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MUSIC, EMOTION, ANALYSIS

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In one of the focal chapters of her book *The Practice of Philosophy* (1930), Susanne Langer explored a supra-linguistic form of knowledge she called ‘insight’. Outlining the properties of this ‘sixth sense’, she wrote: ‘my thesis is that insight is understanding by the five orthodox senses, is non-discursive reasoning, different from verbal expression only by peculiar characteristics of its symbolism’ (1930, p. 152). Those ‘peculiar characteristics’ gave rise to a symbolic system in which content was subservient to form: what mattered were not the objective representations accomplished by a mode of expression, but the intricate patterns through which they were realised. Such patterns, which were the functional basis for myth and the *raison d’être* of art, found their highest expression in music. As Langer saw it,

[m]usic is the purest of symbolic media. Schopenhauer has rightly given it a special place among the arts, because in not employing any mythical ‘literal meaning’ it can represent its actual object with less obstruction than the arts which must work through a distracting specific subject. Could it be that the final object of musical expression is the endlessly intricate yet universal pattern of emotional life? (1930, pp. 160–1)

What ultimately interested Langer was less the affiliation of music with emotion, and more music’s demonstration of the means through which insight was accomplished and the extent to which it could be developed. The means, as set out in her *Introduction to Symbolic Logic* (1937), was human beings’ capacity for recognising connections between abstract patterns: analogy makes possible the appreciation of similarities between sequences of musical sounds and the experience of emotions, and it also makes possible the apprehension of logical forms.<sup>1</sup> An explication of the non-discursive knowledge with which insight was associated was one of the central goals of Langer’s *Philosophy in a New Key* (1942), and nowhere was the symbolic representation of this knowledge more evident than in musical expression. Building on the distinction between denotation and connotation common in mid-century analyses of semantics, she wrote, ‘there is ... a kind of symbolism peculiarly adapted to the explication of “unspeakable” things, though it lacks the cardinal virtue of language, which is denotation. The most highly developed type of such purely connotational semantic is music’ ([1942] 1957, p. 101).

There is much in Langer’s philosophy that is stimulating for the music scholar. That said, it also presents certain frustrations to those interested in the place of music in human life: language is hardly as secure a base for knowledge

Ex. 1 Domenico Scarlatti, Sonata in A major, K. 208, bars 4<sup>3</sup>–9

[Adagio è Cantabile]

as Langer makes it out to be; despite precision of thought elsewhere, she is noticeably short on specifics when it comes to aspects of musical organisation; and she too often falls prey to the commonplace that music is first among the arts in its ability to summon emotions. This last point is particularly important to the argument I wish to develop, for Langer is not alone in the belief that there is a special relationship between music and the emotions. It is not hard to see why such a belief developed: as is our experience of emotions, our experience of music is something that happens within us, developing and flowing through time, mercurial in its sudden shifts and transformations. Nonetheless, the plain facts are that we have emotional responses to a wide range of phenomena – broadly defined, emotions are simply psychological and physiological responses to changes in the environment – and that there is little hard evidence that musical phenomena are special in this regard. Where music is special, however, is in the resources it offers for simulating the progress of emotional states, and in particular in the ways it is able to represent rapid changes between such states. In what follows, I shall argue that musical passages which are particularly remarkable are so in part because of the ways in which they correlate with the progress and change of emotions. And this is where musical analysis comes in, for analysis offers the interpretative tools through which the bases for such correlations can be described in clear and consistent detail.

A short passage taken from one of Domenico Scarlatti's more explicitly 'expressive' sonatas – the Sonata in A major, K. 208 – will help me to set out the salient issues. As shown in Ex. 1, subsequent to the arrival on the tonic in bar 5 there is a thoroughly typical move towards the dominant, achieved through the slightly atypical means of a passage that features a persistent and oftentimes pungently dissonant D#5, which, at the end of bar 7, is finally incorporated into the dominant of E (and which notably has its functional resolution not in the upper register, but through the D#3 of the left hand). E major having been achieved in bar 8 (an arrival confirmed by the use of a transposed version in bars

7 and 8 of the melodic cadence of bars 4 and 5), there is an immediate collapse into the parallel minor which, together with a strongly syncopated melody, momentarily sets the music adrift. Whatever else one might want to say about the emotional valence associated with these bars, it would seem that bar 8 brings about a profound change: it is very difficult to sustain the mood of the opening bars in the face of Scarlatti's sudden shift at this point. I would like to propose that this shift is not simply about the sudden appearance of the parallel minor: although the firmly established cultural associations of such a shift are not to be discounted, the deflection away from the goal towards which bars 5–7 struggled is far more important, especially when combined with the circuitous path through which the dominant is finally secured in bar 14 (about which more later). As this passage suggests, the emotions summoned by music are not a result of simple correspondences, but are instead a consequence of the careful crafting of compositional materials.

Although analytical studies which explore ways that musical syntax can be deformed and reformed only rarely consider the emotions that might be associated with such disruptions, and although most of the recent studies of musical emotion have little if anything to say about musical syntax, in what follows I shall argue that this reflects methodology, rather than necessity. How music is organised – or disorganised – has everything to do with music's emotional effects.

My exploration of music, emotion and analysis is in three parts. In the first, I shall explain why Langer's account of the relationship between music and emotion, although generally deprecated in recent literature on music and emotion, is worthy of serious consideration. In the second, I shall review recent research in cognitive psychology that provides something sorely lacking in Langer's account, which is a principled explanation of precisely how the morphology of sequences of musical events can be correlated with affective states (whether those are characterised as emotions or feelings or by some other term). In the third section I shall bring this perspective to bear on Scarlatti's sonata, with the goal of setting out in more detail the relationship between music, emotion and analysis.

### **Research on Emotion and Music**

In a recent article, Patrik Juslin and Daniel Västfjäll observed that studies of music and emotion have been conducted since the birth of psychology in the late nineteenth century.<sup>2</sup> It would, however, be too much to say that this wealth of studies has clarified the relationship between music and the emotions in any definitive way; it also cannot be said that the broader study of human emotions undertaken over the past twenty years has shaped the focus and methodology of recent studies of musical emotion. To support these claims, I would like briefly to consider research on a species of emotion that is both immediate and necessary, characteristics thought to correspond closely with the emotional responses induced by music.

*Basic Emotions and Music*

There is now substantial agreement among a number of researchers that human emotional life is organised around a limited number of basic or primary emotions which are not a product of reflection or appraisal. Although the size and membership of this category varies, the list offered by Paul Ekman may be taken as typical, and includes anger, fear, sadness, enjoyment, disgust and surprise.<sup>3</sup> One of the principal motivations for the notion of basic emotions came from research by Ekman and others on the facial expressions associated with emotions. This research demonstrated both that there were specific expressions associated with particular emotion states and that there was significant cross-cultural agreement on how such expressions should be labelled.<sup>4</sup> These findings conformed to ideas set out by Darwin in his classic study,<sup>5</sup> in which emotions were viewed as evolutionary adaptations shared by members of a species. The various emotions that correlated with distinctive facial expressions were thus thought of as products of innate systems which were in some measure independent from social or cultural learning; in somewhat more technical terms, basic emotions reflected differential responses of the autonomic nervous system. Although the complexity and adaptability of human emotions suggest that innate systems are but one part of a larger picture, such systems support the notion of evolutionary continuity, a notion which connects human emotions with those of other animals.<sup>6</sup> Basic emotions, then, were conceived of as part of an organism's response to changes in its immediate environment and as such were rapid and thoroughly interconnected with its physiology.<sup>7</sup>

The apparent immediacy of emotional responses to music and the evidence of general agreement among subjects about the emotions induced by a given musical passage have led a number of researchers to the assumption that music can induce basic emotions.<sup>8</sup> Empirical work on music and basic emotions has revealed two fundamental problems with this assumption; one relates to the role of categorisation in human cognition, while the other concerns the correlation between music, physiological responses to music and basic emotions.

