

*Being and Going*  
*for George Perle's 80th Birthday*  
Paul Lansky

In his book **Twelve-Tone Tonality** George Perle quotes Schoenberg's statement that the row was "...invented to substitute for some of the unifying and formative advantages of scale and tonality..." and that it is also intended to "function in the manner of a motive." [1] Perle's quote is in the context of his expression of dissatisfaction with the conceptual basis of Schoenberg's system, as well as his subsequent confusion about his own initial thoughts on the matter. Both Schoenberg's and Perle's explicit comparisons of their systems to tonality is fundamental to their conceptions, but Perle's dissatisfaction with Schoenberg's thinking, which led him to formulate his own approach, not only reveals a different conception of composition, as one would expect, but probably also a different view of tonality. Despite their differences, however, both composers see tonality as a critical and central concept--many of the important structural aspects of Perle's system are metaphorically, and sometimes even literally based on tonality--they view the relation of their own methods to tonality as an obvious virtue. On a more superficial level, since Schoenberg's time, many have tended to view tonality as a monolithic, unambiguous and relatively well defined concept, in distinction to 'atonality', 'non-tonality', 'microtonality', 'dodecaphony', etc. There seems to be the sense of a binary classification: either a piece is tonal, or it isn't, and the difference should be obvious. Compositional movements, cliques, organizations, granting agencies, careers, and armed camps have been created, often with little more than these kinds of categorizations to guide and differentiate them. While it is obvious that this kind of thinking is simple-minded and fails to account for most things composers take seriously about their own music and the music of others, it is a persistent notion which unfortunately percolates upwards through many more important and consequential concepts.

In order to make things a little more complicated, and interesting, I am going to attempt to create an orthogonal perspective which embraces a spectrum of possibilities. Rather than distinguish between 'tonal' and 'atonal', or between 'diatonic' and 'dodecaphonic', I am going to look at music in terms of two concepts, which I will call *implication* and *reference* [2] . These are not mutually exclusive and generally interact in different ways, creating threads of understanding and perception. *Implication* refers to the ability which a note, chord, passage, or some pitch/rhythm configuration has to *imply* some other notes, chords, etc., either consequently, simultaneously, or previously. Familiar examples of this are suspensions, resolutions, progressions, sequences, voice-leading rules, cadential patterns, motivic connections, etc. Whether or not the consequences of implications are realized is not important--the absence of realization is often just as significant--consider the familiar phenomenon of leaving a note or chord 'unresolved'. By *reference* I mean the listener's ability to relate a note, chord, passage, etc., to a more abstract concept, such as a collection of pitches, or pitch-classes. The concepts of 'key', 'scale' and 'collection' are familiar forms of *reference*. A dyad in a traditional tonal piece, for example, often expresses referential qualities which help define a context, and usually depend on context as well. We frequently hear a tritone, for example, refer unambiguously to a single scale since there is only one tritone in each scale, while a perfect 5th needs other notes to disambiguate itself. Furthermore, reference colors our perceptions of notes. If our context has been established as

C major, for example, when we hear the notes E and B, their qualities are colored by their positions as the 3rd and 7th notes *in reference to* a C major scale. Note that there is a modal distinction between *reference* and *implication*. While a tritone can *imply* a key, when we talk about *reference* in this respect we are not talking about actually playing some other notes as a result of having played a tritone, instead we are just noticing our ability to refine our sense of place. Another way of looking at it is that *implication* tells us something about where we are going and where we are coming from, while *reference* tells us where we are, helping us get our bearings. It is obvious that when we arrive somewhere, our journey has a powerful influence on our perception of the characteristics of the place to which we have come, but it is not always the case that the journey implies the destination. Furthermore, in most theories of classical tonality, reference and implication are tightly coupled, and virtually indistinguishable. Most of our experience with this music tells us, for example, that it is very difficult to distinguish between the quality of being a leading-tone (its referential flavor), and the behavior of a leading tone (its implicative, time-based tendency). It is an eye towards 20th century music, however, that prompts the development of this dual perspective since I will assert that the ways in which reference and implication interact lie at the core of many of the real distinctions between a lot of contemporary music and traditional European tonal music, rather than the use of diatonic collections or aggregates, triads or hexachords, or whatever. In this sense it is useful to look back through these lenses, perhaps developing a perspective on tonality via the methods of contemporary musical thought, and consequently chip away at the conceptual gap between tonality and what has followed it.

