone will remain prominent.<sup>44</sup>

As expected, the pitch analysis in [Figure 4a](#) reveals a steady decline in pitch, but unlike the roughness curve of *In the Cut*, where there was an increase at the dramatic end of the work, *The Lowest Drawer* presents a very different story (see [Figure 4b](#)).

Example 3:  
Cat Hope, graphic score for *The Lowest Drawer* (2013).



Figure 4a:  
The log spectral centroid (in seconds) through the length of the studio recording of *The Lowest Drawer* (2013).

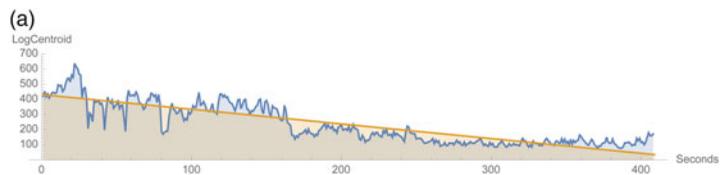
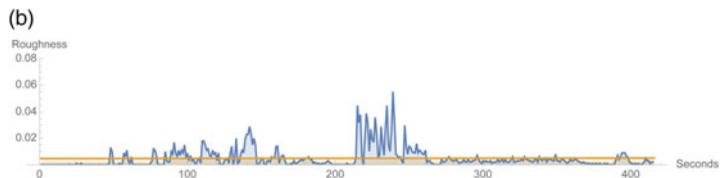


Figure 4b:  
'Roughness' (in seconds) through the length of the studio recording of *The Lowest Drawer* (2013), shown against a trend line.



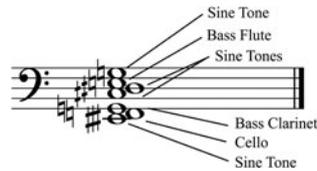
<sup>42</sup> Cat Hope, interviewed by Lindsay Vickery in Perth, May 2014.

<sup>43</sup> Cat Hope, *Cruel and Usual* (2010), [www.cathope.com/cruel-and-usual-2012.html](http://www.cathope.com/cruel-and-usual-2012.html) (accessed 5 September 2018).

<sup>44</sup> Cat Hope, interviewed by Lindsay Vickery in Perth, May 2014.

The roughness prior to 215 seconds (or 3:35) is indicative of pronounced beating patterns caused by the phasing in and out in pitch of the cello and viola against a series of static sine tones. Between 3:35 and 4:07 of the recording, the accumulation of a chord sonority caused the roughness data to peak for a prolonged section of time; the chord is made up of sine tones tuned at approximately 87 Hz, 132.5 Hz, 148 Hz and 197 Hz, and the trio of acoustic instruments performing pitches at approximately 165 Hz, 98 Hz, and 88 Hz on the bass flute, bass clarinet and cello respectively (see [Example 4](#)).

Example 4:  
Cat Hope, accumulated pitches, *The Lowest Drawer*.



The chord appears to contain very particular kinds of 'beating' qualities, and it is confined within a limited range. Several of the more prominent beating patterns result between the cello and the 87 Hz low sine tone (generating a 1 Hz beating pattern), the bass clarinet and the 87 Hz low sine tone (generating an 11 Hz beating pattern), the sine tones at 132.5 Hz and 148 Hz (generating a 15.5 Hz beating pattern), and the flute and 148 Hz sine tone (generating a 17 Hz beating pattern). Such beating patterns are very reminiscent of Alvin Lucier's music for solo instruments and sine tones, and the microtonal shifts Hope explores foreground this quality for the listener. The roughness effectively emerges as a kind of point-of-fracture or a 'disturbance' between the acoustic instrument and the electronics, like ripples on the surface of water when something passes through it (see [Figures 5a](#) and [5b](#)).

