What Is Conducting? Signs, Principles, and Problems

Morten Schuldt-Jensen
**MOTION, BODY AND PERFORMANCE**

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**Introduction**

Vienna, December 1982.

The Philharmonic Orchestra rehearses the beginning of the slow movement of Beethoven’s Fourth symphony. It is the fourth rehearsal, the first three of which went excellently. But today the conductor is slightly irritated about the motif in the 2nd violins (Fig. 1).

They play too broadly, he thinks, so he comes up with a brilliant idea and says: Play it as you would pronounce the name “Thérèse”.

This word 1) establishes an immediate and relevant biographical rapport to the composer and a probable motivation for his writing this music: Countess Thérèse von Brunswick was one of Ludwig van Beethoven’s piano students and the dedicatee for his Piano Sonata Opus 78, nicknamed “A Thérèse”. It has been suggested that she may have been Beethoven’s “Immortal Beloved”, and this refined reference bears witness to the conductor’s profound personal preparation for the project. 2) At the same time, the word mirrors exactly the desired length and course/development of the motif’s two sound phases (fig. 2):

“Thé-rèse”: Vowels short, é–è = bright-less bright = light-heavier. Consonants mirror the onset noise of a light bouncing bow, upper half, the “-se” is not voiced, it cuts off the vowel but lengthens the syllable, which can be emulated by letting the bow leave the sounding string early, a perfect option in up-bowing, the conductor’s choice of bowing for the note “-rèse”. As spoken by the conductor, the inflexion is light, open, airy, smiling, caressing.
Fig. 1. Beethoven – Symphony No. 4 in Bb Major, Op. 60, beginning of the 2nd movement.

Fig. 2. Beethoven – Symphony No. 4 beginning of the 2nd movement, 2nd violins.
The attempts he is presented with by the musicians do not satisfy him; they are still too broad, and the inner syllable relationships are not right. To him they instead rather resemble the word “Marie”, *i.e.*:

![Fig. 3. Beethoven – Symphony No. 4 beginning of the 2nd movement, 2nd violins.](image)

Vowels long, a–ï = dark and open-very bright = heavy-light, hence on a micro-level the opposite of “Thérèse”. Conductor’s inflexion of “Marie”: Lilting, almost sad, covered sound. The consonants of “Marie” resemble an on-string bowing, middle bow, and in the played version with an inelegant lengthy stress on the down-bow of the short note, maybe a deliberate exaggeration in order for the musicians to tell the conductor to change the bowing back to up-down, which would be “normal” for a motif like this (but which also completely lacks the subtlety and would forever expulse the elegant Thérèse from the piece).

It is difficult to imagine a more appropriate use of a word-sign for a musical event than this. But unexpectedly, within the next minute the situation develops dramatically into a world-famous scandal. After another couple of attempts, during which it becomes obvious that the 2nd violin group finds this — in his own mind clear and obvious — instruction both technically questionable and on a personal level a bit embarrassing, the conductor, by now with no patience to wait for the concert master to sort this out technically, leaves the rehearsal in rage, and the concert the following day must be called off. A concert of the Vienna Philharmonic Orchestra in the Großer Musikvereinssaal...

The conductor was Carlos Kleiber, one of the most gifted conductors ever, admired and envied — also by colleagues — for his ability to spontaneously find the right movements in almost every situation, which allowed him to improvise and pursue even unrehearsed musical ideas during his performances.¹ This is a rare, prominent example of what can happen, when communication is jammed for one reason or the other. Here Kleiber chooses an intelligent word-based “macro” comprising many technical elements, but instead of speaking “real violin-lingo” when things start to go wrong, he repeatedly appeals to — or rather: insists on — the good-will and understanding of the musicians on a verbal level. And such an understanding is not a given fact. At least it wasn’t on that specific day.²

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¹ Temporal arts — such as music, dance, theatre, as opposed to painting, film, and literature — are all expressed by performances and therefore dramatically dependent on the performing artists’ unique doing in present time. This condition creates a particular intensity and fragility, since the very existence and relevance of the expression depends on the force of concentration of the performers in the singularity of each realization of the work of art.

² The drama can be witnessed here: [https://www.youtube.com/watch?v=xH3sRvuNfJM 43:40 – 46:26.](https://www.youtube.com/watch?v=xH3sRvuNfJM 43:40 – 46:26.)
Because of the status of the participants and the special public interest in this event, this episode ended especially dramatically, but misunderstandings like this are part of daily life in the interplay between orchestra and conductor, so it might be valuable to take a closer look at some core questions forming the basic ingredients of such conflicts. For instance:

- Can a metaphor or words at all express a musical meaning? How deeply can, should and may a conductor interfere with the tone production process, and by which means? How important are certain parameters, though not printed in the score, for the expression and perception of musical meaning?

In the following I shall try to come closer to answering these questions.

**The conductor’s role**

Being the only musical performer not producing sound makes the conductor a unique type of musician. In a live situation he is in constant interchange with the score, alias the composer, the ensemble as a whole, and its single members as well as the audience, and his actions have consequences and trigger expectations on all three platforms. It is indeed a hot chair — or a pond with piranhas, as a musician puts it in the film clip with Kleiber mentioned above.

The most elementary task of the conductor on the podium is the coordination of the musical happenings in his score. He shows when the ensemble will start to play and when to stop, he indicates every change of tempo and if necessary organizes the contribution of single instrumentalists and groups. But on a higher-ranking level, the conductor is responsible for the complete sounding realization of a piece of music, or rather the translation of the symbols in the score — the manifestation of the composer’s aspirations — into sound.

It can be discussed what the ‘piece of music’ or the artistic object is. Is it the composer’s inner vision, the symbols printed in the score, or the resulting sound of the performance, the electric and synaptic activity in the brains of the listeners, respectively the emotions triggered by this activity interfering with their intellectual and tactile experiences? Scientists within musicology, acoustics, neuroscience and psychology will all have their own theories and priorities, but for the conductor, who is supposed to follow the work from composer to listener, all phases are of importance, although he can influence the process directly for only a limited period of time.

**The Conductor’s Triangle**

Presumably, by choosing music as his vehicle the creative artist has decided that his “message” is suited for exactly this form of artistic expression and not, say, printed words or sculpture. The problem for the conductor is that the elusive character of
the medium opens for tampering with his message, not least by those who think of music as primarily a performing art. To others, especially composers, music as sound is not the end of the story, it is just a container, a means of transportation meant to hold and protect its fragile structure of meaning. Living in an era in which “The Great Performing Artist” was higher in course than historically — and otherwise — informed performance practice, Igor Stravinsky suggested that performance should be seen as an ethical matter, a question of musical morality.\(^3\)

He found that the ‘proper function’ of a performer is ‘to transmit music to the listener,’ and later Paul Hindemith spoke of the performer as an “intermediate transformer station between the generator of a composition and its consumer”.\(^4\)

Let us take a look at this path of musical transportation (Fig. 4):

![Diagram of the Conductor's Triangle](image)

Fig. 4. Under the dotted line: The Conductor’s Triangle.