Chopin's C minor Prelude, example 1, has a famous ambiguous note in the 3r

Example 1  
Chopin Prelude in C minor, Op. 28/20.

measure. In the autograph score the final E in the right hand is left without an accidental so it was often assumed that it was an E natural, since this is what the previous E is. According to the Paderewski edition Chopin corrected this in a pupil's score, but the mistake has persisted in many editions [3]. In my experience, children often play a C major chord, while adults play a C minor chord (maybe children just use crummier editions). Both choices tell us something about implication and reference and each has a significant effect on the piece we hear. I prefer E flat for several reasons. First, a C major chord on beat 4 of measure 3 partially reflects backward as the dominant of the F minor chord on beat 3, which has just been tonicized, and it also seems to prolong a 'C-major-with-F-minor-neighbor-chord' color. A C minor chord, on the other hand, implies a more emphatic motion forward to the downbeat of measure 4 through the chromatic shift from E natural to E flat and the contrary motion of the outer voices, more successfully reinforcing the two-measure phrasing Chopin now requests.

Second, a C minor chord allows the previous, tonicized F minor chord to assert itself more aggressively and independently--rather than merely as a neighbor chord to a pair of C major chords--and be heard as the culmination of a downward arpeggiation of an F minor triad (C in measure 1, A flat in measure 2, and F measure 3) leading to the dominant, G, in measure 4. Finally, a C major chord creates a two-measure stretch in which all but one of the chords are major, marking these measures in more specific distinction to the rest of the piece and slowing down the forward motion. It also makes measure 4 seem to mimic measure 3, thus further destroying the sense of a two-measure phrase.

I'll go out on a limb now, and assert that a choice of E natural leans towards a more *referential* sense of the passage while an E flat is more *implicative*. E natural tells us that we are in a major mode for a while and we needn't particularly care about where we are coming from or where we are going. E flat, on the other hand carries many more *implications* about what is going to happen and what has happened. E natural also makes the C minor chord in measure 5 more startling--the referential sense shifts suddenly, while E flat is more heavily *implicated* in the flow of the piece. In short the choice of E flat or E natural depends on whether the listener prefers an implicative reading over a referential one. Perhaps children, whose long range hearing is less sophisticated, are more inclined to grab onto a palpable point of arrival and a clearer sense of reference--a student once told me that he liked the E natural because it created a specific 'mood' at that point--while more sophisticated listeners are more attuned to the forward motion and continuity of a piece. This limb is starting to groan, however, and I'd better back off before I go plummeting to the forest floor.

Let's take a moment to consider the experience of listening to Blues from this perspective (begging forgiveness in advance for subjecting Blues to such furrow-browed theoretical scrutiny). Implication and reference function in rather clear and easily distinguishable ways. Implication certainly has a heavy meaning in this music since at any moment, by virtue of our sense of where we are in a standard Blues pattern there is a powerful feeling for what is to come next, and it is quite typical for a good Blues player to use this, sometimes delaying arrivals, emphasizing points, making subtle changes, and so on. Reference, however, has an equally powerful and central role. We know where we are at all points through our extensive experience of the form, and we don't particularly worry about where we are going. We locate ourselves comfortably in the flow, referentially, and having found the focus of the moment are content to observe the action, allowing us, and the performer, to concentrate on other matters more central to the music: words, pitch inflections and bends, instrumental skills, improvisation, rhythm, instrumentation, etc. In much minimalist music reference has a similar and even more specifically focused role as it allows the listener to concentrate on the inner workings of complex patterns of repetition.

