Composers & Imagery: Myths & Realities

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INTRODUCTION

The art of composing may be considered an art of creating illusions. Music is the only context in which we hear sounds which have no particular basis in the physical world, even though some physical props are necessary to create the artifice. In our everyday lives, the sonic environment provides sensory information on which we depend to analyze what is going on around us, while hearing music for its own sake is a very different experience. By common agreement, we try to suspend our normal listening habits and allow the music to create a different atmosphere, where the sounds are interpreted as transcending the mundane world and creating new images--sometimes abstract, sometimes more literal imitations of familiar phenomena. It comes as no surprise, therefore, that composers often resort to modes of imagery that draw on the properties of the physical world in order to produce illusions that retain a convincing presence and behaviour.
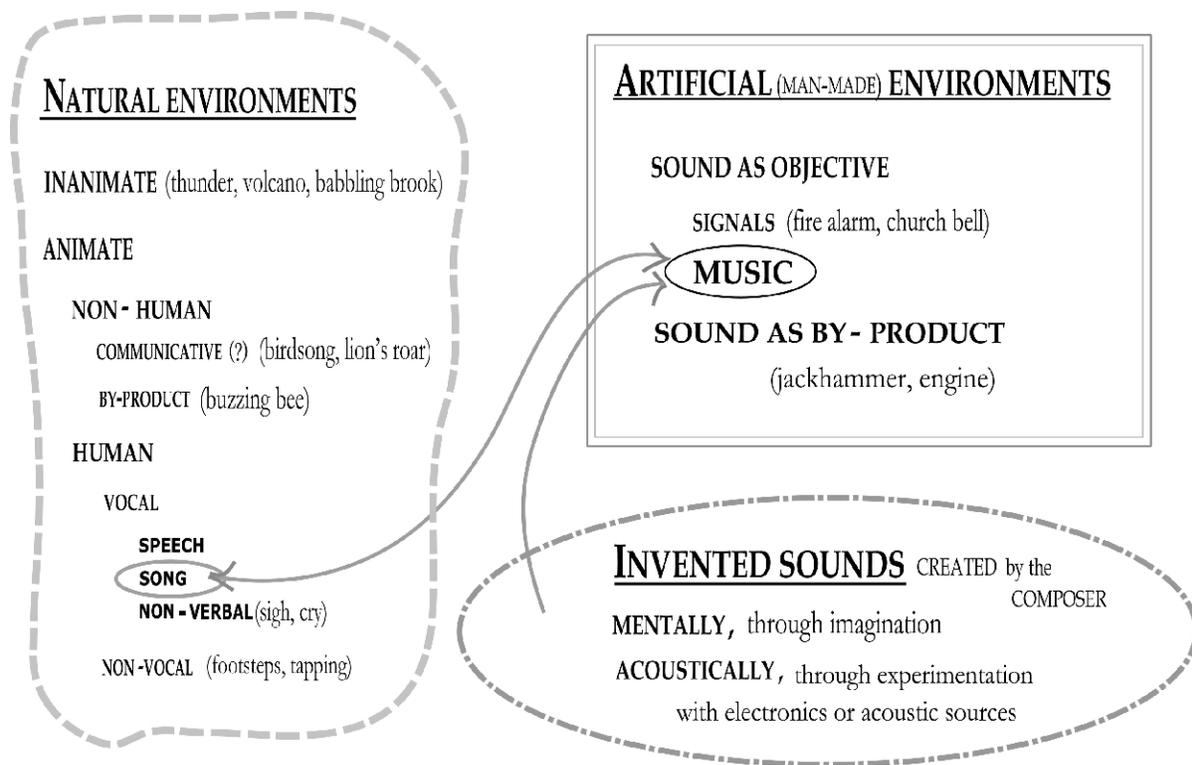
The problems associated with the study of imagery in music are compounded when studying the use of imagery in the compositional process. Much of the compositional process can take place in the subconscious and composers have rarely felt any need to examine their strategies, much less to articulate them. Typically, the process and strategies employed differ widely according to the characteristics of the people involved. In addition, various comments by and about composers through the ages have resulted in some pervasive misconceptions.

In investigating the rôle of imagery in the compositional process, I scanned various writings by and interviews with composers, looking for hints of how each one thought about composing. I complemented this study with questions posed to colleagues and composition students, drawing on my own experience as well. It is hoped that the sampling of approaches and reflections will illustrate the richness and complexity of the field and thus not only stimulate further inquiry but also aid in the preparation of adequate tools for the investigation.

THE NATURE OF COMPOSITION

Intentions and Objectives

Varying functions of music through the ages and in different cultures have led to quite divergent intentions and objectives on the part of the composer. Music may be composed to accompany a religious ritual, or a film; it may express a personal state of mind or describe a particular scene or mood; it may be an abstract design in the sonic medium, or even a means by which to investigate properties of time or perception. The intentions and objectives will necessarily condition the process and consequently the specific use of imagery.