The first stretch of the path deals with the transformation from musical idea into configuration of time, instruments, and playing techniques, traditionally resulting in a score with notes and other musical symbols. Understanding this part of the process is crucial for the conductor in his aim to identify the musical intention of the composer.

The last stretching deals with sound, acoustics and musical perception, things ‘out there’ which the conductor cannot control, but on which the ‘transportation of the musical idea’ nevertheless deeply depends.

The stretching in-between is where the conductor takes the coded idea to the ensemble and manages the transformation into sound — often with very differing results, which many musicians and audiences can confirm. This is also where the

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3. “A struggle, more or less unconscious, between the creator and the interpreter is almost inevitable. The interest of a performer is almost certain to be centered in himself”. (T.S. Eliot, The Sacred Wood)

relationship between conductor and musicians is defined. By using words and predominantly symbolic gestures the conductor can place himself — or be placed by the musicians — in the right-hand “musicological corner”, whereas the use of a functional conducting technique respectively leading the ensemble from the first violin desk or a keyboard can make him primus inter pares among the “fellow” musicians in the left-hand corner. Every conductor-ensemble constellation is unique in this respect, and in a given constellation it even differs from piece to piece, dependent on e.g. musical style and instrumentation.

It is of course arguable whether it is at all legitimate to end up with different sounding versions of the same score, and whether this is due 1) to an incapability — or indifference — of the performers, 2) to a conscious personal editing of the score and/or performance elements, with which the performing artist wishes to profile himself (resulting in concepts like e.g. “Karajan’s Beethoven”, “Böhm’s Mozart”, etc.), 3) to legitimate differences in the way we read the score (including the composer’s more or less intentional lack of precision), or 4) to a more fundamental lack of precision in traditional and current music notation concerning a variety of practical elements of a performance.

The semantic outcome of a spoken sentence can obviously vary or even radically change, depending on the tone of voice, loudness, tempo, the colour of and relationship between vowels and consonants, pauses etc. Likewise, the perception of a music semantic unit depends on a host of possible technical variations in the way the sound is produced, and in order to obtain the expression he has planned, the conductor must select, provide or complete this information, which is not necessarily present in the score and the parts but nevertheless necessary for the musicians. To a certain extent one might say that this completion and selection forms his interpretation of a piece, and this aspect accounts for a great deal of the above-mentioned differences.

An experienced conductor is able to “hear” the score in his head, and must also in principle, during his personal rehearsal preparations at his working desk, estimate the necessity of supplemental information. But every orchestra and choir is different, as is the concert hall or church acoustically with and without audience. Like every other musician, the conductor gets excited and even spontaneously develops new musical ideas during the performance. Hence, what he and the ensemble rehearses must be changeable to a certain extent in order to allow an artistic optimum to be reached in the acoustically and spiritually new environment of every performance.

If a conductor wishes to — unambiguously — convey modifications during a concert, he must condition the ensemble and also otherwise enable a non-verbal communication of an enormous amount of information in real-time. The

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5. Many of the seemingly free choices are, however, reduced or disappear completely with an increasing knowledge of style, period conventions of notation, and biographical knowledge of the composers’ life and artistic aspirations.
categories of parameters in which he can make such changes will be listed later in this article (Musical/Performative Categories).

**The conductor’s tools**

The conductor has at his disposal:

a. The information in the score
b. Rehearsal time
c. The orchestra/choir or more precisely: musical instruments and human voices with a certain configuration operated by people with variable skills
d. Words about music
e. His gestures, facial and body expressions

*a. The information in the score*

In classical, Western-European music — where the conductor as an institution is “at home” and needed — the score traditionally contains information about time and tempo, mood, pitch and length of the notes, relative dynamic markings and the character of certain sections of the piece or the movement. A Bach-score has much less printed information than a score by G. Mahler, R. Strauss or a contemporary composer. This does not necessarily mean that the number of parameters is smaller in early music, just that the composer used to be there and provide the information directly as a leader or a soloist.

*b. Rehearsal time*

The conductor has a certain, rather limited rehearsal time with the ensemble at his disposal, in which he can form the sound production and optionally achieve a version coherent with the imaginative one that he developed during his scholarly work with the score.

*c. The orchestra or choir*

All ensembles — and the different conductors’ relationship to them — are different, and depending on the immanent resources of the ensemble there can be many ways of reaching the imaginative goal. Sometimes the conductor choses to accept a less-than-ideal but — with the given resources — feasible version or to go with the tradition of the house and the orchestra.

*d. Words about music*

Some conductors talk quite a deal at their rehearsals. Their main topics are usually:

1) musical contents and their intentions with it, and 2) playing and singing techniques.
It is a question whether it is a wise strategy or at all feasible to access the contents of music from the verbal side. If not verbalized in the first place, is the content at all “wrappable” in words, has the sender the necessary poetic talents to do this, and is the artistic approach of his “audience” — the musicians — verbal or rather motorical?

Helped by the increased accessibility of brain scanning and motion capture techniques, musicologists, psychologists, and neuroscientists are now showing an increasing interest in the question of how we perceive music. Of special interest is of course how we structure musical meaning, be it as “a fusion of auditory and motor sensations” or rather through “a specific point of convergence between syntactic processing in language and music”.

For conductors, the relevance is dichotomic: Apart from the obviously interesting examination of what we are saying, this also influences how we should say it, i.e. the methods with which such a structure of meaning should be conveyed in order to preserve, respectively reveal, as much of it as possible during the process of translation on the base of the conductor’s triangle (Fig. 4).

A professional choir or an orchestra is a multi-cultural forum. The members often have different national and social backgrounds; they differ in gender, age, education and cultural breeding, thus representing many phenotypes, from almost purely motorical talents to music theoretical geniuses — and every thinkable type in between. Also the instrumental registers — the violins, the brass section, the soprano group etc. — tend to have their own culture, so that one metaphor or choice of words may be interpreted very differently by the single players. As we saw it with Kleiber, on some days even a very carefully chosen selection of words can be wasted or even cause serious trouble, and most orchestral players find, in general, that “conductors talk too much”, meaning that they seldom find their words helpful. An example might help to understand what they mean:

Christian Thielemann, chief conductor of the Sächsische Staatskapelle answers the question of how to conduct the characteristic agogic “lilt” of a Wiener Walzer in this way:

I can’t explain that either. I just say that it must somehow be played indirectly. In a rehearsal I once said: “Think about a disingenuous person. You meet a friend in the street and say: ‘Oh, how wonderful, I’m so glad to see you’ but at the same time you think to yourself: ‘Dopey cow’. There, and now you play the waltz.”

Sometimes it works. But it mustn’t be to negative either. It must keep it’s charm.