Stravinsky's **Serenade in A**, example 2, has been the subject of some interesting

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IGOR STRAVINSKY  
1925

## HYMN

Maestoso  $\text{♩} = 58$

ben articolato

smile

10

p

f come prima

Example 2

Igor Stravinsky, Hymne, Serenade in A  
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Example 2  
Igor Stravinsky, Hymne, **Serenade in A**  
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and thoughtful analytical investigation [4]. The piece opens with robust F major music in which there is a heavy focus on A through registral placement and octave duplication. Despite its triadic and diatonic color, there are some anomalies which seem to create unusual

premises--something seems to be telling us to put on tonal ears but not to take them too seriously. While *referentially* speaking, the notes in the opening are culled from an F major scale, it will be more productive to use the cycle of 5ths as a syntactic base. From this perspective we notice some interesting things. First, most of the pitches in the first five measures are not only from the F major slice of the circle of fifths (B flat, F, C, ... E), but only use a 6-note segment of the cycle (B flat ... A). There are no E's until measure 5 so the defining tritone of F major, B flat-E is never given an opportunity to solidify the perception of an F major collection, and when the E does finally enter in measure 5 it is mainly in connection with an A minor chord. There are several B naturals in the bass, moreover, which seem to be peeking sharpward in the circle of fifths, and their brief duration creates referential ambiguities, gently implicating an A minor/C major collection and preparing the arrival at A minor in measure 6. In short, Stravinsky's choices subtly color our referential perceptions of the passage so that there is a wonderful ambiguity with respect to the tonal context, allowing him to create a unique color around A by subtly adjusting the referential palette. In measure 7 what was previously a clean F major color in measure 1 is now smeared with D minor, as if Stravinsky is drawing the referential base more evenly across the F major stretch of the 5ths cycle. As this phrase draws to a conclusion in measure 14, where it finally reaches an A major chord, the reference reaches even further sharpward in the 5ths cycle to a D major collection (G,D,...C#). Again Stravinsky is careful to be referentially ambiguous with respect to A major by emphasizing G rather than G# and by landing on an A major chord with C# in the bass.

George Perle has alerted me to an interesting questionable note in this passage. In the original edition, the first B in the left-hand in measure 13 has no accidental in front of it, and Stravinsky himself plays it as a B natural in his recording. In the most recent edition, edited by Soulima Stravinsky, this has become a B flat, and most pianists have always played it as a B flat, maintaining the motivic connection with the previous measures. I prefer a B natural because of its relation to the sharpward referential crawl which is taking place as B natural makes its first explicit appearance in the right hand in measure 11, and then, as the phrase is repeated, F# enters in measure 12. B natural in measure 13 then clicks the shift more firmly in place, particularly as we then get an F#-C tritone in the outer voices on the fourth eighth note. Perle prefers B flat. His view is that it implies a more consistent sharpward crawl. [5] Perhaps he is hearing more implication in the passage while I am hearing it in a more referential sense, with sudden shifts of reference which are made lively by hints in shading and color. In fact, I feel that Stravinsky has created a delicate dance of reference in this piece (to add even more metaphors to the fire). While implication is present to the extent that we gain a precarious sense of balance at given moments and are perched gingerly at the edge of a move in one direction or another, the forces at work are such that the richness of the texture is created by a web of referential colors and balances rather than by a compelling force of implication. Diatonic tonality, as such, is more a placeholder than a syntactic basis for this music. If one chooses to read strong tonal implications this would have the effect of throwing a strong bias into the complex set of references and make the music a lot less interesting.