NATURAL ENVIRONMENTS

INANIMATE (thunder, volcano, babbling brook)

ANIMATE

   NON - HUMAN

      COMMUNICATIVE (?) (birdsong, lion's roar)

      BY-PRODUCT (buzzing bee)

   HUMAN

     VOCAL

       SPEECH

       SONG

       NON - VERBAL (sigh, cry)

     NON -VOCAL (footsteps, tapping)

ARTIFICIAL (MAN-MADE) **ENVIRONMENTS**

SOUND AS OBJECTIVE

   SIGNALS (fire alarm, church bell)

   MUSIC

SOUND AS BY- PRODUCT

   (jackhammer, engine)

INVENTED SOUNDS CREATED by the COMPOSER

MENTALLY, through imagination

ACOUSTICALLY, through experimentation
   with electronics or acoustic sources

Processes and Strategies

    There are various stages in the compositional process which can be grouped under three headings: the gathering of material, the arranging of the gathered material, and the encoding of the material for eventual communication to the listener.

    Strategies for the collection and arrangement of material differ widely among composers. The collection process is usually an on-going activity throughout the years; eventually, a composer may have a remarkable repository of material available for mental recall. The diversity of material that can contribute to a composer's repertoire of sounds are illustrated in Figure 1. The sounds and designs considered most appealing are remembered, analyzed, imitated, extended, developed, and/or transformed, then recycled into the memory bank. The entire collection process may occur mentally, or be supplemented by notated sketches and/or recordings. At any point, the composer may begin playing with the memory bank sounds, arranging them into various configurations. The individual's personality and work habits will determine whether such manipulation of the material occurs more at the subconscious or more at the conscious level, whether it involves methodical rigour, playful improvisation, or both. The encoding generally takes the form of notating a set of instructions to performers in the form of music notation; other means range from mental preparation to play the composition in an improvisatory style to the recording of an electronic work onto CD.

        The sequence of these stages is not always linear, and very often the stages occur in a nested fashion. Thus, a composer may begin by gathering and arranging pitches and rhythms for a melody which is then written down in music notation, ready to be selected and arranged at a later date for inclusion in a larger work. Equally possible is that the large-scale form of the work, with something of its overall character, will be established before the details of any melody are arranged. The first

melodic line to be written will not necessarily be the first to occur in the final work; authors will recognize the parallel with refining chapters of a book in a non-sequential fashion. Commissions and requests from performers often dictate a specific instrumentation, and in some circumstances even the length of the work, the venue and the technical abilities of the performers will be important factors from the start.

The Role of Inspiration and Associated Myths

The initiative for composing is often thought to be inspiration, and in that guise it may subsume gathering and arranging stages. The role of inspiration in the compositional process is clearly relevant, but less clearly definable;[1] today, much of what used to be regarded as inspiration is now referred to as the workings of the subconscious. It could be argued that inspiration implies imagery; certainly the myths that surround the one have confused investigation of the other.

The most basic and insidious form of what I think of as "the Mozart Myth" pretends that the composer's task is to receive divine inspiration in the form of a musical masterpiece, and then transcribe it: "a stenographer to his Muse," as Erickson wryly expresses it (1955, p. 43). Its most erroneous implication is that inspiration arrives in the form of a pure and complete auditory image, already orchestrated, which the composer proceeds to encode from memory, from beginning to end.

The myth doubtless dates from antiquity, but seems to have been given particular resonance from two separate events recorded from Mozart's life. The first is his transcription of Allegri's Miserere at age 7, after a single hearing: a feat that would require an extraordinary musical memory and a complete grasp of the correlation between the heard sound and the notation. Given the less complex musical vocabulary of the time, it is not quite as dramatic as a child of today being able to notate Boulez's Structures, for example, but nonetheless it is proof (if true) of Mozart's formidable talent. The second event is his completion of the Overture to Don Giovanni in a single day, (1) just before the first performance. In this case, it is clear that the composer would have been working on it mentally for a long time previously. [2]

The Mozart Myth becomes considerably more believable if one allows for the possibility that the heard masterpiece is not necessarily specific and complete in terms of its notational detail, nor that it is necessarily the first step in the process of composition. Many works have indeed had a sudden moment of inspiration as their births -- it is just that the "fleshing out" of the idea may require subsequent months or years of work involving techniques which the composer has already refined over years of training. On the other hand, it is possible that the composer does hear a complete, detailed work all in a flash   but usually after having spent many months working with specific musical ideas that the subconscious has finally arranged into a satisfying design.

Attempts to explain the real compositional process do not always clarify; Schoenberg, on the first page of his book Fundamentals of Musical Composition, says:

> A composer does not, of course, add bit by bit, as a child does in building with wooden blocks. He conceives an entire composition as a spontaneous vision. Then he proceeds, like Michelangelo who chiselled his Moses out of the marble without sketches, complete in every detail, thus directly forming his material. [italics the author's] (1967, pp.1-2)

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[1] See Duchesneau, 1986, for a full discussion of the subject.

[2] Incidentally, this story also underlines the composer's disregard for composing sequentially.