8. „Das kann ich auch nicht erklären. Ich sage halt, das muss irgendwie indirekter gespielt werden. Ich habe schon mal in einer Probe gesagt: „Denken Sie doch mal an einen falschen Fufziger. Sie treffen eine Bekannte auf der Straße und sagen: Ach, das ist ja schön, Sie wiederzusehen!“
The musical “lilt” mirrors a dance-technical specialty of the Wiener Walzer meant to make the dancing couple “fly” or “hover” a little longer while on their toes. Correct agogic can be explained in a couple of seconds by showing the six waltzing steps meant to accompany the music. This again could easily be transformed into conducting movements with three uneven beats — or less than three beats with differing movement quality through the trajectories. Both being based on physical-motorical factors, these two explanations could be used immediately by the musicians as “a playing recipe”. A third possibility could be to verbally describe the timing of the beats, *i.e.* indicate the duration of every beat in relationship to a standard 3-beat. Professional musicians are trained to deal with this kind of interjected academic approach. Instead, the conductor presents a story that allegedly can only be understood and used as explanation by someone who himself is in possession of a disingenious person’s multiple layers of character. Does it tell the musicians that they have to play the second beat early and the third beat late — when to do this and when not to? Is that the meaning of “somehow indirectly”? Who is going to put this into action and after how many attempts? In which position does the process following the explanation place the conductor as a leader?

Having first to be interpreted — and then instrumentally translated and rehearsed — metaphors about musical content seem not to be optimal neither from a semantic nor from a time economical point of view. And as the triangle above (Fig. 4) depicts, conductor and ensemble are situated not at the end stations for musical meaning (“composer” and “audience”) but on the transportation track in-between, where other semantic rules are in play: *Musical meaning is carried by means of sound itself in a function of time.* This a matter of pure physics, and all desired musical information must be contained in the — measurable and recordable — sound parameters in the room. Conductor and ensemble must — obviously — convey musical meaning to the audience without the use of words. Hence a non-verbal form of rendering must establish itself during the rehearsals, enabling an audience to understand through sound without further explanation.\(^9\) This is where the conductor’s movements take over.

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9. In a live situation, however, not words but the visual appearance of the performers is of great importance and help for the audience. Many listeners say that they would have trouble decoding the music without the total body expression of the conductor, a possible explanation of the personal cult around him. Historically, the simultaneous appearance of this musical function and the installment of “Das große Concert” as a religious substitute ritual in the middle of the 19\(^{th}\) century made the conductor a high priest in this new art-religion. In the 20\(^{th}\) century, this cult was professionally enhanced — Karajan is a prominent example — and with the increasing general focus on visual stimulants, the music industry is of course pushing this side, too, marketing “optic” sopranos and violin soloists as well as conductors with flying hair, and with an increased concentration on opera and filmed concerts.

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A major difference between verbal musical instructions and the silent gestures of conducting is that the former can only be purely referential, whereas the latter are deictic gestures of command addressing the orchestra in real time: they guide the performers while they are playing.

Deictic signs do not need to be gestural; traffic lights are deictic signs as well. They are all symbolic and therefore have a restricted paradigmatic and syntagmatic unfolding, and the range of their signification is bound to their situation of communication, their place, and their time of display. Pointing (by finger, hand or gaze) is the most common example of a deictic gesture, and probably the most basic case; it is conventional, always situational and intentional — requesting the addressee to pay attention either to what it is pointing towards (its object) or to how it is pointing to it (its manner), and then requiring an action involving object and manner. Rhythmic pointing does both, in that it marks ‘beats’ that are objects in time, while at the same time marking the quality of connected beats, rhythmic flow and sound.

However, as we shall see later, even intended real-time gestures can be divided into two major categories: one of immediately understandable “playing recipes” and another of arbitrary signs subject to interpretation, the latter deteriorating the precision, the bandwidth and the tempo of the communicative process.

Nevertheless, metaphoric language stays a very beloved tool for conductors, and many concert masters will recognize the situation described in the following quote by concertmaster Julia Schröder: “We all know that we have the same goal”, the violinist says. “Sometimes I am simply a translator and must convey technically what the conductor says with pictures”.10

So how does this technical translation from metaphors into actual sound take place?

In order to obtain a homogenous string sound, the concert master of every string group observes and cultivates a number of parameters, most of which have their own name and definition in classical string terminology:

- bowing direction (up-down) and sequence
- bowing type, length and speed
- used section of bow and amount of pressure on string
- contact surface (amount of bow hair in use)
- registration, i.e. choice of string for a given tone
- sounding point of string
- vibrato (when, how and how much)
- etc.

10. “Wir wissen alle, dass wir dasselbe Ziel haben”, sagt die Geigerin. “Manchmal bin ich einfach eine Übersetzerin, muss technisch vermitteln, was ein Dirigent in Bildern”, sagt Julia Schröder, Concert master, kammerorchesterbasel, (Radiomagazin Nr. 33/34 09).
All of the parameters above are purely physical factors with a decisive influence on the resulting sound and thus carrying musical meaning. Does the responsibility for the realisation of all these parameters lie in the hands of a concertmaster or the single musicians respectively? If so, is the conductor still in full control of his interpretation?

The triangle in Fig. 4 sees the position of the conductor as part of the active process of translation. Using words from “the sound corner” (left) to influence the ensemble directly as to how to play and sing in order to eventually evoke the right pictures is a far more powerful position than the more symbolic rôle of “storytelling” (right corner of triangle).

However, the direct involvement of the conductor in the sound production itself demands of him, that he has a clear vision of the music beforehand, a profound knowledge about music theory, playing and singing techniques, very good ears and an ability to keep track of a vast amount of details. And maybe the most important component: the key of translation itself, meaning an ability to perceive sound not only as affordance, but in its singular qualities. James Gibson in 1979 presented the idea that “when we hear a sound we do not perceive the pitch, the timbre, and the duration as independent properties of the sound, but rather we perceive a glass breaking, a baby crying, or the wind blowing.”

But just as Richard Strauss as a composer would need an inversely directed — or rather: supplementary — ability to break down the taste of a certain Bavarian beer (which he thought himself capable of composing) to singular sound qualities to make it playable, the conductor must have the same ability and experience to lead the restoration back from symbols in a score to a “taste”, eventually to be enjoyed — as affordance — by the audience.

This same ability is a prerequisite for learning and using “functional conducting”, (a conducting method, which can shortly be described as “direct gestural modelling of sound”).

e. Gestures, facial and body expressions

Why are the signs of all conductors so little alike, even when they conduct the same piece of music? Is there no common language, or do they all want something different from the same score?

Beyond doubt, the differences in what they read, and what additional information they want to convey — as mentioned above — is part of the explanation. But even the same piece — e.g. by consecutive repetitions of shorter excerpts at rehearsals — is conducted differently by the same conductor. Possible explanations:

12. Given that the audience were beer-experts like Strauss himself and thus able to tell the difference. We only perceive what we already know (in the sense of bodily, emotional or intellectual experience). It might be interesting to look into which associations the jagged sound pictures in Vivaldi’s “Winter” evoke in the Amazonas, for instance.
• The conductor wants a different result every time (expressing an artistic choice)

• The conductor wants the same result every time but compensates the fact (or probability) that ensemble B is different from ensemble A, that the musicians in an ensemble unintentionally play the repetition differently, or that physical conditions — e.g. the acoustic, because of the audience — have changed from rehearsal to concert.