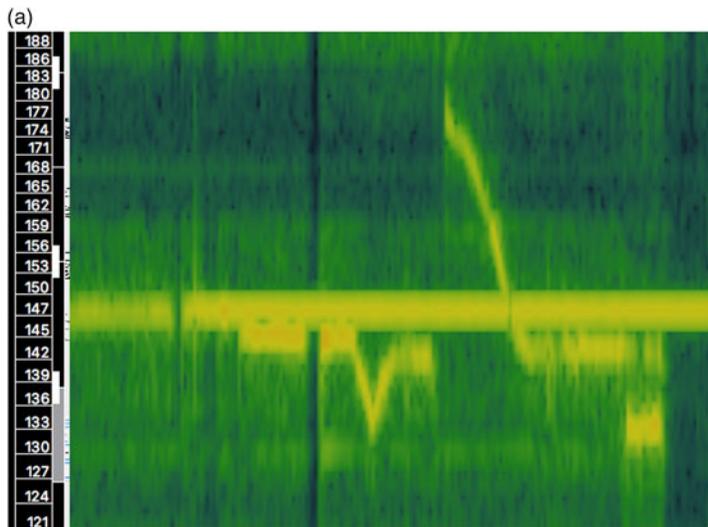


Figure 5a:  
Acoustic instrument glissandi superimposed against sine tone oscillators causing beating patterns as the instrument tunes in and out of the frequency of the oscillator.

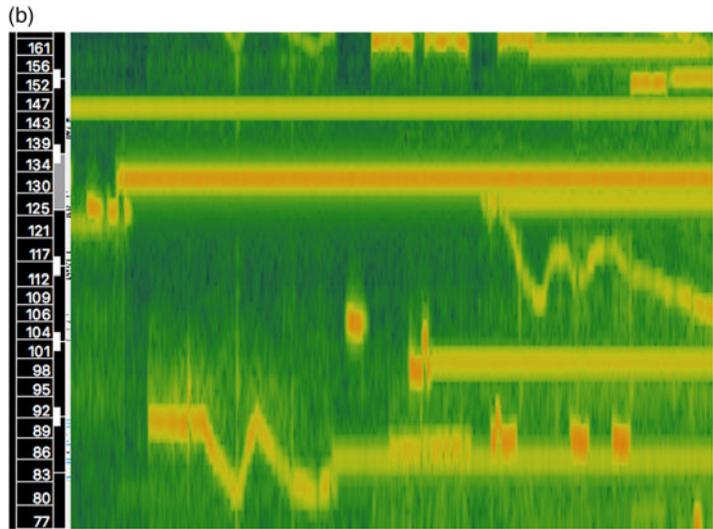


Figure 5b:

A more complex juxtaposition of acoustic instruments and sine tone oscillators creating the chord discussed above.

### Noise versus Line and Glissandi

From the outset Hope's works appear to be separated into two contrasted aesthetics, one highly influenced by her background as a noise artist, foregrounding texture and densities in both the vertical and horizontal domains, qualities of noise, and loud dynamics. Scored concert music within this aesthetic and category include *Wolf at Harp* (2010), *Chunk* (2011) and *Juanita Nielsen* (2012). These works follow a lineage from Hope's practice as a solo noise artist, as well as her work in *Lux Mammoth* (2000–2004), *Candied Limbs* (2005–), and *HzHzHz* (2013–). In contrast, another series of works appear to foreground the use of line and glissandi. In interview, Hope has expressed the significance of Iannis Xenakis in his works *Metastasis* and *Terretektorh* and György Ligeti's *Volumina* in her work:

Discovering Xenakis' and Ligeti's coloured drawings – plans for pieces – was a breakthrough moment for me. My music is like a modern version of those drawings, but I saw no need to turn them into notes, as Xenakis did. Discovering Ligeti's *Volumina* score also was a key moment of 'validation' for my approach. And Grainger's *Free music* was a similar revelation – here is someone else who tried to get rid of the step-like nature of the tempered scale and the mathematical breakdown of time in musical works. I think his influence on my work came much earlier than *Kaps Freed*.<sup>45</sup>

Hope further clarifies her rationale and interest in exploring 'line' in her own compositional work:

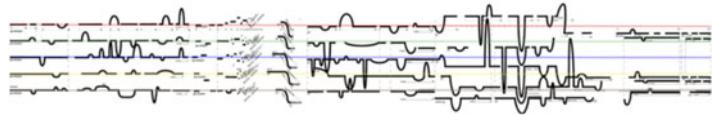
I am interested in sustained sound, drones, proportions, noise and slippery, continuous movement and lines seem to convey these musical concepts to musicians much better than conventional notation. They also convey ensemble elements very clearly forward through time and space . . . When lines are used in traditional notations, they are often short or weirdly unended (think of a glissando indication, or baroque decoration), with no real indication of time, just a gesture. Lines get rid of the tendency for pulse and the grids so often used in music.<sup>46</sup>

<sup>45</sup> Cat Hope, interviewed by Stuart James in correspondence between Melbourne and Perth, 4 September 2018.