As if anticipating the skepticism of other composers, he hastens to add: "No beginner is capable of envisaging a composition in its entirety; hence he must proceed gradually, from the simpler to the more complex." The spontaneity of his own vision is thrown into doubt by reports of his own struggles with Jacob's Ladder, a work which he finally abandoned after many years. However, the inconsistencies fade on re-reading: Schoenberg may well have been referring to a spontaneous vision as yet untranslated into the musical language, and therefore the years of work are simply a testimony to the difficulty of finding the appropriate language for expressing it. (4)

Conversations and readings, as well as personal experience, suggest that such spontaneous vision of an entire work is most common upon awakening from sleep. Stockhausen, for example, reports (1974, p. 24) "I have all sorts of sound visions very often at night in a deep sleep. I wake up and the entire pieces are in me; I've heard them." Such an experience can serve as a potent stimulus, but the process of transferring all details of the auditory image to a reproducible score is problematic. Typically, not all of the details are retained with the same clarity; just as the listener discovers when leaving the concert hall, less crucial details fade first while key themes and textures leave more indelible impressions. Even if the original image is purely auditory (an assumption we will examine below), it will not necessarily involve specific instruments. Instead, the composer might "hear" an abstract sonic configuration, which must be then encoded: "translated" into a common musical language and notational system for reproduction on available acoustic instruments by available techniques -- a process that implies compromise, or at least interpretation. [3] Unless the composer has a firm belief in the divinity of the inspiration, he or she may also be tempted to improve on the aural experience, only to discover that such editing interferes with the retention of the original. Likewise, even if the entire image is maintained in the memory for some time, the mental focussing required to remember every detail can jeopardize its retention.

The phenomenon is referred to by Stravinsky (1972, p. 111) in a most poignant comment about his old age (at 85) when he remarks: "I dreamed a new episode of my work-in-progress but realized, when I awoke, that I could not walk to my desk to write it down, and that it would be gone by morning." His acknowledgement of such a strategy makes his repudiation of the Mozart Myth more emphatic:

> The idea of work to be done is for me so closely bound up with the idea of the arranging of materials and of the pleasure that the actual doing of the work affords us that, should the impossible happen and my work suddenly be given to me in a perfectly completed form, I should be embarrassed and nonplussed by it, as by a hoax. (1970, pp. 52-53)

As further clarification of his objection to the passive role of the Muse's stenographer, he asserts: "We have a duty towards music, namely, to invent it." (1970, p. 53).

IMAGERY IN THE COMPOSITIONAL PROCESS

When and How Imagery Is Used

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[3]The excitement with which many composers greeted the advent of electronic instruments was due to the elimination of this necessity of translation, as the original sonic idea could theoretically be reproduced with great fidelity to all its nuances, without having to be mediated by physical limitations of instruments and performers. Unfortunately, there are two tremendous obstacles to this process: the time required to arrive at the desired sound, and the amount of extraneous sounds which may have to be heard in the process   both of which can interfere with the integrity of the remembered sonic image in the composer's mind.

Imagery may be intertwined with inspiration and stimulation, or it may be employed in a more mundane way as a practical tool which enables the composer to maintain a musical idea in memory while searching for appropriate expression of the idea. It can come into play at any stage of composition, from the initial gathering of seminal ideas for a work to the final encoding. Although different tasks and different personalities affect the type and amount of imagery employed, it is not uncommon for one composer to draw on many types of imagery   auditory, visual, multi-modal during the process of composing one single work. Each type has its own particular characteristics and typical functions, so each will be examined separately as far as possible.

Types of Imagery

  "   auditory

   Given that two of the three main stages of the compositional process are the gathering and arranging of material, and that much if not all of that material is of an aural nature, it is logical that auditory imagery plays a fundamental rôle in compositional strategies. A major part of a composer's development is learning how to manipulate auditory images in order to arrange them into more extended configurations. This implies not only the musical imagination to hear sonic gestures and chordal structures, but also the musical memory to be able to store and retrieve them again at will, and the capacity to alter each image (for instance, by substituting a different instrumentation, changing the tempo, or transposing the pitch) and mentally replaying it. A strong sense of auditory imagery comes into play when the composer decides to construct a new sound mentally from the superposition, juxtaposition or mixing of known sounds. The vividness of the auditory image is equally necessary when involved in notation, so that it can be clearly maintained and referred to during the sometimes tedious procedure of encoding into appropriate symbols.
   By mentally "playing back" the auditory image repeatedly to oneself, it can become "engraved" more firmly into memory, but is still subject to being dislodged or obscured by other information, particularly of a similar sonic variety. This aspect can be deduced by the fact that many composers search out quiet places to work, in order that physical sounds not interfere with the mental images. For the same reason, many composers prefer to work away from the piano in order to avoid timbral confusion and the interference from potentially wrong notes struck while playing.
   An imagined sonic configuration may or may not be complete in all its parameters. Frequently, as evidenced by composers' sketchbooks and writings, the initial idea may consist of a melodic contour and rhythm but not yet be fixed in terms of starting pitch, instrumentation, dynamics or even precise tempo. Such incompleteness, far from being a deficiency, permits a greater range of possibilities for appropriate transformation into the final composition. However, the initial "hearing" of the sound object will often embody a particular character or expressive quality even if not present in the initial sketch. Therefore, when the composer begins to choose instrumentation and dynamics for a particular fragment, certain choices might be automatically excluded because they are contradictory to the desired character.
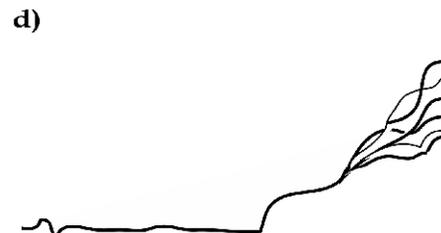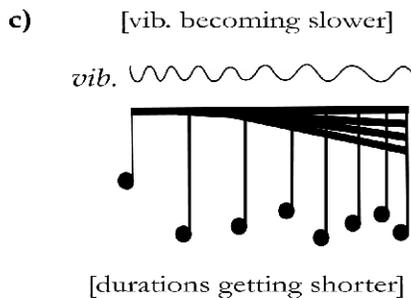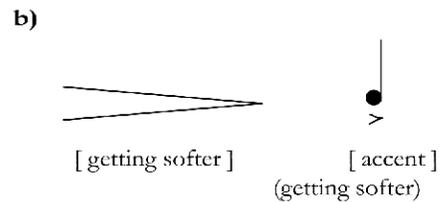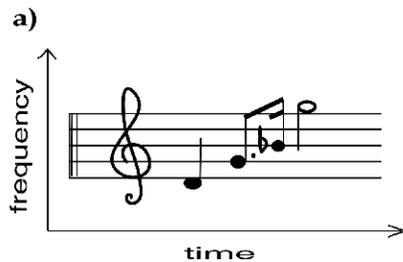
  "   visual