• The conductor is not conscious about the meaning of his signs, thus cannot repeat his own last version but relies on a mixture of beat patterns and spontaneity, reckoning on the musicians to sort it out. In the rehearsals, he will have to stop frequently and give verbal correction, but during a concert…

• The signs of the conductor in general have marginal or no influence on the way the music is performed.

The last two explanations would mirror the prejudices of many musicians (not few would maintain: experience), and in combination with a couple of frequently occurring character traits of a certain type of conductor, this nurtures the less attractive part of the “Maestro Myth”. The first and second explanation presuppose that the conductor is conscious about his gestural tools, and that he can alter and calibrate them freely according to the type of information he wants to convey.

### Basic problems in the tradition of conducting

Despite the high profile of the profession and a long tradition of teaching the subject at universities and conservatories around the world, conducting is a poorly researched craft with little documentation of means and method. Even an elementary common terminology is lacking, which makes an academic discourse very difficult. Over the years several books have been written about conducting, describing instrumental and singing technique, how to place the orchestra, the methodology of rehearsing, organizing of ensembles and concerts as well as a conductor’s guide to the most important works from the standard repertoire. Rather missing is an analysis of the performative and musical implications of the single elements and qualities of conducting gestures and how to master more than very elementary patterns of movement.

There seems to be (or at least: have been) a broad consensus of opinion, not least among renowned conductors of the 20th Century, that important parts of the resulting impact are inherent, personal qualities unable to be learned or taught.  

13. “There is no way to really put your finger on what makes conducting great, even what makes conducting work. Essentially what conducting is about is getting the players to play their best and to be able to use their energy and to access their point of view about the music. There is a connection between the gestures, the physical presence, the aura that a conductor can project, and what the musicians produce”. (Alan Gilbert, Musical Director of the New York...
Leo Blech (1871-1958), himself a famous opera conductor, once concluded on watching Erich Kleiber: “that is how it is: one day you get up in front of an orchestra, and either you know how to conduct — or nobody will ever be able to teach you.”

So instead of giving their version of a systematic methodology to conducting, most authors and teachers explain the function and impact of conducting with words like charisma and vibrancy, personality, intensity, individual expressiveness etc., some of them depicting and/or describing certain gestures with good/right or bad/wrong, but without further explanation. Most tutorials restrain completely from illustrations, others depict trajectories for singular measures, so-called conducting or beat patterns, however with no information about the quality and 3-dimensionality of the movements, let alone patterns comprising musical entities longer than one bar.

As a teacher of conducting, you must ask yourself: What do I teach my students, then?

And the students: Why study this at all? Do I want control? Can I get it? And if so, by means of which parameters?

Gestural tools

Basically, the conductor communicates with his whole body — consciously or not, he influences the musicians and singers through his gestures and body posture, his muscular tension and facial expressions. In detail, possibly active “talking parts” include: (Baton), fingers, hands, arms, face, head and body. The “conducting space” comprises the whole length of his arms in front of and at the side of his upper body from his hips and upward to the top of his head, rather seldom higher than that.

By lifting his arms, the conductor activates a system of levers driven by gravity and the energy he actively applies. The more distant the hands are held from the body, the bigger the effect of the mass with which he influences the sound (Archimedes), and the more of the potential energy \((PE)\) in the system he releases, the louder the resulting sound from the performers. By adjusting the position of the hands, the size, speed and form of the movements, as well as the relative weighting of hand and arm, the conductor can influence most of the parameters making up the composite sound of the ensemble. If he respects the physical laws of movement and gravity, these purely physical instructions will be understood by musicians and singers in real-time, as they are not subject to interpretation but transferable into


15. A study has recently been made at the Basel School of Design with promising perspectives for future graphic presentations of these aspects.
playing and singing technique following the same laws. (A detailed description of this functional conducting technique would exceed the goal and framework of this article, but it is “out-there” and functioning, and documentary research is being conducted at the Media Lab, M.I.T., Boston, for the time being.)

Ana-Logic

Other elements than physics can be helpful in order to communicate the necessary amount of information in very short time. By stacking information in “macros”, a high communication efficiency can be reached through several simultaneous tracks combined with a contact to profound psychological layers, this resulting in a more satisfactory and engaging working quality.

The human brain attaches abstract meanings to the shapes and sounds in a consistent way, which the experiments of Gestalt psychologist Wolfgang Köhler in 1929 and a couple of more recent modified repetitions\(^\text{16}\) show.

![Fig. 5. Takete and Maluma.](image)

The Maluma-Takete Effect (Fig. 5) is a non-arbitrary mapping between speech sounds and the visual shape of objects. It does however also function between visual objects and musical sounds. Listeners are able to presume the tactile quality of an object judging from the sound it makes. This is the case not only on an elementary level (e.g. hearing a double bass, discriminating it from a piccolo flute and describing the difference in size, colour, material and the way it might move if it were alive, but also the playing techniques of a single instrument or the vocal configuration of a singer can change a tactile/haptic impression.\(^\text{17}\) Likewise, but the other way around, a singer or an instrumentalist will in fact change their sound

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17. This feature of the human brain has been used artistically by composers for hundreds of years. A famous more recent example is Saint-Saëns: Le Carnaval des animaux, but also Schubert in “Am Feierabend” (Die schöne Müllerin No. 5) plays with our tactile imagination when he depicts two very different men and a young girl in dialogue just by characteristically changing the singer’s vocal registration.
quality according to the “maluma-takete-quality” of an object shown to them while playing and singing, which of course can be of decisive manipulative value for the conductor, if he builds in tactile features in his gestural repertoire. As this analogical ability seems to be mapped in our brain on a deeper — and quicker — level than are language and other rather slow and culturally dependent interpretive brain processes, a conscious use of these mappings opens the possibility of controlling important sound qualities in real time.

As the audience, too, will tend to — more or less consciously — perceive music in tactile categories, specific influence of tone production becomes even more interesting for the conductor as a means for a detailed control of interpretation.

For instance, an everyday situation: The composer writes a *forte* for a chord in the score but nothing about the character of this loud sound: is it supposed to be brutal, ample, glaring, plentiful, aggressive, or maybe masculine, generous, radiant, hard or plump? This decision will have to be made by the performer and conveyed through playing/singing technique, a process with many consequences.

In order to exemplify how many possibilities — but also risks of distortion — this multimodal communication offers, I have (subjectively) distributed a number of the previously mentioned simultaneous and unavoidable choices of every string player in a sheet (Fig. 6) with only two, but contrasting choices: Takete and Maluma.

