

Music as Motion: A Synopsis of Alexander Truslit's (1938)
Gestaltung und Bewegung in der Musik

BRUNO H. REPP

Haskins Laboratories, 270 Crown Street, New Haven, CT 06511-6695, USA

Truslit's (1938) monograph, rarely cited nowadays and found in few academic libraries, contains profound insights into the motional character of music and the performer's role in shaping it. His ideas are highly relevant to contemporary attempts to understand the nature of musical motion and its communication in performance, and, although often speculative and supported only by very marginal data, they provide a valuable source of hypotheses for the more extensive and precise empirical inquiries that are feasible now. To bring Truslit's important theoretical contribution to the attention of contemporary researchers and musicians, this paper presents a highly condensed and annotated translation of his book.

Translator's Prologue

Historical consciousness is limited in today's science, particularly in the fast-moving United States. Apart from a few classics that are cited (though perhaps not read) by everyone, literature that goes back more than a few decades is commonly ignored, particularly if it is in a foreign language. Deluged by new publications, few scientists have the time to dig up historical sources, and many are hampered by their lack of foreign language skills. It is also true, of course, that many older works lack the methodological sophistication of contemporary studies. These older authors, however, often made up for this lack of rigor by depth of insight and breadth of view. We can still benefit from their wisdom.

Alexander Truslit's (1938) monograph, *Gestaltung und Bewegung in der Musik (Shaping and Motion in Music)*,¹ came to my attention through a reference in Gabrielsson (1986)—the only reference to Truslit's work I have encountered. I obtained a copy on interlibrary loan from the University of Iowa, where one of the few copies in the USA is located.² I was not able to obtain the sound recordings (three 78 r.p.m. discs) that originally accompanied the book.³ Even so, I found the book extremely stimulating and insightful. Truslit's claims, even though they are largely speculative and subjective, seem highly relevant to contemporary attempts at understanding the motional character of music and its communication in performance.

For those who are interested in these problems but have been unaware of or unable to read Truslit's book, I provide the following synopsis. The text is, with minor exceptions (such as some contractions, added descriptive statements, or added emphasis), a literal translation of statements culled from the approximately 200-page original, which lends itself well to this kind of distillation. German terms are quoted wherever faithful translation seemed difficult. All headings are literal translations of the book's major section headings. My own comments appear as footnotes and in the epilogue.

by
 Alexander Truslit

Motion as the Fundamental Element of Music

Musical experience and shaping. To experience music fully, both the listener and the composer or performer must understand its most essential characteristic.⁴ This characteristic is the expression of *inner motion*, whose spontaneous manifestation in voice and movement formed the origin of song. This expression is the eternal driving force of music. In music, however, it is *consciously shaped*; inner experience and artistic form merge into an integral process. The artist's motion experience creates the form and gives it content. Creative and re-creative artists use various techniques for shaping their materials. The listener, who is liberated from technical concerns, must nevertheless carry out this shaping process internally (*inneres Mitgestalten*), to realise the full potential of music.

The literature on musical interpretation. There is little scientific literature on the shaping of musical performance (*Vortragsgestaltung*), and what there is offers little of practical value.⁵ Authors rarely ask (and never answer) the question in what particular way a *crescendo* or *ritardando* is to be executed; instead, they often appeal to the artist's "taste" or "feeling" which, however, cannot form the basis for artistic shaping. In general, the observations of these authors concern surface manifestations (changes in intensity or tempo), but not the underlying force that shapes them. Of greater interest are the ideas of authors (such as Rutz, Sievers, and Becking) who have pointed to a connection between body posture or forms of rhythmic movement and musical performance. The purpose of the present investigation is to ask about the *meaning and inner necessity* of the superficial properties of performance, and to explore more thoroughly the parallelism between musical and bodily processes.

The acoustic elements of shaping. The acoustic elements that an artist manipulates in shaping a performance are pitch, timbre, intensity, and duration; while the first two are of great importance for the composer, the last two are most important for the performer. Music played with tones of equal intensity and exact duration (as notated) sounds lifeless and mechanical. It is variations in duration and intensity that create the living shapes in music. Such a "free" realisation is by no means unfaithful to the notated score; on the contrary, it is closer to the work's original conception. The artistic shaping of intensity is called *dynamics* (*Dynamik*, "moving force"); that of durations, *agogics* (*Agogik*, "conduct").

The lawfulness of musical interpretation. Observation of fine artists shows that these "liberties" in performance are by no means arbitrary. Certain patterns keep recurring and can be captured in "rules" of interpretation. These rules, however, do not reveal the biological significance of the shaping process.