*Basic emotions, musical emotions and categorisation.* Most of the evidence for the induction of basic emotions by music has come from categorisation tasks. For instance, subjects have been asked to sort musical excerpts into categories identified by words used for basic emotions,<sup>9</sup> by movements associated with basic emotions,<sup>10</sup> or by photographs of facial expressions associated with basic emotions.<sup>11</sup> The premise here, as it is in other work on basic emotions, is that the subjects' ability to perform such tasks accurately reflects an intuitive grasp of discrete emotional states.<sup>12</sup> A possible complication, however, comes from research on what Eleanor Rosch and others have called the basic level of categorisation.<sup>13</sup> The basic level offers a way to optimise informativeness and efficiency – for instance, under most circumstances the term we would use to describe either an Irish setter or a dachshund would be 'dog'. This does not mean that we fail to appreciate the differences between the two, only that this level of

categorisation provides the best initial tool for communication. Similarly, we might describe both Dido's last aria from Purcell's *Dido and Aeneas* and the 'Marche funèbre' from Chopin's Piano Sonata No. 2 in B $\flat$  minor, Op. 35, as 'sad' and yet still recognise distinctive differences between the emotional states associated with these works. A further complication follows from the way basic emotional terms such as 'sad' and 'happy' are used to characterise responses to music. In all of the studies of music and basic emotions that I have cited, subjects were asked to categorise the music according to which emotion the music expressed. There is, however, a significant difference between the emotions that are attributed to something or to some set of events and actually experiencing those emotions: as Peter Kivy has observed, characterising a melody as expressing sadness does not necessarily mean that listening to it makes the listener actually feel sad.<sup>14</sup>

*Basic emotions, musical emotions and physiology.* The second fundamental problem associated with applying research on basic emotions to music involves the nature of physiological responses to music. If one takes the position that basic emotions reflect evolutionary adaptations, the assumption that music has a special capacity to induce basic emotions is a rather odd one, since the time scale for the emergence of such adaptations is several orders of magnitude larger than any proposed for the human species's development of the cultural practices characterized by the term 'music'. It seems more likely that a number of sound stimuli are able to induce basic emotions – stimuli to which our evolutionary ancestors would have been exposed – and that works of music simply recruit aspects of these stimuli.

As noted above, evidence for basic emotions is drawn from differential responses of the autonomic nervous system.<sup>15</sup> Although studies by Ivan Nykliček and his associates (1997), Carol Krumhansl (1997) and Charlotte Witvliet and Scott Vrana (2007) have shown that music can also induce such differential responses,<sup>16</sup> the correlation between these changes and specific emotional states remains a matter of speculation.<sup>17</sup> As but one example, in their study Witvliet and Vrana explored physiological responses to music based on the facial expressions associated with emotional responses. When we encounter something pleasant, for instance, muscles in the zygomatic region of our face (which are used when we smile) become active. When we encounter something unpleasant, however, muscles in the corrugator region (which are used when we frown) become active. Nonetheless, while the activation of muscles in the corrugator region can indicate a response to unpleasant stimuli it can also indicate effort or concentration, neither of which is necessarily unpleasant. Indeed, there is some evidence that physiological changes may be a consequence of an engagement with music which goes well beyond basic physiological mechanisms. Jaak Panksepp, in a series of experiments prompted in part by the prevalence of the experience of 'shivers down the spine' that was reported in an earlier study by John Sloboda (1991), found that the majority of his subjects experienced chills when listening both to music he provided and to music they supplied. One song in particular, 'Making

Love out of Nothing at All' by the group Air Supply, yielded a mean of 4.4 chills per minute in a group of 14 students.<sup>18</sup> When Oliver Grewe and his associates attempted to reproduce Panksepp's results, however, they found that this same piece produced chill responses in fewer than ten per cent of their subjects; among those who did experience chills, it was at the rate of 1.1 per minute.<sup>19</sup> This difference in results, together with other evidence from their study, led Grewe and his associates to propose that chills were not a direct physical response to music so much as they were a consequence of the ways listeners use music to influence feelings.

The lack of precision in all of these assessments of physiological responses to music, together with the markedly different results obtained by Panksepp and by Grewe and his associates, suggests that we are far from a state of certainty about the physiological changes associated with listening to different types of music, or about the correlation of such responses with basic emotions. A similarly tepid assessment of research on physiological responses to music and sound stimuli was offered by Dale Bartlett, who, after reviewing studies conducted over a 120-year period, concluded that the most that could be said was that music did in fact have an influence on bodily systems and that this influence was either stimulative or sedative.<sup>20</sup> Perhaps a more serious methodological problem, and one not limited to studies of physiological responses to music, is that none of the studies mentioned above made an attempt to distinguish between the responses induced by listening to music and the responses induced by listening to non-musical sound stimuli. The distinction is an important one, for, without evidence to the contrary, we have no way of knowing whether the observed responses are specific to music. Research by Margaret Bradley and Peter Lang seems to argue against just this sort of specificity. As part of a study of affective reactions to both visual and acoustic stimuli, Bradley and Lang had subjects listen to sixty non-musical sounds while they recorded physiological data very similar to that gathered by Witvliet and Vrana.<sup>21</sup> The results were almost exactly identical: crying babies, growling dogs, chirping birds and lowing cows induced the same patterns of response in facial muscles as did music. Without research which makes direct comparisons between the two, we have no way of knowing whether music is in any way different from non-musical sound stimuli in the physiological or emotional responses it induces.

### *Musical Emotions and Iconicity*

If, as this brief survey has suggested, musical emotions are not basic emotions, what are they? One helpful distinction was offered by Klaus Scherer in his 2004 review of research on emotional responses to music, in which he noted that in most cases an organism's physiological responses to emotional stimuli are adaptive: they help the organism prepare its reaction to the stimuli and as such are proactive. The physiological phenomena associated with basic emotions are clear examples of a proactive response. Physiological responses to musical stimuli, by



contrast, are rather diffusely reactive and not as highly synchronised across different organismic components as are those of more utilitarian emotional responses.<sup>22</sup>

This perspective on music and emotion provides a context for reconsidering Langer's idea that the form of symbolisation exploited by music relies on a shared morphology between musical materials and the experience of emotional states. Pointing to the expressive advantages of music over language, Langer wrote that '[b]ecause the forms of human feeling are much more congruent with musical forms than with the forms of language, music can *reveal* the nature of feelings with a detail and truth that language cannot approach' (Langer [1942] 1957, p. 235; emphasis in original). Such a characterisation does not capture the sort of necessary and unmediated connection between music and emotion assumed by many researchers, but, as my brief survey has suggested, there is at present little empirical support for such a connection. If anything, research has demonstrated that the connection between music and emotion is a general one and not fundamentally distinct from our emotional responses to a wide range of phenomena; as such, it is very much of the sort proposed by Langer.

