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What to Think About When You Conduct:
Perception, Language, and Musical Communication

Lee Humphries

Introduction

During the 1968 primary campaign, a group of business leaders asked candidate Eugene McCarthy why he was qualified to be President of the United States. He replied that when you got right down to it, probably nobody was qualified.

The same goes for conductors: Probably nobody has the complete set of skills the job calls for. Yet, some people still want to do it. If you're one of those, you're going to need a plan of action.

In this essay, I'll propose a way to go about it, an approach that I arrived at over a number of years while conducting various professional ensembles in performances of new music. The approach is based not only on musical structure, but also on psychological and linguistic structure. In that respect it is somewhat unusual.

I am grateful to the many fine players who served as guinea pigs while I surreptitiously slipped little musical experiments into the rehearsal, trying to discover what subtle aspects of conducting they were unconsciously responding to. I am also grateful to the many composers whose interesting works provided me a wealth of novel conducting problems to come to terms with.

Part 1
Perception

Hearing Difference

Let's begin by noting that all the information in a score isn't equally important. As you prepare for rehearsal, you need to distinguish among the score's various features and determine their relative significance. This is the first step in building a useful mental image of the work. That image—filled out and refined over the course of score study—will guide you in organizing the rehearsal and gauging the ensemble's progress.

Difference and attention. Listening to music is an act of perception. The mechanisms of perception are highly relevant to conducting, so I'll take a few paragraphs to discuss them. Then I'll show you their application to score study.

The fundamental unit of perception is *difference*: the difference between simultaneously occurring phenomena, and the difference between phenomena separated in time. Each perceived difference is a psychological event.

Our fundamental response to difference is *attention*. Music holds our attention with its ongoing flow of parametric differences—temporal, metric, rhythmic, melodic, harmonic, tonal, textural, formal, dynamic. These differences take place at all levels of musical structure and vary in their attention-capturing potential. But what determines that potential? To answer this, let's look at how we make sense of incoming data.

To find meaning, we spontaneously conduct an internal search, looking for a *mental framework* in which the incoming data plays a concordant role. This operation is usually carried out in a split second. The result is a foreground-background structure of "role-within-framework," which makes up our mental organization of the moment.

As more data arrives, we're likely to encounter some new element that doesn't fit our current framework: it has no role there. This lack of fit triggers another search for a different mental framework where it *can* play a role.

The amount of attention we pay to an element is a function of its incompatibility with our current mental framework. The greater an element's potential for reorganizing our framework, the more attention it commands.

This psychological principle is of the utmost musical importance. It is the key to identifying the compositional elements that will dominate the listener's attention. And it is the perceptual foundation for effective stick technique.

Levels of attention. The events that attract the most attention are those which have no role within our current framework—which make sense only when our existing framework is *replaced* with a different one. They have a quality of surprise about them. They are novel, unexpected, discontinuous. Some musical examples are: a change of tempo with no mediating accelerando or ritardando; an change of dynamics with no mediating crescendo or decrescendo; a shift of tonal center with no mediating modulation; a change of texture, register, instrumentation, meter, phrase structure, articulation, scale, harmonic style.

The events that attract moderate attention are those which become meaningful when our current framework is retained, but *modified*. They have some novelty, but are felt to be a logical extension of what has preceded them. They contribute to a sense of progression and growth. Some musical examples are: tones that extend the boundaries of the melodic range; crescendos or diminuendos; accelerandos or ritardandos; modulations; systematic changes in rhythmic density; systematic addition or subtraction of instruments.

The events that attract the least attention are those which *reinforce* our current framework. They lack novelty and fit smoothly into the existing mental organization.

The most significant musical event at any point in time is the one that most challenges the listener's current mental framework.

The limits of attention. There is a limit to the speed at which we can repeatedly shift our attention. The maximum rate at which a conductor can give cues and/or transmit expressive details is an absolute value, independent of the tempo of the music. Experience has shown me that this is approximately one instruction per half-second. At mm. = 120, that amounts to a cue every beat; at mm. = 60, two cues per beat. But this value is an upper limit: it is difficult to sustain for more than a few measures without making yourself dizzy and drowning the ensemble in excess information. A more comfortable rate for both conductor and ensemble is one transmission every one to two seconds—allowing for momentary increases or decreases in the rate when called for by the music's structure.