The law of motion in music. As we have noted already, the origin of music lies in inner motion (*innere Bewegtheit*). The composer Carl Maria von Weber has described how, on his travels, the forms of the landscape moving past the coach window would evoke compelling melodic images in his mind. Ethnomusicological research has revealed a relationship between the landscape and the melodic motion of folksongs: The songs of mountain people often show jagged melodic lines, while those of hill dwellers are gently arched, and those of the plains people are monotonous.⁶ The inner motion that gives rise to music may be more or less conscious. It is a pure sensation of motion, not necessarily accompanied by emotional experiences.

Just as motion can generate tones, so the tones can elicit a sensation of motion in the listener. Even single tones can accomplish that, if they are dynamically changing. For example, on hearing the tone G4 played on a violin, one observer reported a feeling of moving freely, being suspended in the air; on hearing D6, a feeling of jumping high, quickly climbing up, etc.⁷ To have clear experiences of this kind, however, certain prerequisites are necessary; therefore, not everyone makes these observations, even though everyone has the potential for having the corresponding experiences.

The phenomenon of *visual synaesthesia* (*Synopsisie*) makes it possible to demonstrate these experiences, also for series of connected tones. Some persons who experience the motion character of music and who have a pronounced visual sense can translate the motion from the auditory to the visual domain by drawing "synoptic pictures". On listening to the same music performed in the same way, a synoptic person usually has the same visual image, even if days or years intervene, and even if the music is only imagined. The colour of these images usually reflects sonic (timbre, intensity, and register) and harmonic factors, whereas their form depends on pitch, intensity, and duration of the tones—that is, on the melodic-rhythmic motion in the music.⁸

Tonal motion and emotional experience. Musical motion is often just playful, like a bird gliding through the air; however, it can also have a deeper significance—the expression of inner motion. We know from recent research that every experience is accompanied by an inner process of motion, which is often barely perceptible.⁹ Therefore, a certain musical motion should elicit in the listener a corresponding motion experience. An experiment was conducted in which two subjects (not musicians, but experienced in psychological observation) were presented with single tones played with different forms of motion on the violin and were asked to describe their experiences.¹⁰ There was considerable agreement between the two subjects in reporting impressions such as "powerful", "sad", "commanding", etc., in response to particular tones. These impressions were determined by the totality of each sound (pitch, timbre, volume, duration), but primarily by its underlying form of motion. This is the element that music has in common with all kinds of other experiences and living things. Moreover, the specific form of the motion reflects the specific kind of the experience. Straight motion (*i.e.*, a tone of constant intensity) can elicit only a very limited range of experiences, or a direct awareness of the tone as such. All more differentiated experiences are associated with *curvilinear* forms of motion.

A survey of the subjects' responses shows that, although they do not refer directly to experiences of motion, they reveal states of tension (*e.g.*, feelings of power, excitement, elevation, contraction, etc.) which tend to result from inner motion. Often the inner motion cannot be described well in words and can be captured precisely only by the musical motion itself.

Historical references to motion in music. Music is tonal motion (*tönende Bewegung*); it was thus from the beginning and will always be that way. However, when we listen to how music is "made" today, we find that tonal motion is often difficult to sense. The music of primitive people has an elementary, vital motion that is often missing in our music of today. There is also evidence that in antiquity and in the middle ages there was a closer connection between motion and music. For example, in ancient Greece the conductor of a chorus would outline the melodic motion with his hand. Early notational systems (*e.g.*, neumes) were a fairly direct representation of the melodic motion. The later development of exact representation of pitches on a staff, however, led to a loss of this graphic immediacy and of a sense for the connection between the separate notes. Modern notation encloses the living music like a rigid and cold armour. Yet it is not difficult to cut through this armour and to make the imprisoned shape come gloriously alive.¹¹

Music as a Biologically Conditioned Form of Motion

The concept of motion as it functions in music. The term "motion" (*Bewegung*) has been used by music theorists in many different ways, often to refer just to the tempo. However, we need a broader definition that encompasses all of music and that accounts equally for the experiences of the shaping performer and of the receiving listener. The novelist Jean Paul came close to the truth when he said: "Music is an invisible dance, just as dance is inaudible music". The motion experience elicited by music is of an inner nature and affects the whole being. Its only outward manifestation are subtle tensions of the muscles. These sensations easily pass unnoticed because they are overshadowed by more intense acoustic, visual, and motoric sensations that accompany music. The performer, for example, "experiences" the technical movements he makes in playing his instrument. Yet, if the execution is proper, these movements arise from inner motion in adaptation to the instrument and thus are organically integrated with musical motion.