Jay Dowling and Dane Harwood, in the discussion of emotion and meaning they undertook in their book *Music Cognition* (1986), described Langer's treatment of music and emotion as one that relied on the form of symbolic representation which C. S. Peirce called the 'icon'. As they characterised it, 'the musical icon does not represent specific, verbalizable emotions, such as pity or fear. Music represents the dynamic form of emotion, not the specific content' (Dowling and Harwood 1986, p. 206). This formulation is one with which Langer would likely be sympathetic – as Robert Innis has observed, Langer saw her account of symbolisation as building on that of Peirce.<sup>23</sup> But despite having been granted such a prominent place in one of the key texts for research on music and cognition, iconicity has not figured large as a framework for the study of music and emotion. In the essays collected in *Music and Emotion* (2001), for instance, iconicity receives only a passing mention; and in the successor to that volume, the *Handbook of Music and Emotion* (2010), it surfaces only as a historical curiosity.<sup>24</sup> Juslin and Västfjäll, in their enumeration of the different kinds of psychological mechanisms that underlie emotional responses to music, place iconicity under the rubric of emotional contagion, which follows (in a somewhat circuitous fashion) from their understanding of musical icons as a means through which emotions can be expressed.<sup>25</sup>

Again, researchers who operate on the assumption that emotional responses to music are necessary and unmediated generally have little enthusiasm for explanations of musical emotions based on iconicity, since these view emotional responses as mediated by evaluations of shared morphology. Another reason may be a lack of understanding of the analogical processes upon which iconicity relies, processes which allow humans to connect different domains through correlations that seem necessary and unmediated, but which, as I shall show in the next section, are in fact neither.

## Music and Analogy

### *Musical Analogies*

In taking up the matter of analogy, let me turn away from music and emotion and explore an analogy that is based almost entirely in the musical domain, taking as my example one of the most successful of Louis Moreau Gottschalk's compositions, *The Banjo* (Op. 15). Although the work, written during the summer of 1853, certainly capitalised on the craze for the banjo that developed during the mid-nineteenth century, its success lay in Gottschalk's virtuosic evocation of the musical idioms with which the instrument was associated.<sup>26</sup> As illustrated by Ex. 2a, these included vigorously syncopated rhythmic figures which repeated, with slight variation, every bar, and which were collected into four-bar units that gradually built into larger structures – features typical of the banjo music with which Gottschalk and many of his listeners were familiar. Nonetheless, even though there are good reasons to believe that portions of *The Banjo* replicated with some fidelity the performance practice of mid-century banjoists,<sup>27</sup> the fact remains that the piano is not a banjo. To summon the visceral rhythmic presence of the banjo (keeping in mind that the banjo is functionally a drum activated by strings stretched across its surface) Gottschalk reinforces strong beats with notes from the bottom octaves of the piano; as shown in Ex. 2b, he eventually introduces a density of texture and range of register that far exceed what is possible

Ex. 2 Louis Moreau Gottschalk, *The Banjo*, Op. 15

(a) bars 9–12

(b) bars 55–58

The image displays two excerpts of musical notation for Louis Moreau Gottschalk's *The Banjo*, Op. 15. The first excerpt, labeled (a), covers bars 9–12. It begins at measure 9, marked 'MODERATO. Tres Rythmé.' in 2/4 time. The music is in a key with four sharps (F# major or C# minor). The right hand features a syncopated rhythmic pattern of eighth notes, while the left hand provides a steady bass line with chords. The dynamic is marked 'p Con Spirito.' The second excerpt, labeled (b), covers bars 55–58. It starts at measure 55, marked '8<sup>va</sup>' and 'Martellato.' The right hand plays a rapid, virtuosic passage of sixteenth notes with triplets, marked 'f brillante.' and 'ff'. The left hand continues with a rhythmic accompaniment of chords. The dynamic 'ff' is prominent.



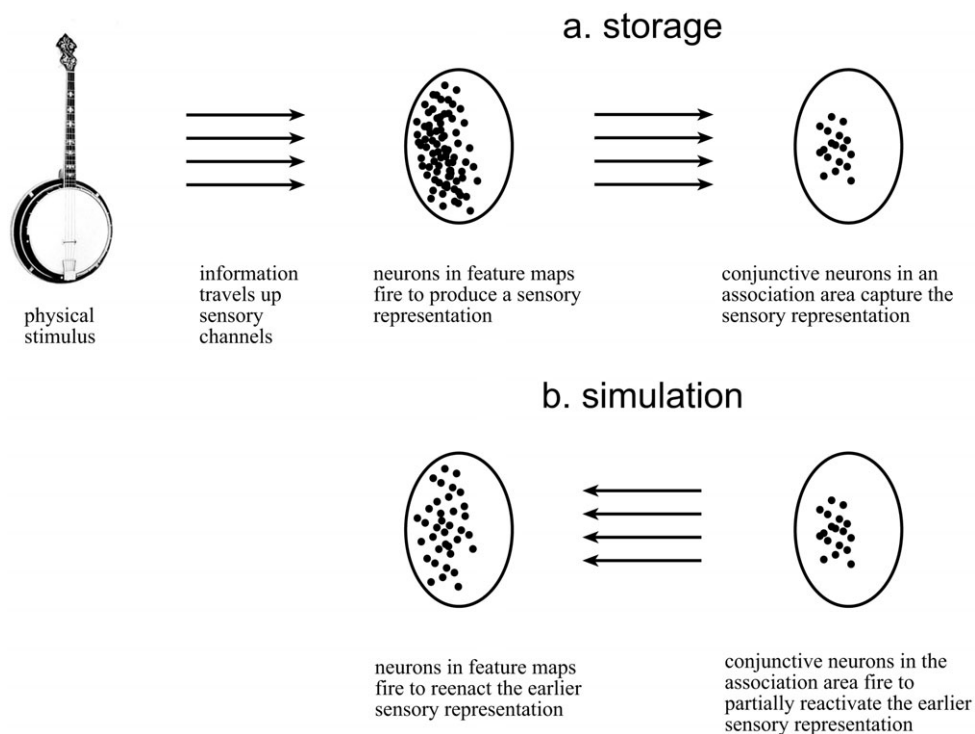
on the banjo; and although a staccato articulation is used throughout, even so attenuated the resonance of the piano far exceeds that of the banjo. In short, *The Banjo*, as played on the piano, is not really a banjo. And yet most listeners can make the connection quite easily, correlating their knowledge of the sound and music of the banjo with Gottschalk's piano showpiece.