Visual imagery also plays an extremely important rôle in a composers' training. Most of us began decoding music notation at an early age: learning the cryptic correspondence between complex graphic symbols and sonic parameters. (Figure 2) The underlying principle is the use of an x/y graph representing frequency and time coordinates; (2a) dynamics are often represented by the

graphic "hairpin" as well as by letter symbols (2b). The notation system has been continously developed and extended; in the 20th century many new symbols and refinements were introduced to reflect a growing interest in specifying timbral shading (for example, 2c) and new approaches to temporal organization. In particular, the palette has been broadened by the advent of electroacoustic music which use graphics to represent sonic configurations as well as the tools for their manipulation.

Music theory and analysis also rely on symbols, largely based on Roman and Arabic numerals for describing tonal hierarchies, chord configurations (such as figured bass), metric structure, and various classifications of pitch sets and intervals. Composers have long used these and similar symbols in their compositional sketches as a type of shorthand, and it is logical that some manipulate their ideas mentally with such visual symbols as codes. Analytical approaches which incorporate graphics, whether drawings of melodic contours (Erickson, 1955; Zuckerkandl, 1959) diagrams (Lerdahl & Jackendoff, 1983), graphic symbols and even spectrograms (Cogan & Escot 1976; Cogan, 1984), have been well-received.

Many contemporary composers often work with graphic imagery at an early stage of the compositional process. In most cases, the graphic images bear some resemblance to the (conventional or expanded) notation system referred to above, although they may be quite cryptic jottings. They allow a composer to think about / play with the sound objects without having to

a)

frequency

time

b)

[getting softer]

[accent]
(getting softer)

c) [vib. becoming slower]

vib.

[durations getting shorter]

d)

specify all details. For example, the "doodle" in Figure 2d might serve to represent a local pitch/duration complex of a few seconds' duration, or a plan for the structure of an entire subsection of a work several minutes long. In the latter case, it might be a either a graphic gesture from a very early stage of the compositional process, before the detail is specified, or a much later step in which some of the detailed components of the design have already been determined and therefore do not have to be specified in this particular diagram. In the latter case, the sketch allows a considerable amount of information to be codified into a single unit, if we keep in mind that the composer could mentally place a magnifying glass on any part of the drawing and see, or hear, the detail.

Although these images usually exist as drawings on paper, it is common for the composer to use them mentally, with or without paper reproductions. Given that the final encoding of a work is usually in the form of a musical score, it is not surprising that the composer moves very freely between the auditory concept and its visual representation.

Interaction of auditory and visual imagery

The composer may mentally construct certain passages with the aid of graphic imagery (especially traditional music notation) without transforming them into their sonic counterparts. In fact, when assembling a piece by collage technique, á la Stravinsky or Varèse, it is easier to imagine the manipulation of scraps of paper than scraps of auditory material, since in the physical world it is considerably easier to exchange the spatial arrangement of two objects than the temporal order of two events. Those who work with sound programs on computers are even more accustomed to dissociating sound from its temporal position in a large scale, as the cut-and-paste technique of word processing are equally easy to perform with sonic data. However, given that the result of the work is always of an aural nature, there is usually considerable interaction between the visual and the auditory image, and often the composer will regard them as inseparable.

The computer sound programs also make visible a procedure which is familiar from the compositional process: the zooming in and out on the time scale. At some stages it is useful to "play" an entire composition-in-progress at the intended tempo, even if a few sections are still lacking in certain details (at which point playback becomes extremely low-fidelity, resembling attempts to sing a song when one has forgotten many of the verses and some of the notes). However, during much of the compositional process, it would be inefficient to start playback at the beginning; on the other hand, it may be useful to compare the auditory images from two or more places in the work. Again, visual imagery is a convenient way to navigate.

Kinaesthetic imagery

Although I doubt that kinaesthetic imagery exists in isolation for composers, it is a significant aspect of some cross-modal imagery, and as such merits a focussed, if brief, attention.