Musical motion is internal and encompasses the whole human being. It is not only an emotion (*Gemüts-Bewegung*) but also a true motion sensation. It must be distinguished from acoustic vibrations, from sympathetic resonance, from technical movements in playing an instrument, from the sequence of tones (which is only the outward manifestation of the inner process), and from conducting movements (though they merge partially with it). Musical motion can be likened to an invisible, imaginary dance which is free from all physical constraints. Absolute freedom in movement is the special privilege of music. Musical motion is as differentiated and manifold as life itself, and each musical work has its own motion sequence (*Bewegungsablauf*). What all motions have in common is that they communicate from one inner being to another.

From a scientific viewpoint, the experience of musical motion may be counted among the *vestibular sensations*.¹² These sensations arise from

movement of the whole body, not of individual limbs. In the emotions, vestibular sensations are encountered in pure form, although little attention has been paid to them. In our experiments, they appear as various patterns of tension in the whole body. We may conclude that even the more differentiated musical experiences are mediated by vestibular sensations. Although they are mostly of a passive nature, they occasionally may have a more active character which then may be transmitted to the limbs.

The mechanical elements of motion. Every motion starts with an *impulse* or energy that gives it direction and velocity. These properties are modified by resistances in the environment and in the moving body itself (friction, mass, etc.). Every movement needs space and time. By observing the movement trajectory in space and time, we can infer the energy that gave rise to it.

The acoustical elements of motion. Movements usually cause sound. The dynamic development of the sound (*i.e.*, its agogics) provides information about the movement trajectory. The closer the moving object, the louder the sound. The faster the movement, the higher the "pitch"; changes in timbre will occur also. Thus, the acoustic dimensions that convey the movement of objects are the very elements that are involved in musical performance, *viz.*, dynamics and agogics.

Since a movement can be recognised by its dynamo-agogics (*Dynamo-Agogik*), it follows that it can also be *represented* by the same dynamo-agogics, so that any movement can be expressed acoustically, hence musically. *Provided the sound has the dynamo-agogic development corresponding to a natural movement*, it will evoke the impression of this movement in us. This impression will be strongest when changes in pitch are involved; this is not essential, however. When the speed of a movement does not change much, its nature is conveyed by its dynamo-agogics alone.

The acoustic elements of motion and the shaping of sound. Thus we come to realise that musical dynamics and agogics are nothing but the expression of movement processes (*Bewegungsvorgänge*). Musical shaping is the shaping of movement. Every *crescendo* and *decrescendo*, every *accelerando* and *decelerando*, is nothing but the manifestation of changing motion energies, regardless of whether they are intended as pure movement or as expression of emotion. Therefore it is not sufficient to execute a *crescendo*, for example, by increasing the intensity of the tones in some arbitrary fashion. The dynamic development must arise as expression of a natural movement, in which case the appropriate agogics will also appear, so that the tone sequence assumes a living, true, and eloquent expression.

Just as space and time are inseparable in a real movement, so dynamics and agogics are both necessary for musical motion; neither is sufficient by itself. The function of agogics is to "guide" the dynamics; this function can only be fulfilled when both result from the same movement. Dynamics and agogics thus must be mutually attuned and without contradiction. In music, the motion processes should occur in a natural manner, otherwise they seem strange and do not communicate anything. Motion is perceived as natural only when it obeys the natural laws of movement. Therefore, the dynamic-agogic shaping of music cannot be applied from the outside, but only through

the inner execution (*Mitvollzug*) of the appropriate movement. This applies equally when the object of the shaping is an emotion rather than a pure movement.

The biological and psycho-physiological foundations of the law of motion, and of music experience and shaping. Our daily experience from birth on connects sensations of movement, vision, and hearing; thus associations are formed. We also find an expression of acoustic motion (mostly as emotion) in the intonation of spoken language. However, there is also a more direct path from sound to the sensation of motion, through the *vestibulum*. This is evident in fish, for example, which have no basilar membrane but only a vestibulum: They react to sound with movement (*e.g.*, flight). In humans, the vestibulum serves to maintain equilibrium and is closely connected with the system of motoric muscles. An uninhibited body reacts to sound with certain movements. In animals, P. Tullio (1929) has elicited particular movements by acoustically stimulating the exposed labyrinth; the nature of the movement depended on the type of sound.¹³ That humans do not often react to sound with overt movements may be attributed to cultural inhibitions. However, an inner movement reaction will often occur, especially when listening to music. Indirect (associative) and direct (vestibular) effects work in concert and form the psycho-physiological basis of musical experience.

Through its connections to the muscular system, the vestibulum is also the natural organ for the motional shaping of music. It controls both dynamics and agogics. However, the vestibular-muscular connection can be disturbed: Voluntary impulses, education, inhibitions, etc., may work against the physiological link.