In the real world, there are of course all thinkable shades:

<table>
<thead>
<tr>
<th>Aspect / action</th>
<th>Choice</th>
<th>Effect</th>
<th>Choice</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>sounding point on string</td>
<td>sul ponticello</td>
<td>sharp, hard overtones predominate</td>
<td>sul tasto</td>
<td>soft, fundamental frequency predominate</td>
</tr>
<tr>
<td>used section of bow</td>
<td>tip or frog</td>
<td>transparent or focused + compressed (overtones)</td>
<td>middle</td>
<td>full</td>
</tr>
<tr>
<td>length of bow / time</td>
<td>short</td>
<td>open, crescendo, leaves string sounding /ringing</td>
<td>long</td>
<td>covert, diminuendo, muted ending</td>
</tr>
<tr>
<td>bowing direction</td>
<td>up</td>
<td>down</td>
<td>down</td>
<td>down</td>
</tr>
<tr>
<td>bowing type</td>
<td>bouncing</td>
<td>lying, on-string</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bow pressure on string</td>
<td>high</td>
<td>hard, focused, aggressive</td>
<td>minimal</td>
<td>soft</td>
</tr>
<tr>
<td>contact surface / amount of hair on bow active</td>
<td>little/few</td>
<td>thin, cheeping</td>
<td>broad / many</td>
<td>full, generous</td>
</tr>
</tbody>
</table>
registration /choice of string for a given tone | light | transparent | heavy in high position | with nucleus, meaty
--- | --- | --- | --- | ---
position | open string | many overtones and high-frequent bowing noise | stopped string | bowing noise and overtones relatively damped by stopping finger
vibrato | non-vibrato | plain, natural, naïve, honest, insisting | vibrato | non-assertive, generous, pleasing, vain
phrasing | short | long lines |
articulation | short (pause between offset and new onset relatively long) | sustained (pause between offset and new onset relatively short or absent |

Fig. 6. Table, string players tone production options /Maluma-Takete.

As can be seen, it is clearly an advantage for the conductor’s control of his interpretation, if he has ways to inform about the calibration of these parameters. Not least because they are active, whether he is involved or not. A string player of course cannot avoid making a choice about any of the categories, just because the conductor does not inform about it. The result could be random — or by contrasting personal choices in a group: chaotic — and the combined result might even contradict the overall aim and intended musical meaning of a given phrase.

In the following section, I shall make an attempt to sort such performance parameters according to the conductor’s natural “sphere of interest” and distribute them into categories:

**Musical/Performative Categories**

At first, structurally listed:

- Phrasing (tempo and dynamics/loudness)
- Articulation
- Sound quality (configuration and weighting)
- Intonation

**Phrasing**

Just as the spoken and written language, music can be structured in segments of meaning, or semantic segments of differing length. Very across-the-board single
notes thus compare to letters, motives to words and phrases to sentences. Phrasing means making these semantic units audible.

If recited without any commas, modulation of voice or breathing, it can be very difficult to understand the meaning of a text. In music, the comprehension is further complicated by the fact that the listener is very often supposed to hear and understand the expression of several voices simultaneously.

Segmentation /Clarification of semantic units in a musical phrase can take place using:

*Tempo*

A slight change of tempo will often enable the listener to combine a number of minor musical events to a phrase. Usually the tempo is accelerated through the chosen point of culmination, after which it is relaxed, reaching the basic tempo of the piece at the end of the phrase. The changes in tempo are minimal but nevertheless capable of creating a bow of tension discriminating the given phrase from the next one.

*Dynamics*

The same goes for dynamics. If loudness within a phrase is slightly increased until the point of culmination and decreases again, it will help constituting a unity of the notes involved.

Thus, musical phrasing can be said to be a combination of the independent parameters tempo and dynamics, every phrase demanding a unique and organic blend of the two.

*Articulation*

In the score, every note describes a sounding event at a certain frequency with a duration relative to other events and the basic tempo. The beginning and the end of an event are referred to as onset and offset respectively. The articulation signs (accents, slurs, dots etc.) prescribe the length and development of sound between onset of the sounding note and onset of the next note.

![Articulation, examples](image)
Figure 7a pictures two 8th-notes without any special sign of articulation, this very often meaning a light legato: onset value (y-axis) middle and lightly declining until next onset. Figure 7b shows a tenuto: on- and offset at the same level and no development/decline during the sounding phase. Figure 7c is a staccato: in this case same onset value but only a short sounding phase followed by a pause before next onset. The last illustration, Figure 7d, pictures accents on every 8th-note (the lower part of this type of accent sign being a transformed tenuto): The accent is an effect of the dynamic difference between offset of the former and onset of the new note.

Sound quality and -colour

This is physically speaking a mixture of fundamental tones and their overtones, the production of which can be influenced by the conductor during the process of playing/singing. By the use of certain gestures, body-, arm- and hand postures, the conductor can tell the singers and musicians to modify the tone production in a certain way and thus in real-time vary, say, the brightness of the total output or parts of it.

There are two freely combinable subcategories, which together open a great variety of sound colour possibilities:

Configuration

Gestures that influence the sound configuration achieve this through a change of swinging mass. Of course not all instruments can change their configuration. A piano — and in the orchestra: a harp — has its configuration due to the permanent outlay of strings in a certain framework, that is: one cannot change the strength of the strings while playing. But both string players and many wind instruments can partly chose how much material they will use to produce a certain note. Vocal chords can steplessly change their length and thickness and thus in principle be configured freely, if preferred even without audible transition between registers. The tone production of singers can easily be manipulated by conducting gestures, which is both wonderful and dangerous, as it makes singers and their instrument very vulnerable when confronted with conductors of little vocal expertise or with a poor conducting technique.

Weighting

The weighting of a sound has an effect on its saturation or density. A use of this parameter in case of a singer would mean a change of the subglottal pressure, which has implications on other parts of the voice, too, and a string player would in- or decrease the pressure from the bow on the strings.
Intonation

In all live, non-electronical sound productions, tension is one of the most important parameters, and the word “tonus” is present in many different terms concerning music. The amount and the character of tension in the applying action of the musician/singer as well as tension on the receiving side — the instrument or the sounding body — are decisive for the quality and colour of the resulting output. And — due to the constructing principles of most instruments — for the frequency as well. Pitch is a result of the weight of vibrating mass and the tension in the material. (Think of a violinist tuning his instrument: first he choses a string with a certain thickness and weight, then he adjusts the tension, *i.e.* pitch, by turning the peg (in the pegbox under the scroll), finally he optionally uses the fine tuner screw at the tailpiece. He can change the frequency even while playing by drawing or pushing the active string with his left hand fingers, thus achieving an upward glissando because the tension of the string is increased. Wind players use a similar technique: the famous clarinet glissando in the beginning of Gershwin’s Rhapsody in Blue is partly created by gradually adjusting the pressure on the reed. Singers adjust the tension in their vocal folds permanently and steplessly to create any tone).

As any movement of the conductor is a combination of letting body weight swing, fighting gravity (e.g. drawing straight lines) and entertaining muscle activity over the joints in fingers, hands and the lower part of the arms, it goes without saying that body tension and the conscious use hereof is crucial for the intonation. The influence is of course proportional to the freedom of configuration — *i.e.* no influence on keyboards except maybe for the way in which the keys are stricken, but massively on singers and choirs.