An important stimulus for many composers is that of dance. The influence of dance on music, whether simply through the inheritance of metric schemes from traditional dance forms or through significant musical works being a result of collaboration between composers and choreographers, is traditionally undervalued in music analysis and general discussions. Yet several composers who have written for dance admit that even when writing for a "pure" aural context, their writing continues to be inspired by images of movement and gesture. Whether these movements are

imagined by the composer as being of his or her own body or that of someone else is probably very difficult to establish with certainty, as it is probable that our knowledge of our own bodies informs our perception of the movement of others. A more subtle effect of kinaesthetic or motor movement imagery on composition is demonstrated by the composer who invents sonic configurations based on an awareness of the particular movements required to produce such an effect on a particular instrument.

Cross-modal imagery

Even while attempting to restrict the discussion to "purely" auditory, visual, or kinaesthetic imagery, it becomes evident that there are often latent associations between such images and a more complete model which has all the attributes of an entity or phenomenon of our physical environment. As we move into the study of imagery imbued with multi-modal aspects, the associations become more overt. The composer may arrive at cross-modal imagery in various ways: a scene, such as in film or opera, may benefit from the inclusion of sound effects to clarify the action; a certain mood may be desired and so the composer draws on extra-musical imagery which is consistent with such a mood; or a particularly potent image or scene may serve as a stimulus for the creation of a passage or even an entire composition. The difference between these examples is more a question of degree and attitude than of imagery itself. In the case of the sound effect, a sound is used as a more or less direct representation of its sound source, whereas in the case of a metaphor as stimulus, the resulting sonic configuration may be far removed from any auditory properties of the original image. In the case of creating mood, much of the process may be largely unconscious on the part of the composer; it is such a common objective that the means to achieve it may be indistiguishable from codified musical practice.

Text provides a special correlation with sound: in addition to the aural properties of speech itself articulation, rhythm, contour, etc. the words may refer to visual images and generally evoke mood as well. (11) A composer setting text to music will normally be sensitive to all such imagery, even if the intention is to avoid obvious parallels. In the case of opera, the complexity increases with the combination of movement, song, visual imagery, and narrative.

sound effects

Even before the integration of recorded sounds into musical contexts, composers could convey the sense of an action or environment by an approximation of typical sounds. Traditionally, the "translation" of non-musical sounds into musical contexts involved some adaptation or abstraction, so the listener is required to use some imagination to read the illusion, just as theatre-goers are asked to accept a few well-chosen props as indicating a change of scene. Beethoven's Pastoral Symphony is a famous example; the rhythms of factory machinery in Mossolov's String Quartet and the train in Villa-Lobos's Little Train of the Caipira are equally convincing portrayals of specific environments within very musical contexts. Despite a few notable examples of incorporating actual extra-musical sound sources into a composition, such as the cannons and bells in Tchaikovsky's 1812 Overture and the sirens in Varèse's Amériques, composers have usually preferred to imitate and stylize; the increasing ease of incorporating genuine recordings seems to have contributed to this tendency to avoid doing so. Significant works in the field of musique concrète have in fact explored the converse: transforming recordings of familiar sound from the environment into abstract

configurations to be appreciated for their sonic characteristics instead of their traditional associations. Similarly, Messiaen's Chronochromie, though built exclusively on the raw material of bird song, involves such transformations of time, timbre and microtonal adjustments of frequency that the original is barely discernible, nor is its recognition fundamental to the appreciation of the work. However, these examples can be seen as acknowledgement that considerable effort must be expended on the part of the composer (and sometimes, the listener as well) [4] to rip a sound away from the imagery of its natural source.

creation of mood or atmosphere

    Some sound objects are much easier to dissociate from their natural or probable source than others: sounds which resemble human utterances may well be the most difficult to ignore. Sighs, shouts, or a quiver in the voice are all universal cues to a person's inner state. We are so accustomed to reacting to such aural cues that music which is imbued with similar properties may unconsciously evoke similar reactions. (See for example Sundberg, 1982; Lindström, 1997.)

    Music designed to create the appropriate atmosphere and underline the action of a movie involves a particular type of correspondence, and conventions exist for portraying gaiety, anger, longing, danger, etc. Although the exact musical elements and combinations responsible for such expression have hardly begun to be studied in any rigorous fashion (see however Cohen, in press), there are some obvious correspondences that draw on our knowledge of the behaviour of people, creatures, and things in our environment. My own research (Mountain, 1993) suggests that much of our rhythmic perception in music is conditioned by our utter familiarity with human movement and thereby contributes to our appraisal of the amount of energy or tension in a musical passage by encouraging us (even if unconsciously) to compare the rhythms to our own capacity for executing them. (This is parallel to our judging the scale of a sculpture as being larger, smaller, or the same size as ourselves.) Aside from speech patterns, motor movements such as walking and running provide the most obvious correlations, but gestures and physically tangible evidence of metabolic states such as trembling or shivering also contribute to create specific moods. (An effective way of conveying nervousness is to ask string players to play "tremolo", which involves literally a trembling of the forearm that holds the bow.)