The Comprehension and Identification (Erfassen und Feststellen) of Musical Motion

The basic forms of motion in music. Let us imagine a simple scale, from C4 to C5 and back to C4. The most obvious motion trajectory (*Bewegungsbahn*) for it would perhaps be a straight line; however, such movements rarely occur in nature. Also, an ascending line for the ascending part and a descending line for the descending part would be unnatural because of the sharp angle on top. In nature, everything moves in *curves*.

If we try to find a suitable curvilinear trajectory for our scale, we note right away that a downward movement is unthinkable for the rising part of the scale. It is in the nature of our functional organisation that the general direction of the movement must agree with the (pitch) direction of the tone sequence. Therefore, a rising-falling scale can only have a rising-falling movement.

There are three basic possibilities of an up-down movement, which differ in manner and inner content (*Gehalt*). They are illustrated in Figure 1:

- (1) The *open* movement begins calmly, accelerates on the way up, makes a narrow counter-clockwise loop, and decelerates on the way down.
- (2) The *closed* movement begins rapidly, decelerates as it reaches the top, then accelerates on the way down, making a larger clockwise loop if it continues into another movement.

(3) The *winding* (*gewunden*) movement ascends diagonally into a large counter-clockwise loop and descends fairly vertically, making a smaller clockwise loop at the bottom, which leads it back to its origin.

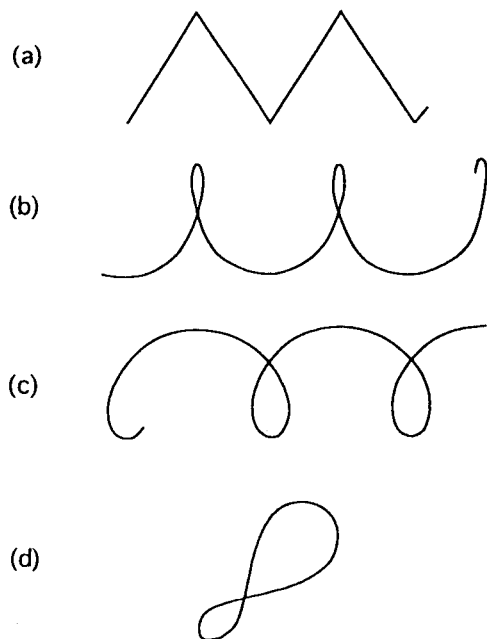


FIG. 1

One artificial and three natural forms of movement (after Truslit's Plate 2): (a) straight; (b) open; (c) closed; (d) winding. The coordinates are spatial (left-right and up-down).

These three basic forms of curving motion have innumerable variants. The winding movement in particular can vary in the angle and direction of its axis, as well as in the relative magnitude of its two loops.

The acoustic manifestations of the different movement forms, and their examination through measurement. To illustrate these movements, an oboist was asked to play a scale that ascended and descended twice over an octave. Once he played it without inner motion, with *crescendo* and *decrescendo* applied from the outside, as it were. The other times he played it with a lively inner motion, according to the three forms of movement. He had not practiced these forms beforehand but was merely shown the motion curves, with explanations of how each motion was to be executed.¹⁴ Even though he had not mastered these movements completely, their differences were nevertheless expressed clearly.

This is evident on listening to the recording. In contrast to the first (straight) example, in which the tones seem to be stationary and unrelated to each other, the other examples exhibit a lively pull, an impulsive forward

motion. The open scale scurries along, taking the upper loops in flight; the closed scale moves forward energetically and broadly; the winding scale winds around itself with even greater energy and wide sweep. Moreover, they differ in their speed, with the open scale being fastest and the winding one slowest. These differences were not intended as such; rather, they result necessarily from the peculiarities of the different movements. In each movement, the descent is somewhat faster than the ascent, which is also quite natural. In fact, all the details of agogics and dynamics follow from the specific characteristics of each movement.¹⁵ Normally, volume will increase with pitch, but the opposite can also occur. Furthermore, there are timbre differences among the movements, with a thinner, more transparent sound in the open movement, a fuller sound in the closed movement, and an even fuller, radiant sound in the winding movement.