You can apply this concept to score study in the following way. First, find a *base rate of attention shifts* with which you are comfortable—say, a shift of attention about every two seconds. Then, taking the tempo into account, find a logical metrical unit that approximates this time span—perhaps a half-measure.

Marking differences in the score. Go through the score, and for each half-measure (or other appropriate unit) determine the most attention-commanding difference contained therein— the most important change in the music. It might be an instrument's entrance, a *sfz*, an increase in rhythmic activity, a chromatic alteration, a change in melodic direction, an irregular resolution. The possibilities are endless.

Mark each significant difference in the score. I recommend the following method. In the appropriate instrumental part, mark the specific beat where the difference occurs. Do this by writing that beat's number there in red pencil. For example, if the most significant difference is an accent in the oboe on the fourth beat, then write a red "4" there in the oboe part.

Marking the score in this way routes your attention. It guides your eye and ear through the maze of musical information to the dominant event of each moment. In the process, you acquire an image of the score as a *timeline of rhythmic attention shifts*.

This approach also makes your learning more efficient. It saves you from having to figure out the significant differences each time you go through the score. Additionally, it enables you to think ahead during the heat of conducting. You can quickly see where important events will appear in upcoming measures, so you can prepare for them well in advance.

Once you've created this timeline as a conceptual scaffolding, you can incorporate other dimensions of musical awareness into it. We'll consider these next.

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Part 2
Pitch, Color, Rhythm, Tempo

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Hearing Pitch

Pitch is perceived in different ways under different musical conditions. In some instances, its harmonic aspect dominates our experience; in others, its melodic aspect; in still others, its textural aspect. At times the musical fabric is stratified—with harmonic, melodic, and/or textural styles occurring simultaneously.

What we hear depends on several factors: the overall pace of the activity, the number of parts, their contoural and rhythmic independence, their spatial and timbrel proximity, and the number of pitch classes presented per unit of time.

As complexity increases, there is a decline in our ability to hear music as a series of discrete chords. Vertical pitch relationships recede into the background; horizontal pitch relationships move into the foreground.

Beyond a certain point, even the horizontal relationships loose their individuality. Texture reigns supreme, and one hears the musical equivalent of physics' Brownian motion.

A passage's organization determines what you listen for. To effectively rehearse horizontally conceived passages, you need a vivid mental image of the individual lines. This is best developed by playing and singing each part.

To deal with vertically conceived passages, you need a clear image of each separate chord and an understanding of the role each instrument plays in it.

Building a harmonic image. Building a harmonic image of a score isn't as difficult as it seems. Here's a strategy that will do the trick:

- Begin by taking a phrase of music and figuring out what notes make up each sonority.
- At the keyboard, condense each sonority into a block chord. Put the bottom note of the sonority on the bottom of the block chord. Stack the other notes above it in close order so that the block chord spans less than an octave and contains all the pitch classes of the original sonority. (In most cases you'll be able to play it with one hand.)
- Play the series of block chords to familiarize yourself with the progression.
- Arpeggiate each chord from bottom to top to bottom (e.g., C-Eb-A-B-A-Eb-C), then sing the arpeggiation. Use note names, scale degrees, or solfege syllables.
- Play each chord's bass note, and sing its arpeggiation.
- Play nothing; sing each chord's arpeggiation.
- Looking at the score, sing the arpeggiation of a chord; then sing the chord member played by each instrument. Proceed this way through the progression
- At the keyboard, play each sonority as it is voiced in the score. While the sonority is sounding, sing its arpeggiation.

This process develops the harmonic image in a series of small, easy steps. Each step prepares you for the next one. The more you do this sort of thing, the more vivid your harmonic imagery will become.

Hearing Color

The coloristic sound of an ensemble arises from things that are rarely spelled out in the score: attack and release characteristics, speed and width of the vibrato, vertical dynamic relationships, vertical tuning, and unity of execution when two or more players are on a part.