    The agreement between listeners on the impact of a musical passage and its mood or activity association (see for example Sloboda, Lehmann, & Parncutt, 1997) is presented as tentative confirmation that the listener, if only subconsciously, imagines a plausible sound source (such as a human body) whose behaviour and characteristics could produce the musical gesture or component. This type of approach overlaps with the designing of music for film, opera, theatre, etc. but can also exist independently, and is hinted at even in quite abstract contexts by verbal annotations in the musical score: "agitato", "lirico", "allegro" or in more modern scores "without expression", "hammering like a madman". Such instructions are an efficient way to convey to the performers a coherent program that will modify every parameter of that passage according to a global directive. The imagery is developed only as far as necessary to indicate a set of global characteristics which govern the behaviour of the sonic object. Research into the expressive timing and other aspects of performance beyond the conventional notation coding has examined the effect of such directions, and verified that the musician will try to modify the performance in subtle but audible ways to

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[4] Cf. Pierre Schaeffer's "écoute réduite" (1966).

convey the attribute requested. There is substantial evidence in many styles of music of a complex set of rules applied by the performer which can be approximated, if rather crudely, by systematic algorithms. (See for instance Clarke, 1985; Clarke & Windsor, 1997; Kendall & Carterette, 1990; Repp, 1995.) In order for such a system to work, the composer must be using the "other end" of the same set of rules.

metaphors and analogies

Inspiration, as hinted above, need not arrive in aural form. The auditory shape may be developed to express a more abstract or non-musical idea, event, process or action. The extent to which the original stimulus is manifest in the final composition is almost exclusively dependent on the intentions (and skills) of the composer, though naturally some stimuli are more transferable into the musical domain than others. Whether the listener is aware of the original stimulus is often irrelevant for the composer; the advantage to the composer is precisely in the form of imagery as a compositional tool. When an image is borrowed from the familiar four-dimensional world, decisions about the details of the sonic manifestations can be made by consulting the known characteristics of the image.

The types of metaphor and analogy that are commonly used can be grouped into general categories: animate beings, inanimate objects, processes and concepts. As with inspiration in auditory form, such metaphors and analogies may provide the stimulus for a simple musical gesture or for the large-scale structure of a work. In addition, it must be stressed that the composer may in fact be only dimly aware of the analogy, and it may either grow or fade in importance depending on its usefulness in the compositional process. Naturally, there are also situations when the composer borrows from a mixed collection.

Animate Beings

The realm of animate beings seems the most potent in the field of musical imagery, especially when the beings are of human type. This doubtless stems from various factors: the still-felt influence of the Romantic era when the individuality of the human was a newly-permissible focus for art; the intimate and common knowledge of human activity among composers and listeners and the subsequent richness of expression which can be alluded to through imitation of speech, gesture, walking, etc.; the gradual codification through the musical repertoire (largely but not exclusively culture-specific) of these same allusions; the familiarity of narrative structure not only from opera but also from theatre and literature; and in general, the perceived appropriateness of music to expression of our human environment.

Schoenberg (1967, p. 93) explains: "The term character, applied to music, refers not only to the emotion which the piece should produce and the mood in which it was composed, but also the manner in which it must be played." He continues (p. 95): "In composing even the smallest exercises, the student should never fail to keep in mind a special character. A poem, a story, a play or a moving picture may provide the stimulus to express definite moods."

A clear example of the rôle of this type of imagery in the compositional process is revealed by Stravinsky, who reports:

More than a decade before composing Jeu de Cartes, I was aware of an idea for a ballet with playing-card costumes and a green-baize gaming-table backdrop. The origins of the ballet, in

the sense of the attraction of the subject, go back to a childhood holiday with my parents at a German spa, and my first impressions of a casino there. (1970, p. 43)

As he continues, the extent to which such a vision can be translated to music is revealed:

In fact the trombone theme with which each of the ballet's three 'Deals' begins imitates the voice of the master of ceremonies at that first casino ... and the timbre, character, and pomposity of the announcement are echoed, or caricatured, in my music. (p. 43)

Carter explains that the soloists in the Double Concerto act as "mediators between unpitched percussion and pitched instruments" (1976, p.76) and that the design of his Piano Concerto "pits the crowd' of the orchestra against the piano's individual,' mediated by a concertino of seven soloists"(p.77). This kind of imagery is clearly related to the performance directives mentioned above, but on a larger scale, coherent through an entire work.

Inanimate objects, processes and concepts

The trend towards abstract art in sculpture and painting in the 20th century was similarly present in music, though more subtle due to the perception of music's innate abstraction. A move away from the human sonic environment resulted not only in unsingable melodies and rhythms too slow for dancing, but also bolder ways of presenting temporal activities in general: collages of static textures, simultaneous presentations of musical passages moving at different rates, a lack of continuity from one motive to the next. Some composers felt, and acted, more like scientists exploring time and sound, and the imagery used reflects this. Ligeti, for example, describes his approach to the electronic piece Artikulation thus:

First I chose types with various group-characteristics and various types of internal organization, as: grainy, friable, fibrous, slimy, sticky and compact materials. An investigation of the relative permeability of these characters indicated which could be mixed and which resisted mixture. (1958, p. 15)

A new compositional technique, usually referred to as "mapping", encouraged novel configurations, while maintaining at least a tenuous link with natural phenomena. Mapping refers to the assignment of a set of non-musical data onto specific musical parameters such as pitch, duration, dynamics, etc. A very elementary form can be found in Cage's Atlas Eclipticalis, for which the composer took a map of the stars and placed it underneath transparent score paper, so that the dots representing the stars were transformed into dots representing pitches, and the temporal distribution of the pitches was determined by their relative positions along the score lines. A stricter application of the concept is found in Dodge's electronic piece Earth's Magnetic Field, in which data from Californian seismographic machines determined the organization of pitch, dynamics, and timbral content. The temporal order of the data was retained, although the scale was reduced to compress a year's worth of data into several minutes. A more abstract form was used by Xenakis in Pithoprakta, one of his first works for orchestra, where mathematical formulae derived from the kinetic theory of gases gave a Gaussian distribution to the pitch structures (see Xenakis, 1971, pp.12-21).