At the heart of such correlations is the process of analogy, a cognitive capacity that some have argued lies at the core of human intelligence.<sup>28</sup> One of the defining characteristics of analogy is the mapping of systematic structural relationships between discrete domains,<sup>29</sup> wherein elements are mapped to elements, relations to relations, and the correspondences between elements and relations within each domain are preserved.<sup>30</sup> In the case of the analogy basic to *The Banjo*, characteristic features of the banjo's sound (the strongly percussive onset of pitches, their rapid decay and the predominantly low register used), together with the deployment of these sounds through specific musical materials (arpeggiated chords arranged in syncopated rhythmic patterns and organised into regularly recurring harmonic patterns), map onto specific features of Gottschalk's composition. And as with all analogies, this mapping is partial: we do not expect the pianist to play her instrument as a banjoist would his (holding it in her lap, plucking and strumming the strings), nor do we require that every sound made by the piano have its analogue in banjo performance.

### *Modelling Analogy*

The preceding account provides a basic framework for understanding analogical mappings *within* music (as in the case of *The Banjo*). The case of mapping *between* domains, as happens with music and the emotions, presents a few more complications, and to address them I shall turn to a theoretical model developed by the cognitive psychologist Lawrence Barsalou. Barsalou's theory developed out of his research on processes of categorisation and offered a way to explain how perceptual information shapes the cognitive representations which occupy our conscious thought. The theory builds on work done in the neurosciences over the past 20 years showing that the perception of a physical entity engages a number of coordinated feature detectors in sensorimotor areas which are relevant to a given perceptual mode.<sup>31</sup> During the visual processing of a banjo, for instance, some neurons will fire in response to the shape of the instrument, others in response to the instrument's surface, colour and orientation. Fig. 1a provides a schematic diagram of this diversity of visual processing. Similar distributions of activation would occur in other modalities and would be represented in feature maps specific to those modalities. These might represent the sound of the instrument (if someone had struck its strings), the way it feels when grasped (in terms both of the sensations created by coming into contact with the wood and metal of the instrument and of its considerable weight when lifted) and introspective states summoned on encountering the instrument (such as memories of a favourite relative who played the banjo or dread at the thought of having

Fig. 1 Illustration of the (a) storage and (b) simulation of sensorimotor information



Adapted from Barsalou (2005), fig. 15.

to listen to banjo music). Fig. 1a also shows that when a pattern becomes active in a feature map, conjunctive neurons in an association area capture the pattern's features for later use.<sup>32</sup> This aspect of Barsalou's account of the processing of perceptual information adopts the theory of convergence zones proposed by Antonio Damasio in the late 1980s. For Damasio, as for Barsalou, perceptual information is first recorded in a fragmentary fashion. The neural records of these fragments are then brought together through the distributed neural structure of the convergence zone, which Damasio described as

an amodal record of the combinatorial arrangements that bound the fragment records as they occurred in experience. There are convergence zones of different orders; for example, those that bind features into entities, and those that bind entities into events or sets of events, but all register combinations of components in terms of coincidence or sequence, in space and time. (Damasio 1989, p. 26)

Although convergence zones are not linked to any specific modality, their basic components consist in all cases of information gathered from perception.

As illustrated in Fig. 1b, the conjunctive neurons in the association area also support a sensory-motor re-enactment of the original activation pattern. Barsalou sketches the process as follows:

[o]nce a set of conjunctive neurons in a convergence zone captures an activation pattern in a feature map, the conjunctive neurons can later reactivate the pattern in the absence of bottom-up sensory stimulation. While remembering a perceived object, for example, conjunctive neurons reenact the sensorimotor states that were active while encoding it. (Barsalou 2005, p. 399)

That is, conjunctive neurons in the association area fire, partially reactivating the pattern of sensory stimulation, and then neurons in feature maps fire, re-enacting the earlier sensory representation. Such re-enactments are of necessity only partial and must be tailored to the agent's current context of action.<sup>33</sup>

Barsalou called the fragmentary records of neural activation captured in a feature map 'perceptual symbols' and proposed that cognitive operations which make use of perceptual symbols could represent types and tokens, produce categorical inferences, combine the symbols to produce hierarchical propositions and yield abstract concepts.<sup>34</sup> The key to this productivity is a cognitively distributed system that Barsalou called a 'simulator', which, through the neural re-enactment of sensorimotor states, gives rise to concepts. The process involves successive iterations of the storing of sensorimotor information, which will occur as additional instances of the original stimulus are encountered. That is, each successive encounter – with different banjos, or with the same banjo under different circumstances – will activate similar states in the feature maps. Similar activations of the feature maps will be captured by similar populations of conjunctive neurons in the association areas, and over time an integrated, multimodal sensorimotor representation of the category will develop. For the category 'banjo', visual information about the appearance of the instrument is integrated with information about distinctive aspects of its use in performance, auditory information about how it sounds and introspective information associated with encounters with the instrument. This creates a distributed system throughout the brain's association and modality-specific areas which establishes the conceptual content for the category.<sup>35</sup> This system, through the re-enactment of the sensorimotor states associated with the category 'banjo', makes possible a simulation of the features of a banjo even when no such instrument is present; in consequence, Barsalou calls it a 'simulator'.

One aspect of Barsalou's theory which is especially important for understanding analogical mappings between music and other domains is that the configuration of properties and relationships encapsulated by the simulator for a category may, under certain circumstances, be applied to a different category, giving rise to analogy.<sup>36</sup> This is just the sort of process on which Gottschalk's *The Banjo* relies: listeners who are familiar with the sounds and idioms of nineteenth-century banjo performance can map the configuration of properties and relations

for the category ‘banjo music’ to passages from Gottschalk’s composition in order to make sense of some of its more unusual features.

### *Musical Analogy and Emotion*

According to Barsalou’s theory, then, Gottschalk’s musical depiction is effective because listening to *The Banjo* reactivates some of the same neural structures associated with actually listening to banjo music, giving rise to an imperfect but still vivid simulation of that experience. Two important qualifications should be added to this account of the basis for analogical mappings. First, listeners who have never encountered banjo music (whether from the nineteenth or any other century) would experience no such simulation of actual banjo music when listening to Gottschalk’s composition. For such listeners, encountering *The Banjo* might in fact be a way of learning about banjo music; when they heard actual banjo music, they would understand it by a reference back to Gottschalk’s Op. 15. Second, it should be emphasised that Gottschalk’s musical depiction is a dynamic one which unfolds over time. It thus simulates not simply banjo music, but the *performance* of banjo music. Again, there could be no such simulation in listeners not familiar with banjo music, but such listeners might well correlate Gottschalk’s music with any number of dynamic processes, including types of movement or particular emotional states.

This last observation points to the relevance of analogy, informed by Barsalou’s theory of perceptual symbol systems, for understanding the relationship between music and emotion. Part of the reason we characterise certain pieces of music as ‘happy’ is that listening to such music reactivates some of the neural structures associated with experiencing emotions related to happiness. The result is a *simulation* of happiness – in Scherer’s terms, an affectual response that is not proactive, but diffusely reactive. As Langer understood, analogy provides the basis for correlating musical passages with emotions; less clear in her account, but essential to understanding relationships between music and emotions, is that these correlations are based not simply on ‘shape’, but on structural relationships between sequences of musical events and the dynamic processes that typify emotional responses.

In summary, I propose that musical materials can serve as prompts for us to create what Barsalou would call a simulation; most important for my purposes are simulations of dynamic processes such as the performance of music on a banjo or an affectual response. And this brings us back, at length, to Scarlatti’s sonata, and to what musical analysis can tell us about how the sonata might prompt the simulation of emotional states.