Color is sometimes paradoxical. An instrument's warm, resonant sound can be unsatisfactory within the context of the ensemble if it lacks sufficient edge to cut through the other instruments. Give it some nasality, and it becomes more beautiful in a relative sense by being less beautiful in an absolute sense.

Hearing Rhythm

One of the most useful statements ever made about the perception of rhythm turns up on page ten of Grosvenor Cooper and Leonard B. Meyer's *The Rhythmic Structure of Music*

(University of Chicago Press): "Durational differences . . . tend to produce end-accented groupings . . . ; intensity differentiation tends to produce beginning-accented groupings . . . ; and the proper combination of durational difference with intensity difference tends to produce middle-accented groupings. . . ." This has tremendous implications for musical performance.

If players put undue dynamic stress on a note that is located on a weak beat (or on the weak part of a beat), they will disrupt the underlying meter. Specifically, the stress will create a beginning-accented grouping whose strong and weak elements are out of phase with those of the meter.

Similarly, if players under-stress an "on-the-beat" short note and over-stress an "off-the-beat" long note that immediately follows it, they will create an end-accented grouping whose weak and strong elements are—once again—out of phase with those of the meter.

Metric disruptions also arise because of inappropriate dynamic relationships *between* instruments. If one instrument's on-the-beat note is under-stressed, it can make another instrument's off-the-beat note sound stressed—creating the illusion that *it* is on-the-beat.

These are common problems, even in the best ensembles. They are brought on by our natural tendency to emphasize notes having formal importance within the phrase (e.g., first notes, highest notes, longest notes) and to de-emphasize their neighbors.

The ability to distinguish subtle dynamic differences is critical in maintaining metrically appropriate rhythmic groupings. *An accurate image of rhythm incorporates an understanding of dynamic, as well as durational, relationships.*

Hearing Tempo

Setting the tempo. The maximum and minimum tempos at which a piece can be played are determined by its most difficult passages. Although these passages may last only a measure or two, if you set a pace without taking them into account, disaster will meet you around the corner. Either the strings will capsize trying to negotiate a raging torrent of presto thirty-second notes, or the trombones will sink into blue-faced oblivion trying to sustain a tied string of largo whole notes.

Once you've decided on the appropriate tempo, your next problem is to feel it each time you begin. It's easier to remember a tempo within a musical context than to remember it in the abstract. So practice setting the tempo by first recalling the musical passage in which it appears. When you think you've found the right tempo, get feedback from the metronome. If you use the metronome for *correction, not direction*, you'll shorten your learning time.

Changing the tempo. You can master the shift from one tempo to another by understanding their mathematical ratio. Suppose the work begins at **QUARTER = 80**, then switches to **QUARTER = 60**.

- Make a fraction of the two tempos; put **TEMPO I** in the numerator, **TEMPO II** in the denominator: **80/60**.
- Reduce the fraction: **80/60 = 4/3**.
- Divide **TEMPO I**'s beat by the fraction's denominator: **QUARTER ÷ 3**. **TEMPO I**'s beat is now divided into three units (i.e., triplet eight notes).
- Four of these units equal the beat in **TEMPO II**. **FOUR** is the fraction's numerator.

When the mathematical ratio of the tempos isn't reducible to an easy fraction, an approximation of the ratio may be just as good. Say, **TEMPO I** is **QUARTER = 63** and **TEMPO II** is **QUARTER = 80**. The fraction **63/80** won't reduce, and you can't think eighty units per beat.

But **63/80** approximates **63/81**, which reduces to **7/9**. Better yet, **63/80** also approximates **64/80,** which reduces to **4/5**. The latter is preferred—it's simpler to divide the beat into 5 units than 9 units. So again, divide **TEMPO I**'s beat by the denominator, **5**. And multiply the resulting unit (i.e., one-fifth of a beat) by the numerator, **4**. The four units satisfactorily approximate the beat in **TEMPO II.**

Part 3
Language and Perception

Few of us realize the extent to which language filters our experiences and prescribes our responses. Language is hypnotic. Every sentence is an indirect suggestion. Its vocabulary, syntax, and vocal characteristics evoke a mental framework that brings certain perceptions to the foreground of our awareness.