It might be asked whether some of these differences are imaginary. To prove their objective existence, measurements were conducted on the sound examples. Using a "film gramophone", the sound wave was recorded on film and then projected onto a wall to magnify it. Thus the durations of tones could be measured to the nearest millisecond, and relative amplitudes were measured in millimetres.¹⁶ The results of these measurements are shown in Figure 2.¹⁷

It is evident that the open motion proceeds faster than the closed one, which in turn is faster than the winding one. There is also a tendency, most noticeable in open motion, for the scale to be played faster the second time. This speeding up with repetition is a characteristic of natural movement; it is most pronounced at the beginning of a tone series. There is also a tendency for the descending scale to be faster than the ascending scale, especially in the first playing.¹⁸

The unnatural temporal precision of the "straight" scale may be noted. Such mechanical exactness suppresses the inner life and restricts the musical content to the sonic appearance; it has no expressive effect on the listener. In the various forms of motion, on the other hand, if the agogic subtleties occur in the right manner, the tones also seem to arrive with great temporal precision, but with a liveliness that contrasts starkly with metronomic playing. The precision here derives from entirely different sources.¹⁹ Maximum precision is found rarely, but characteristically in the greatest masters of musical performance.

The amplitude curves in Figure 2 show a moderate increase of volume in the open movement, a stronger increase in the closed movement, and an even stronger increase in the winding movement. There are some deviations from the ideal dynamic shapes; however, each movement form is expressed very clearly.²⁰

Additional studies confirm these impressions. Thus, in further sound examples, a bassoonist plays a broken chord *staccato* in the three movement forms, and a violinist (somewhat more experienced) plays an ascending series of broken chords in more complex (concatenated) open and closed movement forms.²¹

It should be remembered that dynamics and agogics, although they are measured separately, form an inseparable unit. The amplitude curve depends