### **Music, Analysis and Emotion**

Other writers have commented on various of the exceptional features of Scarlatti’s Sonata in A major, K. 208, the complete score of which is given in Ex. 3. Chris

## Ex. 3 Domenico Scarlatti, Sonata in A major, K. 208

Adagio è Cantabile

Willis recently noted the improvisatory cast of much of the writing (2008, pp. 289–90); Dean Sutcliffe has remarked on the *galant* sensibility which guides the lyrical voice that Scarlatti aims to project through the sonata (2003, p. 360); and Rosalind Halton has singled it out as an archetype of Scarlatti's cantabile style.<sup>37</sup> Perhaps the most telling comments, however, were occasioned by Alessandro Longo's revisions to the sonata. Confronted by what must have seemed to him either copyist's mistakes or flat-out compositional errors in bar 4 – bare parallel fifths in the left hand and unresolved dissonances in the right hand – Longo rewrote the passage as shown in Ex. 4 to render it more conventional. Reflecting on these and other changes, Ralph Kirkpatrick observed that '[i]f ever Longo's corrections failed to render a strange piece less strange to conventional ears, it is in Sonata 208' (Kirkpatrick [1953] 1983, p. 239; italics in original).

To be sure, some of this strangeness is a consequence of Scarlatti's willingness to push the boundaries of acceptable voice leading. One example was provided

Ex. 3 *Continued*

15 *Tremolo*

18

21

23

## Ex. 4 Domenico Scarlatti, Sonata in A major, K. 208, bar 4: Alessandro Longo edition

4

by the passage discussed earlier, in which the persistent D#5 of bars 5–7, having been incorporated into the dominant of E, has its functional resolution not in the upper register, but through the D#3 of the left hand. Such transgressions are oftentimes associated with larger syntactic disruptions, such as the sudden deflection to the parallel minor in bars 8 and 9. This disruption is, of course, set to rights after the return of the dominant in bar 10 and the arrival of both E



major and a cadential pattern appropriate to the key of the dominant in bar 11. The cadence leads not, however, to a confirmation of E as a local tonic, but to another syntactic disruption by way of what is often called a deceptive cadence. The dominant of E returns in the latter half of bar 12, leading to a reiteration of the cadential pattern (with a modified upper voice) and a consummative arrival on E in bar 14.<sup>38</sup>

On the one hand, the syntactic disruptions practised by Scarlatti in bars 8–12 of K. 208 are not, in themselves, excessively strange. On the other hand, when combined with the deliberate tempo and a performance style meant to evoke singing, they loom rather large, inviting reflection both on the course of events which led up to the disruption and the means by which the disruption was eventually assimilated into the larger plan of the piece. Such reflections may occasion a search for analogues in other domains, including that of emotions.

As I observed in my introductory comments, music analysis only rarely considers the emotions which might be associated with syntactic disruptions. But ‘rarely’ is not ‘never’. In the preceding, I invoked a term often used in North America for the compositional strategy of following a cadential dominant chord with a submediant (which happens both in bar 12 and in bar 23 of K. 208), describing the event as a deceptive cadence. While deception as such is not usually thought of as an emotion, it carries with it a significant and typically negative emotional valence, and to this extent analysis can be seen to tip its hat to the emotional implications of syntactic disruptions. Although violations of expectations of the sort demonstrated by deceptive cadences were central to Leonard Meyer’s theory of emotion and meaning in music, Meyer deliberately shied away from more detailed accounts of specific emotions induced by music, believing that there was no principled way to explain them.<sup>39</sup> I have no doubt that expectation and realisation occur in music, but my own sense is that a description of how musical materials correlate with these psychological processes offers too thin an account of the emotional worlds summoned by music. A better opportunity is provided by the research on analogy I reviewed in the preceding section, which offers resources for exploring how syntactic disruptions might be connected to the simulation of emotions.

Let me begin by retracing the steps through which Scarlatti led us to the cadence on E in bar 14 of K. 208. After securing the tonic at the beginning of bar 5, Scarlatti immediately begins to move towards the dominant. But ‘move’ is perhaps an inaccurate term: the D#5 that points towards the dominant appears first as an irritant, dissonant with the left hand’s A and E in bar 5 and the tenor E in bar 6, and then with pretty much all of the F# minor seventh chord in the second half of bar 6. In each case the irritant resolves to E5, only to return with the next change of bass. The D#5 is, of course, also rhythmically dissonant, a syncopation which jars against the orderly framework provided by the left hand’s steady crotchets. It is only with the arrival on the first-inversion dominant seventh of E major, in the second half of bar 7, that D#5 becomes locally consonant, after which it resolves, as already noted, through the D#3 in the left

hand to the E3 of bar 8. The arrival on E major, then, occurs after a bit of a struggle and is thus something of an achievement. It should also be remembered that Scarlatti means for us to hear this achievement as approximately parallel to the arrival on the tonic in bar 5, the melody in the second half of bar 7 being a transposed version of the melody in the second half of bar 4. Although one might expect that the reward for the successful struggle enacted in bars 5–8 would be some sort of celebration, it is instead collapse. Moves to the parallel minor are common enough in Scarlatti sonatas – the strategy offers him a way to enrich his harmonic palette without surrendering his tonic – but in this case the music seems to have lost its moorings. One thing that sets it adrift is the emphasis on the subdominant area: in truth, E minor (as chord if not key) is only a bit player here, serving to harmonise the G♯ lower neighbour note of bar 9, which leads to a first-inversion supertonic seventh in the second half of that bar. A further source of disruption is the syncopated melody, with its persistent returns to E5 – a strategy which recalls the stasis of bars 5–6 but, lacking the dissonance of the earlier passage, here seems enervated, even hollowed out. With the chromatic slide from A2 and C5 in bar 9 to A♯2 and C♯5 in bar 10, the music starts to recover itself, but note that the syncopations persist until the last beat of bar 11, thereby extending a portion of the compositional strategy used in bars 8 and 9 through to the arrival on the cadential dominant.

As I see it, there are two aspects to the disruption of musical syntax that occurs in bar 8 of Scarlatti's sonata. The first involves the deflection away from E major to its minor subdominant, a move that not only undercuts the arrival on the dominant but calls into question the struggle that produced this arrival. The second involves the emphasis on E5 that can be heard from bars 5–11. My interpretation of the fundamental structure of the sonata takes the E5 of bar 1 as the primary melodic note, with a third-progression to C♯5 completed on the downbeat of bar 5. Although the prominence of E5 after this point could be regarded as a prolongation of the primary note, in truth it distracts attention from the arrival on B4 (which is, for the most part, no more than implied in the second half of bar 7, but whose activation in the latter part of the first half of the sonata is signalled by the opening melodic pitch of the second half). Both of these aspects are reinforced by persistent syncopations, which are one manifestation of the attention to rhythmic design which, as Sutcliffe has observed, is so characteristic of Scarlatti's compositional syntax.<sup>40</sup> I would propose that the negative emotional valence associated with bars 8 and 9 follows from similarities between the dynamic path described by the music starting in bar 5 and the experience of struggling towards and then temporarily failing to achieve a goal.