These perceptions, in turn, shape our behavior. Behavior is metaphoric, a physiological representation of the meaning we ascribe to our perceptions.

Every time you say something in a rehearsal, you orient the players toward one set of perceptions and responses—and away from another set. Let's examine this further.

Reinforcing solidarity. There is no doubt that an ensemble plays better when everyone shares a feeling of community and common purpose. The language environment subtly reinforces or undermines this feeling. When you say "we," "us," "you and I," or "you and me," the plural form paints a picture of people functioning as a unit. When you say "I," "me," or "you" in the singular, you present the image of people acting separately. Personal pronouns and conjunctions are psychological fences that symbolically hold people together or keep them apart.

Minimizing resistance. To accomplish much of anything, you must have the goodwill of the players. Goodwill is limited: use it up, and resistance will set in.

It is a fact of human nature that people don't like to be told what to do. Instructing professional musicians is a particularly delicate matter. They have invested a lifetime in perfecting their skills; for many, their self image as a person is deeply intertwined with their public image as a performer. They don't like to appear deficient. But who does?

When you tell musicians to do something ("Play it this way."), you're using the imperative mood, a linguistic construction that commands. And a command puts the recipient in a socially subordinate position.

A negative command ("Don't play it that way!") compounds the problem: it only tells the players what they *shouldn't* do; they are left to infer what they should do. The imprecision of a negative command puts players in the frustrating position of having to meet your expectations without knowing exactly what they are.

You can't avoid giving instructions to the ensemble, of course. But you can do it in a way that takes the edge off.

Use a positive approach. Give the players a clear musical goal to work toward. Say what you want, not what you don't want.

If you are working with competent players, focus your instructions on expression, not technique. Aside from issues of string bowings, wind articulations, brass mutes, percussion mallets, etc., avoid telling them how to play their instruments. Even when you recognize the mechanical cause of a musical mishap, you're likely to get better cooperation if you deal with it in a roundabout way. You might ask the section leader to make a recommendation. (Later, we'll consider nonverbal approaches.)

Insofar as you can, address your corrections to groups of players, rather than to individuals. This makes your remarks seem less personal.

Phrase instructions as questions: "Violins, can we have more bow on these notes?" Now you're asking, not telling.

Put the verb in the passive voice: "Measure four can be played more quietly." This emphasizes the needed change and de-emphasizes (by omission) the person who has to make it.

Eliminate the verb altogether: "A little faster here." This states the desired outcome, but doesn't really tell anybody to do anything. It contains only adjectives and adverbs.

Finally, be aware that your body language and vocal inflections qualify your speech. Players can be put off by *how* things are said as well as *what* things are said.

Increasing sensory awareness. All of us represent the world to ourselves in terms of our senses. Generally we think with visual, kinesthetic, and auditory images. Musical performance skills are founded on the ability to make subtle kinesthetic and auditory discriminations.

Your can encourage such perceptions and influence which sense the players use to process information. Consider two sentences: "Let's play that passage again and see what's going on" and "Let's go over that once more and hear what's happening." On the surface, they seem pretty much alike. But the first is an indirect suggestion to bring visual information into the foreground of awareness, whereas the second is an indirect suggestion to concentrate on auditory information.

Eliciting unconscious insight. As I pointed out earlier, we make sense of a thing by carrying out an internal search for its meaning. This process lies beyond our volitional control: the search is spontaneous, and its outcome is unconsciously determined. Searches for meaning are triggered by such things as ambiguity and incompleteness.

Certain words lack content. They are merely linguistic markers that fill a grammatical slot without providing any concrete information. Among these are the interrogatives "what" and "where." Such words are pathways to the unconscious. Since they lack content, they are ambiguous. And being ambiguous, they trigger an unconscious search to find their contextual meaning.

How do we apply all this to music? Here's an example.

In rehearsal players sometimes encounter a technical problem for which they have no conscious solution; so any breakthrough will have to originate in the unconscious. The breakthrough will likely involve new kinesthetic and/or auditory perceptions—because technique is largely encoded in these sensory modes. Therefore, we enlist the aid of the unconscious by saying something like this: "Where did you feel least comfortable in that passage?"