George Perle's system of *Twelve-Tone Tonality* (TTT) , [6] is predicated on the idea that a dyad is referentially located in a series of hierarchically ordered classes. First, it is a member of an interval class, determined by the difference between its pitch-class numbers, mod 12, and at the same time, it is a member of a sum-class, determined by the sum, mod 12, of its pitch-class numbers. (Another way of looking at a sum-class is that all dyads in a given sum-

class have the same axes of symmetry--there are two for each sum-class, a tritone apart). Next, dyads, as sums and intervals, are situated in an n-dimensional array of sum and interval cycles, and tetrachords are constructed which have a homologous structure to dyads, classified by sums and intervals of their component dyads [7]. The final measure of Perle's 4th Etude from his **Six Etudes**, example 3, provides an interesting case for us to study [8].

Example 3

George Perle, *Six Etudes*, No. 4 (1976)

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Measure 83, which repeats the opening measure of the piece, has a striking figure in the right hand, which begins with an octave D, and in which the intervals decrease in size (12,

10, 7 and 5, in semitones). At the same time, against the right hand's thumb-pedal D, the sums also change ( $D+D=4$ ,  $D+B \text{ flat}=0$ ,  $D+A=11$ , and  $D+G=9$ ). This creates a descending line in terms of the axes of symmetry (D,D is symmetrical to A flat, B flat-D to G flat, A-D to F/F#, D-G to E/F). Other ways of looking at the notes in this measure reveal a persistence of these same sums: the left hand dyads are sums 11 and 4; the top line of the right hand, D-B flat, A-G, and at the end of the measure A-E flat, are sums 0, 4, 0, respectively. Measure 84 begins with a B flat-G flat dyad in the right hand, which, like the D-D octave in the previous measure is in sum-class 4, and the measure ends with a repeated D-D in the right hand, again asserting sum-class 4 (unison dyad). Other dyads in the measure again assert sum classes 4, 9 and 11. Measure 86, following a repeat of measure 83, is now in a slower tempo, and contains a peculiar transformation of the music of measure 84. The right hand of the piano part again begins clearly with a sum-class 4 dyad, B-F, and the left hand has another sum-class 11 dyad, G flat-F (each measure thus begins with a sum 4 and 11 dyad), but the music that follows refers to new sums: B-B, D-C# in the right hand expresses sums 10 and 3, while the parallel music earlier in measure 84, C flat-B flat, D-D, expressed sums 9 and 4, and in the left hand, the sums 3 and 10 are described by G-A flat, A flat-D, as opposed to sums 4 and 9 in measure 84, expressed by A flat-A flat, A flat-D flat. Finally, at the end of this measure there is a two-octave D between the hands, referring again to sum 4, but this is then involved in a move to a sum 3, as the D in the right hand moves to C#.

So, to summarize, in the first three measures of the excerpt the sum classes 0, 4, 9 and 11, are predominant, there seems to be an emphasis on sum class 4, and the intervallic shape of the music implicates a descending line of centers, or axes of symmetry. A new tempo begins with transformed music in which sum classes 4 and 9, move to sum classes 3 and 10. (It is worth noting in this respect that *tetrachordal* sum classes remain constant in the move from 4/9 to 3/10--they are both in *tetrachordal* sum class 1.)

Measure 87 then repeats the second and third beats of measures 83 and 85, except some sum 4 and sum 9 dyads are replaced by sum 3 and 10 dyads. Measure 88 transforms measure 86, replacing sum 3 and 10 dyads with sum 2 and 11 dyads, and in the final measure Perle again transforms measure 88 so that sum 1 and 0 dyads replace sum 2 and 11 dyads. (All these transformations keep tetrachordal sum class 1 constant.)

The overall scheme therefore keeps sum 0 and 11 dyads constant while the music progresses through sum 4 and 9, to sum 3 and 10, to sum 2 and 11, to sum 1 and 0 dyads. The most succinct expression of these can be seen as the right hand at the ends of measures 84, 86, 88 and 89, plays D-D, (sum 4), D-C# (sum 3), D-C (sum 2) and C-C (sum 0), while the left hand at the same time plays A flat-D flat (sum 9) A flat-D (sum 10) A flat-E flat (sum 11) and B-C (sum 11) followed by an octave C (sum 0) in the right hand at the end of the piece. The octave Ds (sum 4) which begin the passage, and occur elsewhere in the piece, thus lead to these octave Cs.