A second significant disruption of syntax occurs in the second section of the sonata and involves the return to E major, as the dominant of A major, in bar 21. Immediately after the double bars, Scarlatti once again makes a reference to E minor. The subsequent appearance of D♯3 in the bass in bar 16 suggests a move away from E as a tonal centre, a move confirmed by the prolongation of the dominant of D minor in bars 17–19 (a harmony which begins its dissonant life

Ex. 5 Domenico Scarlatti, Sonata in A major, K. 208, bar 20: Alessandro Longo edition



as a fully diminished seventh chord). Almost as soon as D minor is reached, in bar 20, it is converted into the dominant of the dominant, and the melody becomes for a moment incoherent. Or at least it seemed that way to Longo, who attempted to smooth its jagged contours and render its voice leading more orderly with the changes shown in Ex. 5. In doing so, however, I think Longo missed the point. On the one hand, the jagged melody completes the purge of the stepwise downward lines of bars 18 and 19 which was begun by the angular melody above D minor. On the other hand, the arrival on D minor in bar 20 is the culmination of a series of parallel tenths which starts with the A2 in the bass and C#5 in the melody of bar 18, continues with the B2 and D5 and then the C#3 and E5 of bar 19 and finishes with the D3 and F#5 of bar 20. In structural terms, this F#5 operates as an upper neighbour note to the primary melodic note E5; the D#5 in the latter half of the bar operates as a lower neighbour note. As for the primary note, its arrival at the beginning of bar 21 is only implied; in its stead is the slowly rising melodic line, which gently but firmly offers itself as an alternative to the descending lines which have dominated the preceding bars.

The syntax of bars 15–20, then, enacts another struggle towards the dominant, but one which is both more protracted (in the sense that the process plays out over a significant time span) and more intense (in the level of surface dissonance which it encompasses). The culmination of this struggle is also markedly different: the E major of bar 21 is not a point of arrival, as was the E major of bar 8, but a point of departure, setting up the final structural closure on A. It is as though the music were not only searching for a way out of the morass of the parallel minor, but finding that increasing energy was required to accomplish the feat. This dynamic pattern has strong correlations with the sort of frustration that leads to desperate measures which, once taken, yield surprising results. The experience of a sequence of events like this – the apparent impossibility of reaching a desired goal, the grasping at seemingly irrational measures to do so and the unanticipated efficacy of such measures – is one that would be saturated with emotions. So too the experience of listening to the musical correlate of such a sequence: it is not so much that the music has the same shape as the emotions, but that it embodies a dynamic process which can scarcely be contemplated without summoning a strong emotional response.

Again, the basic compositional strategies Scarlatti deploys in both halves of K. 208 are not, in themselves, exceptional. What is exceptional is the assurance with

which Scarlatti realises his deployment, demonstrating a mastery every bit the equal of an actor breathing unforgettable life into a character who, for some, would be the basis for little more than a routine turn on the stage. The results are sonic analogues for dynamic processes with which it is very easy to correlate emotions. That said, note that it is not actually necessary to hear Scarlatti's sonic analogues as embodying emotions: in my descriptions of passages from the sonata I have focussed instead on trajectories involving local and long-term goals rather than emotional states, believing these to be a much more integral part of the tradition of compositional strategies on which the composer draws.

To be sure, a tempo that obscures the apprehension of the regular recurrences of musical events fundamental to periodic structure contributes to the impression that the piece is expressive, but it is as much Scarlatti's exploitation of this opportunity as the slow tempo itself which makes a correlation with the expression of emotions seem inevitable. As I have tried to suggest in my analysis, key to this exploitation are disruptions of syntax, and in particular departures from the norms of harmonic succession and voice leading which place the coherence of the musical utterance in jeopardy. Although music analysts delight in the compositional wit and craft demonstrated by such departures (when successfully handled), Scarlatti's K. 208 shows them to be a resource for summoning the mercurial shifts and transformations typical of our experience of emotions.

### **Music and Emotion, Emotion and Musical Analysis**

For Susanne Langer, music was the ideal non-discursive medium, one in which form, rather than content, was paramount. As such, it could capture human emotions with a fidelity that language could never approach. Although Langer assumed that the means by which similar forms were brought into correspondence was analogy, she never worked out the details of analogical mappings, preferring to focus instead on the unique forms of knowledge which music and other non-discursive media made possible. In consequence, Langer's approach to music and emotion provided only the barest outlines of a framework for empirical research; for researchers who took the view that the connection between music and emotion was necessary and unmediated, it provided no framework at all. As I have endeavoured to show, however, there is in fact little hard evidence that the connection between music and emotion is necessary and unmediated, and much promise in Langer's approach when it is allied with a more detailed model of analogical mappings. Such a model can explain, in a principled way, emotional responses to music – responses that are, in Barsalou's term, a simulation of emotional responses which we have already experienced. It is important to emphasise that simulations – even though they are of necessity partial and fragmentary, and shaped by both perceptual and conceptual knowledge – are not necessarily any less genuine than the experiences which are their source. It also bears mention that the dynamic processes with which we correlate sequences of musical sound need not be concerned primarily with emotional

states: Gottschalk's *The Banjo* might easily prompt the simulation of physical movements by an imaginary dancer or the phantasmagorical trajectory of objects through space rather than emotions, although either of these simulations might have as its concomitant emotional valences of one sort or another.

As I noted in my analysis of K. 208, Scarlatti's sonata lends itself easily to the simulation of emotions, in no small part because of the prominence of syntactic disruptions that provide sonic analogues for sudden changes of emotional state or for intense experiences of the kind that typically carry a strong emotional valence. Put another way, how music is organised – or disorganised – has everything to do with its emotional effects.

The notion that music analysis should prove a useful tool for the discovery of the origins of our emotional responses to music will, no doubt, seem novel. And yet, inasmuch as analysis is concerned with how musical works achieve their ends, it cannot be that music, emotion and analysis are ever very far apart.

## NOTES

1. See Langer (1937), pp. 29–33.
2. See Juslin and Västfjäll (2008), pp. 561–3.
3. See Ekman (1992a), as well as LeDoux (1996), pp. 112–14; and Damasio (1999), pp. 53–6.
4. See Ekman (1992b).
5. See Darwin (1872).
6. See Panksepp (2005a) and (2005b).
7. See Izard (2007).
8. See Panksepp and Bernatzky (2002); Juslin and Laukka (2003); and Bigand, Vieillard, Madurell, Marozeau and Dacquet (2005).
9. See Terwogt and Grinsven (1988); Dolgin and Adelson (1990); and Balkwill, Thompson and Matsunaga (2004).
10. See Boone and Cunningham (2001).
11. See Kallinen (2005).
12. See Ortony and Turner (1990); and Russell (1994).
13. See Rosch, Mervis, Gray, Johnson and Boyes-Braem (1976); Tversky and Hemenway (1983); Lassaline, Wisniewski and Medin (1992); and Barrett (2006).
14. See Kivy (1990), pp. 165–71.
15. See Ekman, Levenson and Friesen (1983).
16. See Nykliček, Thayer and Van Doornen (1997); Krumhansl (1997); and Witvliet and Vrana (2007).
17. See Larsen, Berntson, Poehlmann, Ito and Cacioppo (2008).
18. See Panksepp (1995), p. 183.