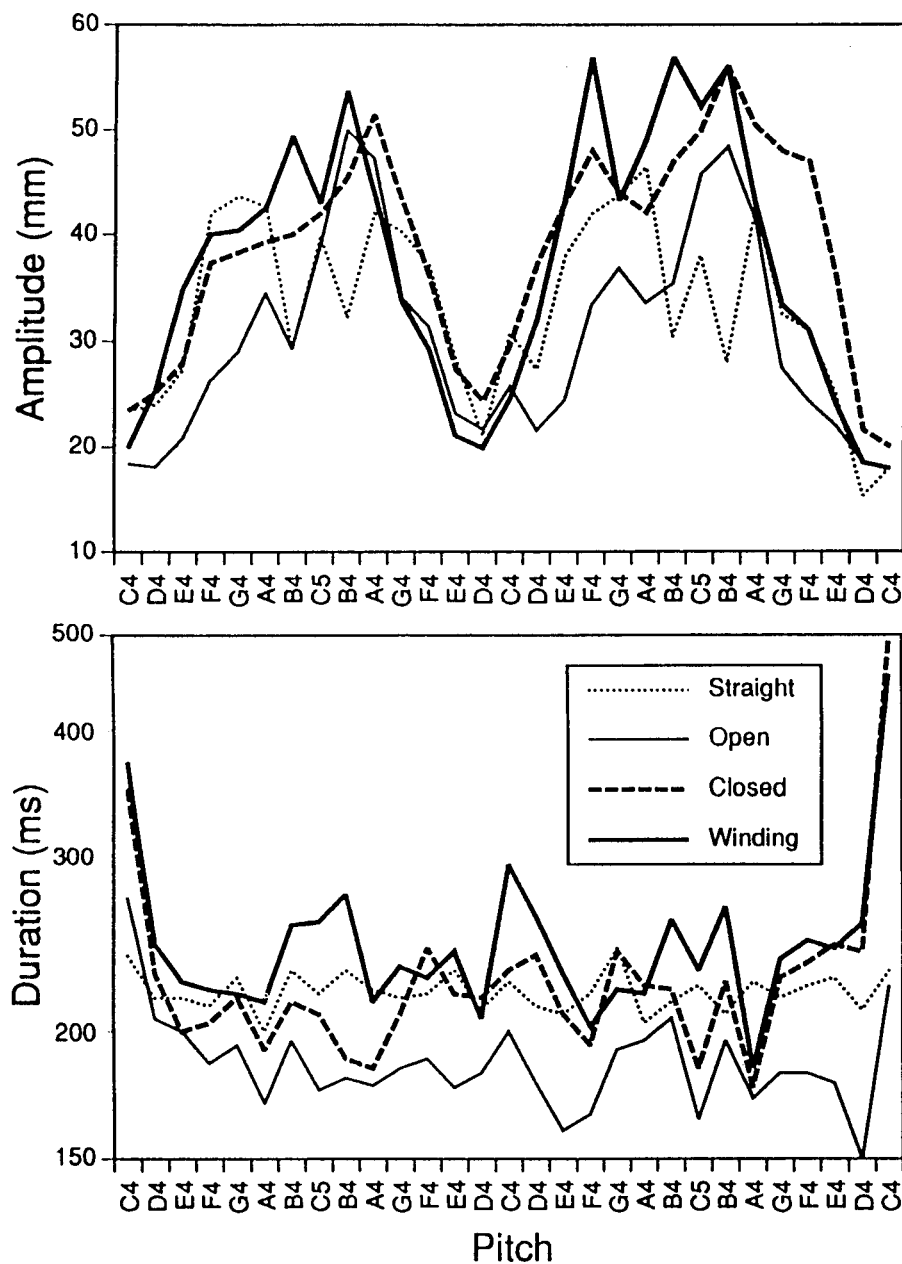


FIG. 2

Relative amplitudes (upper panel) and durations (lower panel) of the tones of a twice ascending and descending scale (C4 to C5), as played "straight" and with three forms of inner movement by an oboist. (Data from Truslit's table on pp. 88-89.)

on the timing of the tones, and a doubling of the tempo, for example, would lead to a much steeper movement trajectory. What amplitude curves (such as shown in Figure 2) cannot represent are the loops and changes in direction of the movement (cf. Figure 1); the loops are stretched out, as it were, along the unidimensional axis of time. When this is taken into account, one can appreciate the complete correspondence of the measured dynamo-agogics with the original movement that shaped the music.

Timbre differences among the movement forms were measured by examining the relative intensities of the partials in bassoon tones (G3, occurring both in an ascending and in a descending *arpeggio*). It appeared that the second harmonic was stronger in closed than in open movement, and strongest in winding movement. It was also noted that intonation tended to be slightly sharp in open motion and slightly flat in winding motion, though it depended on a number of other factors as well. This effect is strongest in the singing voice, and a tone in high *tessitura* may sound impure or wrong when it is mistakenly sung in open rather than in closed or winding motion.

The reception (Erfassen) of the heard motion. Having determined how inner motion manifests itself in simple musical examples, we must now ask whether the listener can consciously apprehend and experience this motion, and whether the motion-based music experience is as naturally given as the motion-based shaping of music.

Sound example No. 10 reproduces an excerpt from Wagner's *Tristan und Isolde* (the end of Scene 1 in Act 2, where Isolde is waving a handkerchief impatiently) whose form of movement is so immediately compelling that it can become conscious on first hearing. If it does not, then perhaps the listener's attention was focused on other musical elements (the sound *per se*, the rhythm, etc.) or his body was too tense (inhibited) to develop the muscular reactions. In such cases, one should attempt to perform curves in the air by moving both arms in parallel (from the torso) in open, closed, or winding form while listening to the music. Soon it will become apparent that one of these forms fits the music better than the others. How does this come about?

When humans or animals move in a group, there is a strong tendency to move *in phase* with the nearest precursor; this can be seen, for example, in running dogs, jumping children, or migrating birds. Otherwise, there is a feeling of incongruence which arises from the mismatch in the simultaneous experience of one's own movement and that of the precursor. Moving in phase eliminates this incongruence.

Music elicits in us motion sensations comparable to those we experience when we observe another moving person; our own movements, which should adapt to the other's movements, are the arm movements recommended above. Of course, it is possible to execute any arbitrary movement to music; however, if we pay close attention, we find which form generates the least "inner friction". This simple procedure makes it possible to determine *objectively* the forms of movement in music.²²

It is useful to record every musical form of movement graphically as soon as it has been determined.²³ One often speaks of a "beautiful line" in music

without knowing what this really means. A drawn curve with corners or bumps in it does not look good; it does not "sing". Our eyes are extremely sensitive to such small deviations from good form. Our ears, unfortunately, have largely lost (*verlernt*) the ability to attend to the pure motion-determined progress of a melody.

In drawing a curve to represent musical motion, the listener must feel the inner motion and let his hand be guided by it. This is achieved most effectively by people with synoptic abilities (see above). The curve as such is not important, however; it is only an aid to visualising the motion. The essential thing in music is the experience of natural motion as expression of an event (*Geschehen*). The curve must be experienced as a picture of motion, as the trace of someone moving. It also implies the energy process (*Energieablauf*) necessary for execution of the movement. However, the *character* of the movement is not determined by the visual picture. Depending on whether a small or a large mass is moving, or on the mood in which the movement is carried out, there may be many fine differences in the dynamo-agogic pattern. This "inner differentiation" of the movement form is not visible in the curve and would clutter the picture, were it included. Thus there are many possibilities of individual shaping. By no means does the curve fix the exact form of movement of a musical work.

The original motion (Ur-bewegung) in music, and proof that it can be determined. The assumption seems justified that every inner motion can find only one corresponding motion-based musical expression, and that every motion-based music can contain only one form of movement, namely, the original one that was effective in the composer.²⁴ In some musical examples, it is fairly obvious what this original motion must have been (e.g., the open movement of wading in the *Tristan* example). In most cases, however, the determination is not so simple and requires a very fine sense for motion (*Bewegungssinn*).