<sup>46</sup> Cat Hope, interviewed by Lindsay Vickery in Perth, May, 2014.

This predilection for line is also apparent in Hope's writings on the subject. Hope and Michael Terren discuss the use of glissandi and stasis, the glissando as structure, glissandi interfering with the drone, and microphonic points on a line.<sup>47</sup> This emphasis on line is featured in Hope's works *Longing* (2011) (see [Example 5](#)), *Platinum Fox* (2012), *Black Emperor* (2012) and *Black Disciples* (2013).

Example 5:  
Cat Hope, graphical score for  
*Longing* (2011).



Hope explicitly discusses the notion of line in the programme notes for *Longing* (2011), *Stella Degradation* (2012), *Her Pockets Full of Inertia* (2014), *Wall Drawing* (2014), *Smoothing the Pillow of the Dying Race* (2016), *Tone Being* (2016), *Shadow* (2016), *Great White* (2016) and *Marking Time* (2016). Observably, Hope pays increasing intention toward explicitly defining the performances practices around the interpretation of line. For example, in the performance notes for her percussion and electronics work *Tone Being* (2016), Hope explains that 'lines indicate a dragged mallet, with no audible attack at the start',<sup>48</sup> and in *Shadow* (2016) she explains that the 'dynamic is generally soft throughout, and a thickening of the line is getting louder and denser (more bow pressure), and a fading of the line is a very, very soft dynamic'.<sup>49</sup>

It is arguably the specificity of line and its changing contour used to describe the motion of sound through time that appeals. This kind of literal specificity would appear to trace back to the influence of Xenakis' architectural approach to musical structure. Hope has made direct reference to the inspiration of Xenakis's *Terretektorh* (1956–1966) in her work *Stella Degradation* (2012), but this architectural approach to musical structure and design can also be observed in Hope's works *Chunk* (2011), *Miss Fortune X* (2012), *Erst* (2015) and *Dynamic Architecture 1* (2015). *Miss Fortune X* uses segments of the base plan (see [Figure 6](#)) for a radio-controlled model airplane her father built. The base plan of the plane, 'Miss Fortune X', formed the musical structure, the lines determining the contours and gestures of the work.

In *Erst* (2015), Hope uses the patterns created by swarms of bees to determine the structure of the work. *Dynamic Architecture 1* (2015) refers to 'a term that is often used to describe designs in urban architecture that prevent human engagement such as loitering sleeping or play'. Hope explains that in this work 'the shapes used provide key structural and harmonic information'.

In 2013 Hope wrote *Sogno 102*, a work dedicated to composer Giacinto Scelsi after reflecting on his book *Il Sogno 101*.<sup>50</sup> Like *The Lowest Drawer*, the work reported an increasingly high level of roughness as the cello vibrato steadily increases in width, causing more

<sup>47</sup> Cat Hope and Michael Terren, 'The Possibilities of a Line: Marking the Glissando in Music', *Proceedings of the Second International Conference on Technologies for Music Notation and Representation* (Cambridge: Anglia Ruskin University, 2016), pp. 176–79.

<sup>48</sup> Cat Hope, *Tone Being* (2016), [www.cathope.com/tone-being-2016.html](http://www.cathope.com/tone-being-2016.html) (accessed 5 September 2018).

<sup>49</sup> Cat Hope, *Shadow* (2016), [www.cathope.com/shadow-2016.html](http://www.cathope.com/shadow-2016.html) (accessed 5 September 2018).

<sup>50</sup> Giacinto Scelsi, *Il sogno 101: prima e seconda parte*, ed. Luciano Martinis and Alessandra Carlotta Pellegrini (Macerata: Quodlibet, 2010).