At first, most players can't answer this question with any precision—proof that part of their experience lies outside their conscious awareness. But on the next playing, the question will trigger some musically significant mental operations:

- There will be a search for the musical location of "where"—a term whose concrete meaning is initially incomplete.
- The search will be kinesthetic because of the words "feel" and "comfortable."
- And comfort, a correlate of facile technique, will become foremost in their conscious awareness. (If you subtly elongate or otherwise intensify the words "feel" and "comfortable" when you say the sentence, you will also send a subliminal message that says, "Feel comfortable.")

I have seen questions like this one—so simple on the surface—lead players to quite unexpected technical advances. The question's potency lies in its capacity to simultaneously initiate an internal search, specify the sensory domain of the search, and elevate that domain into conscious awareness—all in one seemingly off-the-cuff remark.

We make indirect suggestions to help players utilize things they know at an unconscious level, but not at a conscious level. The effectiveness of indirect suggestion depends on the consistency of the messages, the frequency of their repetition, the naturalness of their presentation, and the psychological needs of the player.

We must know what kind of perceptions will illuminate the musical situation, what kind of linguistic forms will evoke them, and how to casually introduce those forms into our remarks at the right moment. Then it's up to the unconscious part of each player's mind to accept or reject a suggestion as it sees fit.

Part 4
Gesture, Troubleshooting, Logic

Physical Gesture

The baton can be more articulate than the mouth. You'll save a lot of rehearsal time if you can clearly show the musicians what you want as they are playing.

What the baton communicates. Your beat pattern ought to be a *visual analog* of the music's structure. Not only should it convey the pulse, tempo, and meter. But it also should show each *unit of expression* and detail its organization.

A unit of expression is a time-packet of emotion. The conducting gesture tells the ensemble about the unit's: (1) duration, (2) loudness, (3) rhythmic organization (i.e., whether the grouping is beginning-, middle-, or end-accented), (4) articulation, (5) continuation into (or separation from) the next unit, and (6) vitality—whether its energy is steady, increasing, peaking, or subsiding.

Each unit of expression is different from the next. As you conduct, you should depict these musical differences by making *analogous visual differences* in your beat pattern. If you do this, the differences in your gesture from moment-to-moment will visually mark the corresponding musical differences, thus calling the ensemble's attention to them.

How the baton communicates. You create gestural differences by manipulating *visual variables*. The most important are: the distance the baton travels within each beat, the speed at which it travels, and the path of its motion.

The distance traveled implies the general level of loudness. The farther the baton travels during a beat, the greater the volume it indicates. When the baton travels an increasingly longer distance in each beat of a series, it suggests a crescendo. When it does the opposite, it suggests a decrescendo.

The baton can be at rest or in motion. If moving, its speed can be constant, accelerating, or decelerating. It can change directions along an angle or a curve. Changes in the baton's speed—combined with changes in its path—convey a wealth of musical detail.

When you clearly stop the baton at each beat, you encourage a detached articulation. If your baton rebounds along a sharp angle and stops suddenly, it implies that the notes end starkly; if it rebounds along a U-shaped curve and stops gradually, it implies that the notes end with a tapered dynamic.

When you interrupt the baton's flow by briefly halting it within an otherwise continuous series of beats, the hesitation will visually separate the material that precedes the halt from the material that follows it.

You can point out the rhythmic groupings within a larger musical structure by subtly decelerating and then accelerating the baton. The cusp between the deceleration and the acceleration visually marks the boundary between two groupings. (Understand that this is *not* a change in the tempo! Each beat still has the same duration. What is fluctuating is the speed of the baton as it travels across the time frame of the beat.)

The beginning-, middle-, or end-accented organization of each rhythmic grouping is shown by varying the beat's size and acceleration to reflect the stressed or unstressed function of the note(s) played therein. The farther the baton travels and the more it accelerates, the greater the stress it implies.

Dramatic line comes about by creating dynamic continuity between the stressed notes of successive rhythmic groupings. If the dynamic difference between successive stressed notes is too great or too little, the line will be broken. To show the dramatic line, the energy change from stress point to stress point should be mirrored by corresponding visual changes in your beat pattern.