19. See Grewe, Nagel, Kopiez and Altenmüller (2007), p. 309.
20. See Bartlett (1996).
21. See Bradley and Lang (2000) and (2007).
22. See Scherer (2004), p. 244.
23. See Innis (2009), pp. 2–4.
24. See Juslin and Sloboda (2001), pp. 93–94, and Juslin and Sloboda (2010), p. 89.
25. See Juslin and Västfjäll (2008), p. 565.
26. See Starr (1995), pp. 147–8.
27. See Smith (1992).
28. See Hofstadter (2001).
29. See Gentner (1983); Gentner and Kurtz (2006); Holyoak and Thagard (1995), pp. 24–31; and Holyoak (2005).
30. See Gentner and Markman (1997), p. 47.
31. See Barsalou (2005), p. 398.
32. *Ibid.*, p. 399.
33. See Barsalou (2003).
34. See Barsalou (1999).
35. See Barsalou (2005), p. 400.
36. *Ibid.*, p. 422.
37. See Halton (2002), p. 27.
38. It bears mentioning that while this arrival is, with respect to voice leading, quite conclusive in its execution – the massed sound on the last crotchet of bar 13 giving way to the bare octave of bar 14 – it is rhetorically quite strange. Although the octave is often supplemented in performance by a brief passage leading back to bar 1 or on to bar 15, the contrast in texture is nonetheless striking and seems intended to withhold the sense of relaxation typically associated with a structural arrival. For discussion of this and similar moments in other sonatas by Scarlatti, see Sutcliffe (2003), pp. 171–2.
39. See Meyer (1956).
40. See Sutcliffe (2003), p. 145.

## REFERENCES

- Balkwill, Laura-Lee; Thompson, William Forde; and Matsunaga, Rie, 2004: 'Recognition of Emotion in Japanese, Western, and Hindustani Music by Japanese Listeners', *Japanese Psychological Research*, 46/iv, pp. 337–49.



- Barrett, Lisa Feldman, 2006: 'Solving the Emotion Paradox: Categorization and the Experience of Emotion', *Personality and Social Psychology Review*, 10/i, pp. 20–46.
- Barsalou, Lawrence W., 1999: 'Perceptual Symbol Systems', *Behavioral and Brain Sciences*, 22/iv, pp. 577–660.
- , 2003: 'Situated Simulation in the Human Conceptual System', *Language and Cognitive Processes*, 18/v–vi, pp. 513–62.
- , 2005: 'Abstraction as Dynamic Interpretation in Perceptual Symbol Systems' in Lisa Gershkoff-Stowe and David H. Rakison (eds), *Building Object Categories in Developmental Time* (Mahwah, NJ: Lawrence Erlbaum Associates), pp. 389–431.
- Bartlett, Dale L., 1996: 'Physiological Responses to Music and Sound Stimuli', in Donald A. Hodges (ed.), *Handbook of Music Psychology* (San Antonio, TX: IMR Press), pp. 343–85.
- Bigand, Emmanuel; Viellard, Sandrine; Madurell, François; Marozeau, Jeremy; and Dacquet, A., 2005: 'Multidimensional Scaling of Emotional Responses to Music: the Effect of Musical Expertise and of the Duration of the Excerpts', *Cognition and Emotion*, 19/viii, pp. 1113–39.
- Boone, R. Thomas, and Cunningham, Joseph G., 2001: 'Children's Expression of Emotional Meaning in Music through Expressive Body Movement', *Journal of Nonverbal Behavior*, 25/i, pp. 21–41.
- Bradley, Margaret M., and Lang, Peter J., 2000: 'Affective Reactions to Sound Stimuli', *Psychophysiology*, 37/ii, pp. 204–15.
- , 2007: *The International Affective Digitized Sounds (2nd edn; IADS-2): Affective Ratings of Sounds and Instruction Manual*. Tech. rept. no. B3 (Gainesville, FL: University of Florida Press).
- Damasio, Antonio R., 1989: 'Time-Locked Multiregional Retroactivation: a Systems-Level Proposal for the Neural Substrates of Recall and Recognition', *Cognition*, 33/i–ii, pp. 25–62.
- , 1999: *The Feeling of What Happens: Body and Emotion in the Making of Consciousness* (New York: Harcourt Brace).
- Darwin, Charles, 1872: *The Expression of the Emotions in Man and Animals* (London: John Murray).
- Dolgin, Kim G., and Adelson, Edward H., 1990: 'Age Changes in the Ability to Interpret Affect in Sung and Instrumentally-Presented Melodies', *Psychology of Music*, 18/i, pp. 87–98.
- Dowling, W. Jay, and Harwood, Dane L., 1986: *Music Cognition* (San Diego, CA: Academic Press).
- Ekman, Paul, 1992a: 'An Argument for Basic Emotions', *Cognition and Emotion*, 6/iii–iv, pp. 169–200.
- , 1992b: 'Facial Expressions of Emotion: New Findings, New Questions', *Psychological Science*, 3/i, pp. 34–8.

- Ekman, Paul; Levenson, Robert W.; and Friesen, Wallace V., 1983: 'Autonomic Nervous System Activity Distinguishes among Emotions', *Science*, n.s., 221/4616, pp. 1208–10.
- Gentner, Dedre, 1983: 'Structure-Mapping: a Theoretical Framework for Analogy', *Cognitive Science*, 7/ii, pp. 155–70.
- Gentner, Dedre, and Kurtz, Kenneth J., 2006: 'Relations, Objects, and the Composition of Analogies', *Cognitive Science*, 30/iv, pp. 609–42.
- Gentner, Dedre, and Markman, Arthur B., 1997: 'Structure Mapping in Analogy and Similarity', *American Psychologist*, 52/i, pp. 45–56.
- Grewe, Oliver; Nagel, Frederik; Kopiez, Reinhard; and Altenmüller, Eckart, 2007: 'Listening to Music as a Re-Creative Process: Physiological, Psychological, and Psychoacoustical Correlates of Chills and Strong Emotions', *Music Perception*, 24/iii, pp. 297–314.
- Halton, Rosalind, 2002: 'Domenico Scarlatti and His Cantabile Sonatas', *Musicology Australia*, 25, pp. 22–47.
- Hofstadter, Douglas R., 2001: 'Epilogue: Analogy as the Core of Cognition', in Dedre Gentner, Keith J. Holyoak and Boicho N. Kokinov (eds), *The Analogical Mind: Perspectives from Cognitive Science* (Cambridge, MA: MIT Press), pp. 499–538.
- Holyoak, Keith J., 2005: 'Analogy', in Keith J. Holyoak and Robert G. Morrison (eds), *The Cambridge Handbook of Thinking and Reasoning* (Cambridge: Cambridge University Press), pp. 117–42.
- Holyoak, Keith J., and Thagard, Paul, 1995: *Mental Leaps: Analogy in Creative Thought* (Cambridge, MA: MIT Press).
- Innis, Robert E., 2009: *Susanne Langer in Focus: the Symbolic Mind* (Bloomington, IN: Indiana University Press).
- Izard, Carroll E., 2007: 'Basic Emotions, Natural Kinds, Emotion Schemas, and a New Paradigm', *Perspectives on Psychological Science*, 2/iii, pp. 260–80.
- Juslin, Patrik N., and Laukka, Petri, 2003: 'Communication of Emotions in Vocal Expression and Music Performance: Different Channels, Same Code?' *Psychological Bulletin*, 129/v, pp. 770–814.
- Juslin, Patrik N., and Västfjäll, Daniel, 2008: 'Emotional Responses to Music: the Need to Consider Underlying Mechanisms', *Behavioral and Brain Sciences*, 31, pp. 559–621.
- Juslin, Patrik N., and Sloboda, John A. (eds), 2001: *Music and Emotion: Theory and Research* (New York and Oxford: Oxford University Press).
- \_\_\_\_\_, (eds), 2010: *Handbook of Music and Emotion: Theory, Research, and Applications* (Oxford: Oxford University Press).
- Kallinen, Kari, 2005: 'Emotional Ratings of Music Excerpts in the Western Art Music Repertoire and their Self-Organization in the Kohonen Neural Network', *Psychology of Music*, 33/iv, pp. 373–93.
- Kirkpatrick, Ralph, [1953] 1983: *Domenico Scarlatti* (Princeton, NJ: Princeton University Press).