If the categories are arranged hierarchically according to basic importance for a musical result and the amount of bits involved in each category, it might look like this (the higher the number, the more information is involved):

1. Tempo
2. Dynamics
3. (Phrasing)
4. Articulation
5. Sound quality
6. Intonation\(^{18}\)

\(^{18}\) It might surprise that intonation is ranked after sound quality. Presuming that a certain basic intonation is at hand, it would be waste of time to try and fine-tune an ensemble without making sure, that the tone production — and thus sound quality — of each player/singer is uniform, as fine-tuning is a question of harmonizing and balancing the overtones of a chord.
Beat patterns

The intentions of the conductor are traditionally conveyed gesturally through so-called beat patterns. A beat pattern is conductor’s terminology for a set of movements structuring a sequence of accentuations, thus building a measure or another accentuation pattern, the basis for any common ensemble playing. A 4/4 measure will structurally “occur” when the first and third beat are more accentuated than the second and fourth beat. A standard 4-beat pattern may have this form (Fig. 5):

\[ \text{Fig. 8. Rudolf (1950) p. 22: 4/4, conductor’s perspective, right hand.} \]
\[ \text{As will be shown later the beat is felt at the lowest point of the trajectories.} \]
\[ \text{The placement of} \quad \odot \quad \text{and} \quad \odot \quad \text{is therefore somewhat mysterious, if not misleading.} \]

The two accentuated beats follow downward (beat 1) respectively outward (beat 3) movements, whereas inward (beat 2) respectively upward (beat 4) movements proceed the two less accentuated beats.

Behind this well-known sign lies a structure which — having its roots in deeper layers of human perception — affects the observer’s sensation of pulse, hence forming the potential basis for the conductor’s control of pulse, tempo and ensemble (= synchronicity).

A downward movement is more accentuated than an upward

A lateral (outward) movement is more accentuated…

left hand   right hand
…than a medial (inward)

In hierarchical order of accentuation
we will get:
down, out, inward, upward

If we want to depict a standard 4/4 accentuation
pattern, we can do it like this:

When adding the fact that a long
movement in a given time slot will be
perceived as more accentuated than a short…

…we can modify the pattern to resemble a
“dry” 4/4 beat pattern. Please note that
the lateral 3-trajectory has been extended
and that the 4-trajectory combines the
characteristics of medial and upward.


The logic — and manipulative effect — behind this is that a downward
movement’s release of potential energy (PE) will give an accentuation (Beat 1) and
vice-versa (Beat 4), whereas a medial movement (Beat 2) will be experienced as
introverted and not so accentuated as a lateral/extroverted (Beat 3).

Thus the beat pattern is in itself a combination of the two control categories at
the conductor’s disposal: the physical/functional and the analogic.

As mentioned earlier, the lack of a common terminology and research makes
discourse difficult. Unfortunately this goes for the design of beat patterns, too.
Summing up from more than 30 books on conducting\(^9\) here is a selection:

19. Bailey, Bastian, Bimberg, Boult, Bowen, Brödel, Cahn-Spayer, Caplin, Chybinski, Diestel,
Ericson, Galkin, Garretson, Göstel, Kahn, Kondraschin, Lijnschooten, Lukoschek, Lumley,
Meier, Opp, Pfortner, Phillips, Rudolf, Schaper, Scherchen, Thomas, Unger, Waltershausen,
Wierød, Wöllner.
Looking at the differences, getting answers to at least three questions may seem crucial for the profession: Does it at all matter what we show? Do we mean the same thing, when we say 4/4 pattern? If only one pattern is “right”, \( i.e. \) represents what we mean by 4/4, are all the others wrong?
Comparative analysis

Without going too much into detail let us look at similarities and differences within these 4 beat pattern features (Fig. 17-20): 1) levels of the beating point 2) form of the trajectories 3) form of upper and 4) form of lower vertical turning point.

Fig. 17. Levels of the beating point positions (1, 2 or 3 levels).
Fig. 18. Form of the trajectories: convex (blue) / concave (red).
Fig. 19. Form of lower vertical turning point (rounded or pointed).
Fig. 20. Form of upper vertical turning point (rounded or pointed):

Each of these 4 features can be shown to have a functional impact (meaning: the players will receive information about how to produce the sound and react
accordingly) on the calibration of aspects of every one of the Musical/Performative Categories listed above (p. 401).

Hence, without deliberate modification (or “sign interpretation”) by the musicians the sum of these functional features will design the resulting sound, and the same music will sound differently when beat patterns change. As none of the shown beat patterns of the selection equals any of the others in all aspects, the result in this case would be 9 different musical events. Thus a beat pattern is never “neutral” and a conductor’s use of certain beat patterns or variations of them — his “personal style” — should express a deliberate artistic choice in each and every case. It can therefore be felt as a bit disturbing, that well-known and potentially trend-setting top conductors apparently advocate the notion of being “somewhat unaware” of what they are doing with their bodies.²⁰

**Subphases of every beat**

If we want to understand more about the functionality in the beat patterns, we have to look at the 4 subphases — the components of every beat, irrespective of the choice of beat pattern:

- **Pre-beat trajectory** = PBT (orange line)
- **Beat** = B (black dot)
- **Post-beat trajectory** = REFLEX (green line)
- **Turning-point** = TP (red x)

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²⁰ “In the interviews the conductors made it clear that for them body movements take a back seat to mental preparation and musical ideas residing in another body part, the brain. Conductors have to be “somewhat unaware” of what they are doing with their bodies, Mr. Nézet-Séguin said.” Wakin, Daniel J., “Breaking Conductors’ Down by Gesture and Body Part”, *The New York Times*, April 6, 2012.
The beat is usually felt at the deepest point of a fall or a pendular swing — the PBT.

After the beat, the hand decelerates during the reflex, the vertical motion comes to a short stop in the TP after which the process repeats itself:

$$\text{PBT} \rightarrow \text{Beat 1} \rightarrow \text{Reflex} \rightarrow \text{TP} // \text{PBT} \rightarrow \text{Beat 2} \rightarrow \text{Reflex} \rightarrow \text{TP} // \text{PBT etc.}$$

It is musically unambitious but indeed possible to reduce the conductor’s pulse / temporal information to B, the onset time of the sound, which gives an impression of a metronomic or digital pulse. However, the sounding phase begins just then and is ringing during the reflex, the resulting sound profile functionally mirroring the reflex through the TP. By carefully forming the reflex, the conductor can influence the length and development of the sound in several ways.

**Convex – concave**

![Fig. 22. A convex (left) and a concave (right) mathematical function.](image)

The trajectories can have a form that equals a mathematical convex or concave function, either all the way or with a phase of each. As the form itself functionally changes the sound features of the trajectory dramatically, making the right choice here cannot be overestimated:

The form of a convex trajectory makes it easy to predict the onset time as opposed to concave movement forms. Use of the latter forces the musicians to either guess the onset moment or to wait, until they have actually seen the beat, thus creating a lag between beat and onset. The result is either a loss of tempo control or (measurable) psychological stress reactions from the musicians, often both.

Shortly after the beginning of a concave phase, the sound will functionally cease.

Thus beat patterns with concave trajectories evoke a punctual sound event at or shortly after onset, a kind of (involuntary?) staccato like in beat pattern 6, Fig. 13.
Fig. 23. A specialty of beat pattern 6 (Fig. 16) is the motorically highly difficult (if not infeasible) change of form from concave to convex on the reflex after 4, functionally evoking an accent and a longer sound on the supposedly lighter 4th beat and as such also musically rather unusual.