It is sometimes said that the beat seen in the conductor's pattern must anticipate the beat heard from the ensemble, otherwise the ensemble won't have time to react. This is not true when you know where you are headed musically and have good control of the baton. Then, the players—by seeing the baton's present speed, rate of change, and path curvature—can predict where, when, and how the baton will end up; and they can play accordingly. We accurately make such judgments all the time when we drive in freeway traffic.

Cues. Cues serve not only a musical function, but a social one as well. Musically, of course, they insure accurate entrances and convey important expressive information. Socially, they link you with the players. When you cue a player you are acknowledging that player's musical role and confirming its importance. You build musical rapport with players by paying individual attention to them as you conduct.

Other gestures. Many problems of instrumental technique can be traced to one or more of these physical causes:
- changing directions along an angular path, instead of a curved path;
- failing to overcome the inertia of the body *before* overcoming the inertia of the instrument;
- initiating motion with the fingers instead of the upper arm; and
- spending more of a note's duration pushing into the fingerboard (or keybed, etc.) than withdrawing from it.

Sometimes you can overcome these causes nonverbally by making subtle body motions as you conduct. For instance, it's harder for a cellist to continue producing a brittle-sounding, finger-driven pizzicato, when s/he sees at each pizzicato your upper arm drawing your fixed-but-passive fingers across some imaginary string. We have a natural inclination to synchronize our body movements to repetitive structures going on about us in the environment. That is what is happening when people unconsciously tap their feet to music.

Troubleshooting

The difficulty of a passage is partly determined by its novelty to the players. An ensemble can get tripped up in a work when it encounters a spot that violates the work's previous compositional norms. These anomalous musical features are significant differences. They can't be anticipated from what has gone on previously, and their sudden appearance in the score disorients the players, who have to search out a new mental framework to get back on track. Look in the score for places where things change abruptly and drastically: a simultaneous change in the tempo and the note value used to represent the beat, an extended syncopation that befuddles the ensemble's perception of the beat, an unusual playing technique.

Equally disorienting are passages that contain a lot of changes over a short period of time: a different meter every measure, shifting groupings within the same meter (e.g., 7/8, where the organization goes from 2+2+3 to 3+2+2 to 2+3+2), a flurry of rapidly changing accidentals, quick pointallistic entrances and exits involving a number of instruments.

Since the ensemble is likely to break down when it first encounters such passages, you'll save time by dealing with them before you try a run-through of the piece.

Logic

Real logic. You can make the rehearsal more effective by addressing musical problems in logical order. Players have to overcome the gross difficulties before they can concentrate on the subtle ones. You can't effectively deal with dynamic nuance or intonation when the musicians are still scrambling to find the notes.

Likewise, give information to the players in the order they will use it. For instance, when you direct players to a place in the score, say something like this: "Go to rehearsal letter C; count back four measures; find beat three." They can't find beat three, until they've found the measure it is in. And they can't find the measure until they've found the rehearsal letter. (Also, put the verb at the beginning of the clause; it makes your instruction easier to understand.)

Implied logic. Every time you redirect the players' attention to a new musical task you tire them a little bit. That's because it takes more emotional energy to set up a new mental framework than to maintain an existing one.

You can minimize fatigue by carefully framing what you say so that the ensemble will perceive your later instructions as a logical continuation of what has been going on—not as an interruption. For example, avoid stopping the ensemble unexpectedly. Warn them ahead of time: "We'll play from letter E to letter F and then stop." That way the stop won't be jarring; they'll know when and where it is coming.

More generally, it's a good idea to *embed clues about the future into statements about the present*: "Before we go on to Movement 3, let's play this passage a couple of times more." Now when they've finished the two playings, going on to Movement 3 will seem logical. Everyone will be expecting it, so they won't have to reorient themselves.

Subtleties like these can make the difference between a pleasant rehearsal and a frustrating one.

Lee Humphries is President of **ThinkingApplied.com**, Minneapolis, MN, where he invents algorithms, analytical techniques, and problem solving strategies.