- Kivy, Peter, 1990: *Music Alone: Philosophical Reflections on the Purely Musical Experience* (Ithaca, NY: Cornell University Press).
- Krumhansl, Carol L., 1997: 'An Exploratory Study of Musical Emotions and Psychophysiology', *Canadian Journal of Experimental Psychology*, 51/iv, pp. 336–52.
- Langer, Susanne K., 1930: *The Practice of Philosophy* (New York: H. Holt).
- \_\_\_\_\_, 1937: *An Introduction to Symbolic Logic* (Boston: Houghton Mifflin).
- \_\_\_\_\_, [1942] 1957: *Philosophy in a New Key: a Study in the Symbolism of Reason, Rite, and Art*, 3rd edn (Cambridge, MA: Harvard University Press).
- Larsen, Jeff T.; Berntson, Gary G.; Poehlmann, Kirsten M.; Ito, Tiffany A.; and Cacioppo, John T., 2008: 'The Psychophysiology of Emotions', in Michael Lewis, Jeannette M. Haviland-Jones and Lisa Feldman Barrett (eds), *Handbook of Emotions*, 3rd edn (New York: Guilford Press), pp. 180–95.
- Lassaline, Mary E.; Wisniewski, Edward J.; and Medin, Douglas L., 1992: 'Basic Levels in Artificial and Natural Categories: Are All Basic Levels Created Equal?' in Barbara Burns (ed.), *Percepts, Concepts and Categories: the Representation and Processing of Information*, *Advances in Psychology* 93 (Amsterdam and New York: North-Holland), pp. 327–78.
- LeDoux, Joseph, 1996: *The Emotional Brain: the Mysterious Underpinnings of Emotional Life* (New York: Simon and Schuster).
- Meyer, Leonard B., 1956: *Emotion and Meaning in Music* (Chicago: University of Chicago Press).
- Nyklíček, Ivan; Thayer, Julian F.; and Van Doornen, Lorenz J. P., 1997: 'Cardiorespiratory Differentiation of Musically-Induced Emotions', *Journal of Psychophysiology*, 11/iv, pp. 304–21.
- Ortony, Andrew, and Turner, Terence J., 1990: 'What's Basic about Basic Emotions?' *Psychological Review*, 97/iii, pp. 315–31.
- Panksepp, Jaak, 1995: 'The Emotional Sources of "Chills" Induced by Music', *Music Perception*, 13/ii, pp. 171–207.
- \_\_\_\_\_, 2005a: 'Affective Consciousness: Core Emotional Feelings in Animals and Humans', *Consciousness and Cognition*, 14/i, pp. 30–80.
- \_\_\_\_\_, 2005b: 'On the Embodied Neural Nature of Core Emotional Affects', *Journal of Consciousness Studies*, 12/viii–x, pp. 158–84.
- Panksepp, Jaak, and Bernatzky, Günther, 2002: 'Emotional Sounds and the Brain: the Neuro-affective Foundations of Musical Appreciation', *Behavioural Processes*, 60/ii, pp. 133–55.
- Rosch, Eleanor; Mervis, Carolyn B.; Gray, Wayne D.; Johnson, David M.; and Boyes-Braem, Penny, 1976: 'Basic Objects in Natural Categories', *Cognitive Psychology*, 8/iii, pp. 382–439.
- Russell, James A., 1994: 'Is there Universal Recognition of Emotion from Facial Expression? A Review of the Cross-Cultural Studies', *Psychological Bulletin*, 115/i, pp. 102–41.
- Scherer, Klaus R., 2004: 'Which Emotions Can Be Induced by Music? What Are the Underlying Mechanisms? And How Can

- We Measure Them?' *Journal of New Music Research*, 33/iii, pp. 239–51.
- Sloboda, John A., 1991: 'Music Structure and Emotional Response: Some Empirical Findings', *Psychology of Music*, 19/ii, pp. 110–20.
- Smith, Paul E., 1992: 'Gottschalk's "The Banjo," Op. 15, and the Banjo in the Nineteenth Century', *Current Musicology*, 50, pp. 47–61.
- Starr, S. Frederick, 1995: *Bamboula! The Life and Times of Louis Moreau Gottschalk* (New York: Oxford University Press).
- Sutcliffe, W. Dean, 2003: *The Keyboard Sonatas of Domenico Scarlatti and Eighteenth-Century Musical Style* (Cambridge: Cambridge University Press).
- Terwogt, Makr Meerum, and Van Grinsven, Flora, 1988: 'Recognition of Emotions in Music by Children and Adults', *Perceptual and Motor Skills*, 67, pp. 697–8.
- Tversky, Barbara, and Hemenway, Kathleen, 1983: 'Categories of Environmental Scenes', *Cognitive Psychology*, 15, pp. 121–49.
- Willis, Chris, 2008: 'One-Man Show: Improvisation as Theatre in Domenico Scarlatti's Keyboard Sonatas', in Massimiliano Sala and W. Dean Sutcliffes (eds), *Domenico Scarlatti Adventures: Essays to Commemorate the 250th Anniversary of His Death* (Bologna: Ut Orpheus Edizioni), pp. 271–308.
- Witvliet, Charlotte V. O., and Vrana, Scott R., 2007: 'Play It Again Sam: Repeated Exposure to Emotionally Evocative Music Polarises Liking and Smiling Responses, and Influences Other Affective Reports, Facial EMG, and Heart Rate', *Cognition and Emotion*, 21/i, pp. 3–25.

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## ABSTRACT

In this essay I explore the idea that musical passages which are particularly remarkable are so in part because of ways they correlate with the progress and change of emotions. Taking as my point of departure Susanne Langer's idea that music represents a kind of non-discursive knowledge uniquely affiliated with emotional life, I argue that recent empirical research on music and emotion has not provided a compelling model for the relationship between music and emotion and that Langer's approach, when refined through recent research on processes of analogy, provides a viable alternative. I apply this perspective to an analysis of Domenico Scarlatti's Sonata in A major, K. 208, with a special focus on passages which are typically regarded as highly expressive.