When describing (1971, pp. 8-9) the stochastic laws which he applied in many compositions, Xenakis gives as illustration the sound of hail on a hard surface, the sound of cicadas in a summer field, and the sound of a political crowd, chanting, shouting, and being dispersed by bullets. Rather than wanting to imitate the specific sonic aspects of any of these, it is the transformation of the rhythms from order to disorder which he chooses as a model. Stockhausen uses strikingly parallel analogies when describing his own compositional methods:

I very often used the image of a swarm of bees to describe such a process. You can't say how many bees are in the swarm, but you can see how big or how dense the swarm is, and which envelope it has. Or when birds migrate in autumn, the wild geese sometimes break formation, flying in nonperiodic patterns. Or think of the distribution of the leaves on a tree; you could change the position of all the leaves and it wouldn't change the tree at all (Cott, 1974, p. 68).

Later he develops this further:

You can put [sounds] together at any speed, density, or distribution in a given time and space field of the audibility range. You can produce a structure and relate it to any natural event. You could, for instance, distribute sounds the way the leaves on a tree are distributed" (p. 71).

A more poetic use of mapping is simply to use a stimulus such as a visual scene or work of art in another medium and then freely "translate" the concept or image to the sonic realm. This may or may not involve a temporal matching from one medium to another. For instance, if the stimulus were the image of a flowering garden on a sunny day, the notable characteristics of the image are neither auditory nor temporal. Therefore, it would necessitate a much freer kind of association, dependent for its specifics on the particular predilections of the composer. Several of my own compositions are based on natural phenomena, often revealed by their titles. In Underground Streams and Spring Thaw, for example, I was thinking about the behaviour of water in melting ice, brooks, eddies, etc. which suggested various treatments of pitch, dynamics and rhythm at several levels, from foreground detail to large-scale formal structure. In such cases, my thinking about the water would simultaneously conjure up visual and auditory images of brooks and rivers, as well as non-image-based thoughts about their behaviour and ways in which that could contribute to the musical design. This imagery would give way to more strictly musical considerations when appropriate.

Mixed metaphors

Such versions of mapping provoke substantial cross-modal imagery, and often wander from one image to another. Ligeti, whose talk about music is extremely rich in visual and other imagery, expresses an approach which seems to embrace both this poetic association and Xenakis's view when he describes a particular passage as being "rather like the slow, gradual transformation of the molecular state' of sound or the changing pattern of a kaleidoscope" (1983, p. 39). In a similarly "mixed imagery" comment (p. 60), he discusses Continuum: "The initial minor third is slowly blurred by the appearance of other intervals, then this complexity clears away and gradually a major second comes to dominate." Later in the same conversation he remarks "My general idea for that movement was the surface of a stretch of water, where everything takes place below the surface. The musical events you hear are blurred; suddenly a tune emerges and then sinks back again." On the "technical process of composition" he says that it is "like letting a crystal form in a supersaturated solution. The crystal is potentially there in the solution but becomes visible only at the moment of crystallization...[producing]...supersaturated polyphony... My aim was to arrest the process, fix [it] just at the moment before crystallization.(1983, p. 15)" Berio likewise exploits mixed-imagery metaphors when, talking about Circles (1985, p. 144), he says: "I grouped the instruments around the text, reflecting the phonetic families so that the sound is sometimes short-circuited and explodes." In speaking of his First String Quartet, Carter says:

the Adagio... [displays a] strong opposition between the soft, muted music of the two high violins and the loud, vigorous recitative of the viola and cello...while the Allegro scorrevole is a reduction of the typically diversified texture to a stream of sixteenth notes with a seven-note theme, fragmented into diversified bits that form a constantly changing mosaic. (p.71)

Stockhausen also speaks of differentiation of musical layers in imagery terms, but is more firmly abstract, though quite deliberately mixing the metaphors:

nowadays I even want to compose pieces where you have one layer which is completely static and another which is then moving with a clear direction toward a climax and a third layer which is epic, like telling you something but not aiming at a certain end--narrative." (Cott, 1974, p. 35)

REFLECTIONS / SUMMARY

While trying to create convincing illusions of line, space, mass, and movement, it is natural to consult one's knowledge about the physical world and the relationship between the behaviour of objects, beings, and processes, and the sounds they emit. Admittedly many composers work on their compositions much of the time in "purely" musical terms, working out problems of harmony and rhythm in a way similar to that of a mathematician solving equations. However, even when working on a less associative level, a composer may still depend upon non-aural images for thinking about music. Notation, graphic sketches, analytical symbols and visual patterns are all very useful and efficient coding systems, so many composers supplement the auditory image with a visual correlate, which may be written down or retained as a purely mental image.