It should be clear therefore that there is a straightforward referential character to this music. At each point in time, we understand the content of a passage in terms of a consistent representation of sum classes and tetrachordal classes. What is interesting about this passage is that while reference is in terms of sum class, implication seems to be created by interval class. (The TTT does not have a natural bias in this direction. I read this case as a result of Perle's compositional choices--I think most of his pieces lean in this direction. It would, however, be quite consistent with his system to flip these roles, making intervallic similarity the basis for reference and sum class the basis for implication, or even to mix them up.) As

we compare dyads which are decreasing or increasing in size, a process is implicated by motivic means through which we can get an idea where we are going and what is implied to come next. In other words, the contents of each section is referenced by sum, and the progression from one section to the next is referenced by the difference of sums, i.e. interval, and this progression creates a process which brings implication into the picture.

In these terms then, the difference between tonality and its successors is viewed through the ways reference and implication interact rather than in terms of the differences between diatonic and a non-diatonic pitch-worlds. The 'tonality' which is so often seen as living on the other side of a large gulf is here regarded as embodying a syntax in which there is a particular kind of functional relation between reference and implication. By applying these concepts to musics on both sides of the divide, however, the chasm looks a lot less formidable and meaningful. It also brings some so-called 'tonal' music being written today into a more reasonable relation with other trends. Perhaps this is what Schoenberg was talking about when he said that there were many more good pieces to be written in C major. Or, perhaps not...

#### *Personal Note*

My use of these concepts is obviously biased towards music in which pitch plays an important role, (although it is not clear that they couldn't be extended to other areas) and in which reference and implication interact. I see it, therefore, as an expression of a particular musical point of view, and as such, it helps me to understand some of the reasons behind my dissatisfaction with the 12-tone system, why Perle's approach first attracted, but ultimately failed to capture me, and it tells me something about how I have tended to compose for the computer.

First, I feel that the 12-tone system is overly dependent on reference and has weak implicative potential. Most of the well-known techniques, such as combinatoriality, are effective at telling us where we are at any given point, allowing us to make connections and associations between spots, and create clear transformations which, to my ears, have the main effect of shifting reference, but with an ineffective and artificial sense of implication. I simply don't like the way in which relations between moments are formed by comparing points of reference. Proponents will probably say that I am expressing a simple-minded view of transformation and of the 12-tone system, but I think I am simply saying that I do not hear the implicative sense of most classical 12-tone transformations, and consequently don't see the 12-tone system making a compelling case for interaction between reference and implication. While it is unfair to generalize, particularly about a compositional approach which has so little to say about its implementation--and in which there are a number of great pieces which sensationally contradict my view--I'm probably simply expressing a prejudice against a more formal interpretation of the system, which is how I would proceed, were I to use it.

Second, Perle's system holds a lot of attractions, particularly in the ways in which using it means inventing your own trail of references, and the hierarchies created by the intersections of sum and interval set up the potential for tracing similar paths of implication. Here I do think that a strong case can be made for the potential for interaction between reference and implication. In the landscape in which I find myself working, however, it is, in fact, the power and beauty of the system which turns me away. I have difficulty reconciling a lot of the issues which engage me in computer music in particular, with a set of premises in which the qualities of pitch-class are so central, critical, and articulate.[9]