The question may well be raised whether it is possible to find the "correct" motion, and whether it makes any sense to search for it. Although this question seems to be answered in the affirmative by our consideration of the physiological facts and our experiments with synoptic persons, an experiment was nevertheless undertaken. Its purpose was to examine to what extent the form of motion determined from a musical score (rather than from listening to a performance) would agree with the original form of motion that was expressed in the music.

Two subjects (N. and T.) participated, both well versed in the methods described in this book.²⁵ Subject N. chose a motion curve and sketched it on paper. He/she then carried out the movement with the arms, or sometimes just imagined it, and notated the musical form that came to mind. The resulting notated musical phrases were presented to subject T., who tried to determine the motion in them and drew the corresponding curves. There were 20 examples altogether (see Figure 3). In 13 of these, the recovered motion curves were identical with the original ones, in six there were minor differences, and in only one (No. 4) there was a clear disagreement. The experiment thus supports the claim that the original motion pattern can be determined from the musical score.

1 Musikalische Form der Urbewegung	2 Urbewegung	3 Festgestellte Beweg. (Reproduzierte Beweg.)

FIG. 3

Experiment on the recovery of original motion from notated music. (1) Examples notated by subject N. (2) Original motion curves, as drawn by subject N. (3) Motion curves drawn by subject T. (Reproduced from the insert between pages 116 and 117 in Truslit's book.)

The significance of the original motion for sonic shaping (klangliches Gestalten). To shape music completely, and to affect the listener as a whole, the artist must shape the work out of the original motion. When music is played with an incorrect motion, there is a disharmony between the tones (whose sequence is a partial expression of the original motion) and the deviant dynamo-agogic shaping, with negative effects on both performer and listener.²⁶

The melos as principal carrier of musical motion, and its relation to rhythm and harmony. The *melos* is the principal carrier of motion; a melody without motion is not yet a *melos*. *Melos* means "singing", and only a melody filled with motion can "sing".

In the evolution of music lively melodic patterns preceded the development of scales. The rhythms that pervaded them were, like the melodies, lively and fluid, without disruptive accents. Infants, before they even begin to speak, sing or babble with variations in pitch—a first manifestation of melody. In our earlier examples of single tones sung with different forms of motion, we observed a tendency of the tone to either rise or fall in pitch—a tendency towards melody formation.

Beethoven, while composing, would hum or growl up and down in pitch, without singing specific notes. This siren-like up and down is not yet a melody, but it is the original form from which the melody develops. This development (selection of specific tones and intervals, rhythm, metric frame, etc.) may proceed very quickly and unconsciously, so that only the more or less finished music is heard inwardly (just as many processes in ordinary speaking do not reach consciousness).

The same basic motion can give rise to somewhat different musical forms. There may be differences in register, interval size, rhythm, meter, etc. These fine differentiations, however, cause an equally fine detail in the original motion of the emerging musical form. Thus the inner motion expresses itself first in the melody, which then is refined through the addition of rhythmic, metric, harmonic, and other elements. Rhythm and meter must be relatively discreet, so as not to disrupt the melodic motion. In dance music especially, fluid motion may be destroyed by strong accents.

Although "rhythm" originally meant "flowing" or "even motion", the concept has shifted over time to focus on special manifestations such as accent and tone duration, while the element of motion in rhythm has been forgotten.²⁷ Rhythm occurs to make the motion of even the smallest impulses purposeful and harmonious, and to inject new impulses. Its purpose is *not* to define accents, divisions, groups, or the like; these appear in rhythm without being planned as such.

Rhythm is based on *combination (Zusammenfassung)* of similarly structured, recurring events. A running dog automatically combines the movements of its legs into a quaternary rhythm and thus needs only a single impulse instead of four separate ones; that impulse in turn is carried by the principal motion, the rushing ahead. That which has been combined—the content of the rhythm, or rhythmic motive—consists of a chain of smaller impulses, which also have motion character. This form of motion, however, as well as its combination, is different from the motion considered so far, which shapes

the melody. Whereas the latter relates to movement of the *whole body* via the labyrinth of the ear, the individual rhythmic impulses as well as their combination relate to movements of *individual limbs* and of the torso via the system of muscles and joints. Thus, overt movements such as foot tapping are easily elicited by rhythmic motion. Rhythmic and melodic motion thus have very different meanings: One affects the limbs, the other the whole person. In its dynamo-agogic consequences, however, rhythmic motion must also follow the law of motion, which is regulated by the vestibulum.