It is interesting to note that new technology is contributing images that are useful to some in the mental organization of their sonic designs, suggesting that imagery can be a dynamic element in the composer's development. As one gains experience in formulating musical ideas and translating them into physical reality, one can also improve the mental manipulation of the material through auditory, visual and cross-modal imagery. The discovery of particularly fertile correlations between the imagery and the sonic designs can in turn stimulate more flexible and powerful organization of the sounds. As one of the most difficult aspects of composing, for many of us, is not the formulation of basic musical ideas but rather their refinement and subsequent notation onto paper, anything that can facilitate that process is treasured. The appropriate use of imagery can help retain the essential characteristics of the idea while the necessary details are chosen which will permit the full expression of those ideas into music.

The use of imagery in this process seems extremely variable, but it is clear to me that all types of imagery are used by some composers, and some types of imagery by most of us. The metaphor of the sonic object was found very useful within the context of electronic music (e.g. Schaeffer, 1966), where the concepts of melody and chord were inappropriate, and also proved helpful in perceptual issues of distinguishing objects, or auditory images, and identifying their boundary-forming characteristics (Bregman, 1990; McAdams, 1982, 1984, 1987). As with so many of our metaphors in music, "sonic object" and "auditory image" have obvious roots in the visual field; not only the words themselves but also the Gestalt principles which had a significant influence on the refinement of the concepts. Despite the static qualities of most objects in the physical world, the sonic object embodies dynamic concepts, as explicit in Godøy (1997a, 1997b, 1998). However, on the whole the metaphor is applied to smaller rather than larger units. One of the most resonant

terms I have found in the discussion is McAdams' "coherent behavior" (1987, p. 39), which he stresses is open to hierarchical structuring. Behaviour suggests to me a clear link to the physical world, where everything has its own properties and behaviour, be it a human, a volcano, or the moon. It implies not only the passage of time, but also the probability of change, whether development, growth and decay, modification, minor fluctuation, etc. The limits of the amount of change which an object will experience/delineate are within boundaries often recognizable only through observation. I am again led to the metaphor of characters, beings, objects, and phenomena existing in an imaginary world created by the composer for the listener's and performer's exploration. Xenakis explains that his explorations in musical composition grow out of an "overriding need to consider sound and music as a vast potential reservoir in which a knowledge of the laws of thought and the structured creations of thought may find a completely new medium of materialization, i.e., of communication" (1971, p. ix). He continues (p. ix): "the quantity of intelligence carried by the sounds must be the true criterion of the validity of a particular music." This approach presents a fascinating argument in favour of creating music that simulates aspects of our physical world: not only for reasons of perception, but for refining our thinking about the world in general. It is interesting that Xenakis's use of stochastic organization, like Ligeti's and Stockhausen's, grew out of a dissatisfaction with serialism, a mid-twentieth-century development in music that used numerical series to govern the choice of musical parameters. The failure of serialism was largely a perceptual problem, and it cannot be coincidental that these three renowned composers returned to methods of organization that related directly to models from the physical world. Our perception evolved to understand the physical world; our perception of musical illusions is still limited by its upbringing.

  I am encouraged by Johnson (1999) to embrace metaphor as a potent tool for understanding music, and our relationship to it. (7) I propose a metaphor to describe the phenomenon of any musical composition: the performers as puppeteers who help present the composer's designed fantasy world, moving the themes and gestures in convincing ways so that they appear to be emitted by imaginary physical beings, objects and phenomena. The idea of melodies being moved by puppeteer musicians may seem more complicated than the usual one of melodies which move by themselves, but since the latter resists explanation, it may be easier to think of musical gestures, phrases and textures as being the product of sophisticated sleight of hand which is reproducing images of physical sound sources, whether familiar or novel.

  Thus a composer's imagery, while thinking about music, may contain vestiges of visual, kinaesthetic, auditory, and even visceral aspects, even though the intended musical configuration is meant to be an abstract sonic design. It probably is an unnatural act to attempt to dissociate the sound from the sound source, and although art is often artificial, we should not be surprised at the evidence of the props when examining the back stages of the production.

  This paper has not offered conclusions, but rather a survey from an "insider" in a field that has understandably been shrouded in mystery--semi-conscious artists, not always verbally articulate or consistent, creating ephemeral designs whose trace lasts only in the memory of those who have the information to decode what they hear. The survey is not all-encompassing: the composers about whom I have read and with whom I have talked do not create a fully representational group. I have focussed on 20th-century composers, as I feel most secure with understanding their language and context. Jazz has largely been ignored, not because of any lack of interest but because the issues are different, and probably more complex; not only is much of the composing done in real time, but it is typical to have joint collaborations in the creative work. In addition, those who are composing in non-Western cultures have not yet been considered; an extreme sensitivity to differences of culture would be required to avoid posing questions which are culturally specific – even the identification of one individual as composer can be a foreign concept. Despite these omissions, I hope that the

information presented here will help those who are in a better position to analyze and contextualize to understand something of the magnitude of the complexity of the issue of auditory and cross-modal imagery in composition. It's a complicated job, creating effective illusions of imaginary sonic objects moving through time, but according to all those involved - composers, performers, and listeners   it seems worth the effort!