The tales I want to tell in computer music often involve a language in which the 'verbs' and 'nouns' arrive with a rich set of references, and in which qualities of pitch are often more usefully thought of as 'colors of the moment', such as the contours of spoken language, the sounds of the real world, the particularities of some spectral shape, rather than as interpretations of a complex system of pitch-class relations. To this end I have found myself, on one hand, often backing away from the construction of rich tales of pitch reference and implication, as I would design were I using Perle's system, and instead building relatively simple pitch-worlds. In some cases the specifics of these pitch worlds descend directly from the qualities of pitch in the source material, and in other cases my pitch constructions are designed to complement and extend them. This is coordinated with the construction of complex timbral and rhythmic textures amidst which the listener can browse without being led by the nose through complex pitch tales. In other words, I am not assigning pitch-class the lead role in the story I am telling--it is basically a member of the chorus--and I often find myself gingerly orchestrating its qualities of reference and implication in careful coordination with other musical matters [10]. Perhaps another way of looking at this is that simple tales of reference and implication are all the more powerful because of their ability to interact and share the spotlight with other aspects of music, somewhat akin to the theory that great poetry is not best for setting since it often refuses to share the stage with musical matters, while lesser texts and music can more easily combine to greater purpose. (I think I just heard a branch snap.)

Another issue at work here is that when listening to recordings of real world sounds, such as I sometimes use as source material, I think that our manner of hearing is largely referential. Since there is no threat (could this be interpreted as implication) in listening to a recording--we don't have to worry about whether the cars on the tape will actually hit us--we spend much of our energy in decoding the sounds and creating a frame of reference rather than inventing or imposing our own musical context. (Since I'm already out on a limb, I'll suggest that this is why a Cage-like dialectic also fails to convince me--the sounds are incomplete music to *my ears*.) What I think I am doing then, as a composer, is to reintroduce 'danger' by imposing music on these sounds and using music's world-building abilities to create qualities of implication, suspense, perhaps even fear--making the sounds of the cars fill us with dread, joy, or whatever.

Well, I think I'd better stop here since the branch has broken and I need to clean off the leaves and dirt...

#### **Notes**

1. George Perle, *Twelve-tone Tonality*, p. ix, (Berkeley: University of California Press, 1977), quoting Arnold Schoenberg, *Style and Idea* (New York: St. Martin's Press, 1975) p.219.

2. While the following text deals with theoretical issues, I make no claims about my qualifications as a theorist, and instead urge that my views be read as the theoretical speculations of a composer. While this may seem to be an attempt to get myself off the hook, I'd prefer to think that this position will have the effect of allowing my points to be viewed from a more productive perspective. I am aware, furthermore, that matters of expectation, implication, etc., have been, and are currently, of lively concern to theorists such as Meyer, Narmour and others. My use of these concepts is intended to be understood in a much more general sense, and not as any sort of attempt to build, or even lay the foundations for a theory of implication.

3. Fryderyk Chopin: *Preludes*, ed. I.J. Paderewski et alia, Warsaw, 1962, p. 82.
4. Arthur Berger, "Problems of Pitch Organization in Stravinsky", *Perspectives of New Music*, Vol.2/1, Fall-Winter 1962, pp.11-42.
5. Personal correspondence, 7/31/94.
6. Perle, *Twelve-tone Tonality*. Also see my dissertation *Affine Music*, (Princeton University, 1973).
7. The classification of tetrachords is much more central to my view of TTT than it is to Perle's.
8. Perle discusses this passage in *Twelve-tone Tonality*, p.148. The observations made here are based on his discussion. I abandon his p/i distinctions, however.
9. After working together intensely for three years between 1969 and 1972, the point at which George and I seemed to diverge coincided with the real beginning of my work in computer music. I wrote one computer piece, *mild und leise*, in 1973, which uses TTT, but it seems, in retrospect, that my dissatisfaction with that piece has a lot to do with the extent to which TTT is calling the shots, while some of the particular capabilities of the computer medium are held at bay.
10. In my speech pieces, *Idle Chatter* (Bridge CD 9050) and *Smalltalk* (New Albion 30CD), for example, I found that it was necessary to use simple, diatonic pitch configurations in order to allow the listener to make sense of very complicated timbral and rhythmic textures. In composing the pieces I found that more complex pitch stories had the effect of confusing the focus. On the other hand, in *The Lesson* (Bridge CD 9050), a piece in which the text is more consequential and serious, and easier to hear, I found that a more heavily implicative and referential, chromatic pitch-syntax was effective.

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