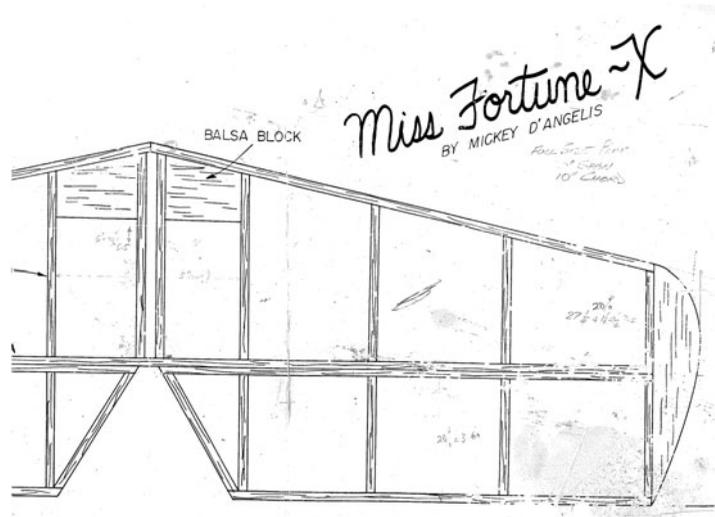


Figure 6:  
The 'Miss Fortune X' drawing Hope used as the structural basis for her work *Miss Fortune X* (2012).

significant changes in the way the acoustic and electronic tones interact over time. This is combined with a secondary factor, three sine tones starting to diverge in pitch (some ascending, others descending). Once the piano enters at 2:34, we find the largest value of roughness for the work. With a flurry of notes to recreate the jagged glissandi shown in the score, a large number of overlapping notes further disturb the texture, contributing to a spike in the roughness data. This is further exacerbated by the close proximity in pitch of the tones (see [Example 6](#) and [Figures 7a and 7b](#)).

Example 6:  
Cat Hope, graphical score for *Sogno 102* (2013).



Figure 7a:  
A spectral analysis of the studio recording of *Sogno 102* (2013).<sup>51</sup>

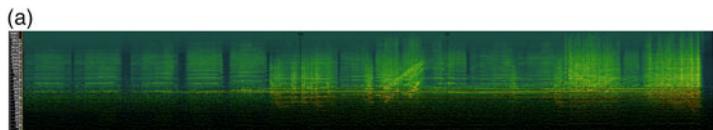
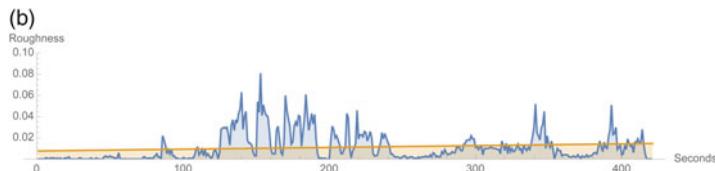


Figure 7b:  
'Roughness' (in seconds) through the length of the studio recording of *Sogno 102* (2013), with a gradually rising trend line.



Tracing Hope's practices to more recent works, such as her operatic work *Speechless* (2017), it would appear that she is finding ways of drawing together the worlds of noise, infrasonics, drone, glissandi, and various approaches to the electronics:

I have never really been able to build them all in together, though I think in my opera I get close . . . There is the string noise notation from *Juanita Nielsen*, the

<sup>51</sup> Cat Hope, *Sogno 102* on *Ephemeral Rivers*. HatHutArt, 2017.

*End of Abe Sada* type of dynamics, the sampling as in *Sogno 102* and *The Lowest Drawer*, feedback notation as in *Majority of One*, percussion notation form *Wolf at Harp*, pointillistic from *Erst*, etc. etc. you can find them all in there. Including my pop/rock influence (using Tina), and noise (the electric bass parts).<sup>52</sup>

### Conclusion

In a decade of scoring concert works, Hope has established herself as one of Australia's leading exponents of new music practice, as both a composer and a performer. Hope's divergent practices as a noise artist, singer-songwriter and composer hint at the breadth of her artistic oeuvre. Her work is highly conceptual, and retains a sense of the mysterious, particularly in the way that the conceptual design of her works is realised. It is hoped that this initial qualitative and quantitative discussion of Hope's work will encourage future discourse on one of Australia's leading innovators in new music.

<sup>52</sup> Cat Hope, interviewed by Stuart James in correspondence between Melbourne and Perth, 4 September 2018.