Musicians can be trained to not react functionally to these characteristics and play a legato (or almost any other articulation) on the verbal direction of the conductor, no matter what he shows gesturally. When this is the case, the category or sign “movement type” is reduced to being an arbitrary sign instead of a function.

**Arbitrary conducting signs**

This unfortunately also happens with other conventional conducting movement icons. A standard cut-off (German: “Abschlag”) is performed as a circular movement with the baton or (the palm of) the right hand. Functionally this implicates several changes of sound quality on the tone to be cut off, in addition to a crescendo often ending with an accent. These side effects are unwished for — especially the accent in the end — and countless are the occasions on which more sensitive conductors have asked the performers not to accentuate — and hence in fact not to react to the functional messages of the sign.

The same goes for the sign up-beat, which is used e.g. to prepare entries. In the standard execution layout, the right arm (or both) swings up-and-inwards, which functionally causes singers (and wind players) to breathe by lifting their ribs and even shoulders (as if shocked) instead of contracting their diaphragm. Every breathing designs the outlay of the singing apparatus, and the high-costal version of breathing produces a sound and voice functionality highly unsuitable for classical music and potentially harmful for the singers, especially in forte. In order to be able to breathe technically properly and obtain the necessary vocal support, most professional singers therefore prefer to look away (e.g. in their notes) or “through the conductor”, when seeing this version of breathing sign coming up, thus firstly making the sign useless and secondly per se robbing the conductor of his influence also on other musical parameters in this time slot.

The up-beat movement is almost identical with the 4th beat in a standard 4-beat pattern. This part of the measure, which is often the least accentuated,
nevertheless in most graphical representations shown to have the longest trajectory. As a longer path of transportation per time unit functionally increases loudness of the tone, unintentional stressing of the 4th beat is almost inevitable solely due to the form of the sign, and many ensemble singers and players will remember having been repeatedly asked by their conductor not to accentuate the upbeat (in spite of what they see).

Such incongruences — and there are many more — move communication between conductor and ensemble from an idiomatic level — in the sense of sound production — to a level demanding not only reading of arbitrary signs but also self-control and modification during the execution of them. This steals intellectual resources from the musicians, takes time and has a lot of potential for mistakes and frustration.

Moreover, only signs already known by the ensemble will function, which makes the phenomenon “visiting conductors” a matter potentially filled with compromises, not the best premises for conquering new musical horizons.

**Implications for research**

The special features of the concave trajectories seem also to have played a decisive role in a series of studies concerning musicians’ synchronization with conducting movements. Especially, the studies by Luck, Sloboda, Nte and Toiviainen in this field represent exceptionally serious attempts to analyse aspects of conducting gestures under controlled conditions and with a thorough methodology.

In a couple of studies (Luck & Nte [2008] and Luck & Sloboda [2007]), participants were presented with single instances of point-light representations of simple single beat and three-beat conducting gestures, and had to tap in synchrony with the beat in each case. The tests show that musicians tend to be synchronized with features such as high, and frequently negative, acceleration, and low position in the vertical axis (= onset) (Clayton [1986]21; Luck & Sloboda [2007]).

In the study by Luck and Sloboda (2007), two conductors participate, one with some professional experience, the other with more elementary skills. Surprisingly, the novice conductor has the least mean standard deviations, in other words: a clearer beat. Not able to explain this and obviously in conflict with the mutual understanding in the practitioners’ environment, the researchers politely try to adapt their conclusions,22 hereby maybe missing an important point: a nearer

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22. “As regards the surprising finding that the novice conductor elicited more consistent synchronizations than the experienced conductor, there are at least two plausible explanations. Firstly, the inconsistency with which the novice conductor produced the gestures may have resulted in participants having to concentrate on synchronizing with every individual beat, as they could not be sure exactly where and when the next beat would be communicated. This
What Is Conducting?

examination of the beat patterns of the two conductors shows, that the PBTs (see fig. 21) of the novice conductor have relatively long and early convex phases (Fig. 24), which makes it easier for the participants to predict the onset-moment.

**Fig. 24.** Plots of the six three-beat pattern gestures produced by novice and experienced conductors at the medium tempo, as seen from the musicians’ perspective (Source: Luck & Svoboda (2007) p. 33. with coloured convex (blue) and concave (red) trajectory phases added by this author).

increased attention may have resulted in more consistent synchronizations over repeated presentations. A second possible explanation is that the experienced conductor deliberately (and perhaps unconsciously) introduced some sort of structure into their beat patterns, emphasizing the downbeats, and relegating the 2\textsuperscript{nd} and 3\textsuperscript{rd} beats to a subordinate status in terms of the accuracy of their production. Participants may thus have responded in a similar manner, maintaining good consistency to the downbeats, but being less concerned with the other two beats, the effect of which was to lower overall consistency. This latter explanation was tested by carrying out a two-way related ANOVA (Analysis of Variance) on BN (beat number) and CE (conductor’s experience). The results supported the theory. Specifically, the significant interaction between BN and CE […] indicated that the experienced conductor elicited the most consistent synchronizations on the 1 beat, but the least consistent synchronizations on the 2 and 3 beats”. (Luck & Sloboda, 2007)
Being a novice, he probably seeks to correspond with the beat pattern used as a model (Fig. 25) for the test, whereas the more experienced conductor uses his own personal, obviously well-practiced patterns with predominantly concave trajectories on the 2- and 3-beat (Fig. 24). According to a convex/concave pattern analysis, Beat 1 of the experienced conductor should be perfectly legible, but especially the purely concave 2-beat should be difficult for the musicians to localize. This corresponds with the actual measured deviations (Fig. 26).

![Fig. 25. Examples of typical two-, three-, and four-beat conducting patterns, as seen from the musicians’ perspective. Luck & Sloboda (2007), p. 27. The 3-beat pattern here is the model for the resulting patterns of Fig. 24.](image)

![Fig. 26. Interaction effect of beat number and conductors’ experience on MSD of participants’ synchronizations. Lower MSD’s indicate more consistent synchronizations. Luck & Svoboda (2007) p. 43.](image)

Thus it might be the form of the respective trajectories, rather than less concentration or a (for any conductor hardly probable) deliberate lack of conducting precision that caused the difference between the mean standard deviations.
In the study by Luck & Toiviainen (2006), singers and musicians participated, and the conductor was present in the room, so that the performers could react to him and not merely to his recorded movements. Here, too, the researchers had to deal with an unpleasant surprise: The ensemble onset now suddenly lies after the visual beat, i.e. the audible onset occurs as the hand of the conductor has already moved upwards and away from the visual onset spot found in previous investigations, and: the faster the beat, the later the onset.

Fig. 27. The predominant concave form of the conductor’s trajectories (depicted here not in the form of beat-patterns) and the point-shaped beats explain the lag between visual and audible onset.
As has been argued above and shown in several studies, the predictability and consequently the precision of the onset of the ensemble is dependent on certain laws of gravity and the trajectory form. Choosing a concave trajectory as preparation for the beat will under certain circumstances force the ensemble to play later than the visual onset signal.

Since there are no other movement features controlling the onset, the length of the lag between visual and audible onset becomes solely subject to the musicians’ interpretation, making even pulsation and tempo — the conductor’s tools to obtain synchronization, his most elementary raison d’être — into just an arbitrary sign.

The researchers could have concluded that the communication using this conducting technique was not synchronized, and that the conductor thus could not be in control of neither the musical flow nor the interpretation. A difficult truth to convey in the practitioners’ environment. So instead — taking this carefully measured ensemble reaction in account, but admittedly unable to explain the phenomenon — they propose a new general explanation for onset cues, thus partly contradicting their own former test results and conclusions (and several others’ as well), which of course does not contribute to further clarification in this very important matter.

23. Looking for other elements possibly synchronizing the delayed audible onset it should be remembered, that movements in e.g. wrist, arm and shoulder sequentially precede those of more distant parts of the system (the finger point / baton).

24. “The results of the analysis suggested that the ensemble tended to be synchronized with periods of maximal deceleration along the trajectory of the gestures (medium positive correlation, small lag) and/or periods of high vertical velocity (high positive correlation, larger lag). This study, then, provides a first step in identifying the key features of conductors’ gestures with which ensemble musicians and singers synchronize in real-world settings. The results of this study also support the idea that the ensemble tends to lag behind the conductor somewhat. Although we did not attempt to identify the movement features that together characterize the visual beat communicated by the conductor, the fact that the ensemble’s pulse was strongly positively correlated with vertical velocity suggests that the conductor’s hand was moving in a fast upward direction, and away from the generally regarded location of ‘the beat’ when the ensemble played. This is further evidenced by the relatively large lag between the maximum correlation between vertical velocity and the ensemble’s performance. These results may be contrasted with the findings from laboratory-based studies, which have found that musicians tend to be synchronized with features such as high, and frequently negative, acceleration, and low position in the vertical axis (Clayton,1986; Luck & Sloboda, 2007). The reason for the lag in the real-world setting is not clear, but one explanation might be the inertia created by the ensemble; musicians in the laboratory-based studies synchronized in isolation, while those in the present study obviously did not. Moreover, the musicians in the present study were given no specific instructions to be as accurate as they could with regard to the conductor’s gestures, while those in the laboratory-based studies were.” (Luck and Toiviainen 2006, p. 196)

25. “The main shortcoming of such systems is that they tend to presuppose that the beat is conveyed by the change in direction from downward to upward motion, and do not allow for the fact that other features, such as those identified by Luck & Toiviainen (2006) may be related to beat induction.” (Luck and Svoboda 2007, p. 29)
Perspectives

In a phase, in which research on conducting is starting up slowly and only few commonly recognized results are at hand, this somewhat insecure reaction from the researchers is understandable. Trying to get scientifically reliable, replicable results by using all available occasions and (primarily local) resources, the unfortunately restrained access to such resources often forces researchers to let singular, more or less professional and representative conductors serve as models, maybe in the presumption that every conductor follows a set of standard rules. As shown above, no such standard exists, and as experts in computer tracking, psychology or other branches other than conducting, the researchers cannot know that most conducting techniques are regional schools or even personal matters, in which movements are inherited from a tradition, “a master” or even developed in order to obtain theatrical effects rather than functional goals. In his influential conducting book, Bimberg writes: “Every conductor should use his best endeavours to perform his movements in a fashion equally aesthetic [!] to interpreters and audience”.

There is no doubt that a conducting layout based on concave trajectories may look fancier than certain other, more functional versions do, especially to an audience. The ensemble, however, impressed or not, does not react to aesthetics but to the predictability and expressive functional qualities of the chosen trajectories, only able to follow the laws of (bio)mechanics, first of all with regard to gravity and angular velocity, which the tests in controlled as well as ecological environments mirror.

Looking for scientifically measurable regularities within this field requires an overview of the many “dialects” and the development of a method to rule out the purely regional or even personal styles, and researchers will probably also have to overcome the tendency to just take the verbal and gestural statements of the practitioners for granted. In the conclusions of several studies it is carefully ensured that no “mysterious” result be interpreted offensively against the conductor. This is natural and respectful, especially if the researchers sense that many technical aspects might be unreflected and thus inseparable from the more personal qualities of the conductor. Likewise, uttering a critical vocal-technical view on a voice is equally difficult to handle without embarrassing the possessor, maybe because also in his case the body is the instrument. On the other hand, this approach potentially makes research much less consistent and might lead to the wrong conclusions. Showing curiosity and posing persistent questions is not disrespectful behaviour, on the contrary, as this might bring the whole craft to a new state of consciousness, reduce psychological stress among musicians and conductors, and further musical development.

Conclusion

This article is based on many years of experience with conducting and conductors (e.g. serving as a choral master at the side of many of the world’s leading orchestral conductors), studying tools and methods, and the results of the use of them.

Some conclusions could be made, for instance: words should be used with great care, respecting that they are usually unsuited for describing contents of music, whereas they can be helpful in a technical translation into playing and singing technique.

Not only language, but also many traditional movement patterns seem problematic as vehicles for unambiguous transportation of musical meaning.

Conducting gestures can be examined from two different points of view: 1) as a framework for the actions of the musicians bringing out a direct acoustic, physical reaction; and 2) as symbols subject to interpretation as a ritual language with its own syntax, and maybe even as an art form in its own right. If the gestures of conducting are seen in the latter perspective as a part of the right-hand-corner of the conductor’s triangle (Fig. 4) — hence being yet another language to be interpreted by the musicians alongside with the symbolic language of the notation — future research should systematically examine in which categories of non-verbal communication ("body-language") the act of information takes place and how these messages are transformed into actual playing/singing. Likewise by whom this transformation is carried out, when in the process of interaction this happens, and how fast it is done (given that interpretation takes time). If, however, conducting gestures are seen a part of the left-hand-corner, i.e. the sound producing actions of the musicians and the resulting physical sound (which then originates directly from the gestures of the conductor), it should be examined which parameters of playing/singing can be influenced or even controlled, and by which action of which part of the body.

Some answers to these questions have already been suggested above, others are subject to on-going research, among other places at The Massachusetts Institute of Technology.

Every systematic effort to document the ways and means of communication within this secretive art form will be welcomed by conscientious participators in the conducting environment as well as by many choirs and orchestras, and research will probably show, that the conducting craft underlies exactly the same high technical and communicative demands as does any other musical profession. The conductor’s use of movements should be as perfect, deliberate and versatile as we expect it from any other instrumental virtuoso. That these regularities do not always seem to apply, even in the top of the musical industry, is not a conductors’ specialty but holds good for other types of musicians as well, and should probably be explained from a sociological and commercial — rather than a technical and musical — point of view.
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C. Kleiber: https://www.youtube.com/watch?v=xH3sRvuNfJM.


**List of Figures:**

Figure 8: Rudolf (1950).


Figure 27: Luck and Toiviainen (2006).

All the other figures in the article are the author’s own illustrations and tables.