Consideration of several recorded examples shows that the rhythm alone (as tapped with the finger, for example) can suggest a motion that is different from that which emerges when the melody is added. The melodic motion carries and absorbs the rhythmic motion, without suppressing its inner pulsing. That the two motions spring from different sources is also evident from encounters with students who have a highly developed rhythmic sense but no feeling for melodic motion, as well as from clinical cases which show that melody production can be impaired while rhythm production remains intact.

Harmonic dissonance can also cause tension in the muscle system, but again in a different way than melody and rhythm.²⁸ The sharper dissonances, which result in greater tension, tend to lie in those parts of the musical motion curve that must be executed with greater energy and tension. Thus, if the melodic motion is executed correctly, justice is also done to the harmonic relationships.

The determination of the original motion (education of the sense for musical motion through inner listening). When we listen to music that has been shaped by motion, it is easy to hear the expressed motion. However, when we have only the score, how do we arrive at the motion that we need for its sonic shaping?

Consider a single long tone. To determine a motion curve, at least three points are needed; a single tone provides only one, so there is considerable freedom. The motion could go from left to right or from right to left (which, depending on the hand executing the movement, will be towards the body or away from it), and upward or downward. Normally, however, a single long tone will have a curve that rises from left to right, unless some very special expression is intended. If the curve is open, the tone becomes short and pointed; a winding curve gives the tone something disquiet and provocative; a closed curved works best because it results in a quiet and broadly encompassing form.

For a short tone, the closed form is still best, though it begins before the tone sounds; an open form would be appropriate only if the tone is to be understood as a question or scream. However, tones rarely occur in isolation. The accompaniment or the following context usually indicate the original motion, not only for the tone itself but for the whole phrase or section. Incidentally, the motion sense has a tendency to persist in the same form.

For two tones, there is already a better basis for determining the original motion. Thus, two tones ascending an octave suggest a closed form rising from left to right and falling slightly at the end, whereas two tones descending

one octave result in a closed form rising slightly and then falling from left to right.²⁹

To illustrate further the relationship between musical form and motion, let us see how small changes in a musical phrase of about 12 tones change the form of motion. Figure 4 shows nine variations of a simple broken chord and the corresponding motion curves. Example 1 clearly has an open form which rises slowly at first, then faster. In Example 2, these differences are reversed, and the motion is a closed one. A small change on top from C4 to D4 (Example 3), which creates a dissonance and corresponding tension, causes a sharp counter-clockwise turn towards the body, hence a winding motion. Note also that the ascending part of the curve is now rounder, bigger, and fuller of energy than in Example 2, even though the notes are the same. In Example 4, the highest tone is raised but causes little tension because it is a member of the triad; this causes the upper loop of the curve to become bigger and rounder, and the lower loop to adjust correspondingly. When the highest tone rises even further to the sixth scale step (Example 5), it results in harmonic tension, so that the upper loop becomes broad and filled with tension, whereas the lower loop is small.

These examples show how a seemingly insignificant change in the melody can amount to a change in the form of motion. In the first three examples the character of motion has changed. If one tries to perform these examples with other forms of motion (preferably on an instrument), he will see what inhibitions arise and how unfavourably the incorrect curves affect the sound. Examples 3-5 illustrate how, in addition to the musical "line" visible in the notation, the harmonic development implicit in the tone sequence influences the form of motion. The motions can also differ very much in energy.

In Example 6, the simple "line" is varied by a temporary change of direction, reflected as a small loop in the curve. The overall character of the movement is not affected. The extension of the first tone in Example 7 results in an even broader beginning of the curve. The last two examples (8 and 9) show that neither metric nor rhythmic variations influence the basic form significantly. Similarly, the articulation of the notes (*legato* versus *staccato*) is irrelevant to the basic motion and only of characterising value.

In all these examples, the motion was not derived from the picture of the notes; rather, it was "intuited" (*empfindungsmäßig "erspürt"*). What was to be demonstrated here is how certain musical moments can determine the course of motion, and how meter, rhythm, phrasing, and articulation align themselves with the musical motion.³⁰

We turn now to some examples from the musical literature. With some simple motives, such as the "nature motive" from Wagner's *Das Rheingold*, the form of motion is easily recognised; obviously, it is closed (rising from left to right). A longer simple motive, the "supper motive" from *Parsifal*, has a widely arched closed form, with several small loops where there are dips in the melodic contour as well as harmonic tensions. Each loop, bend, or change in direction is a source of energy that helps sustain the great arch.

It is instructive to compare two examples having rather similar tone sequences but very different forms of motion, caused mainly by the different harmonies: The beginnings of the slow movement of Beethoven's Piano Sonata

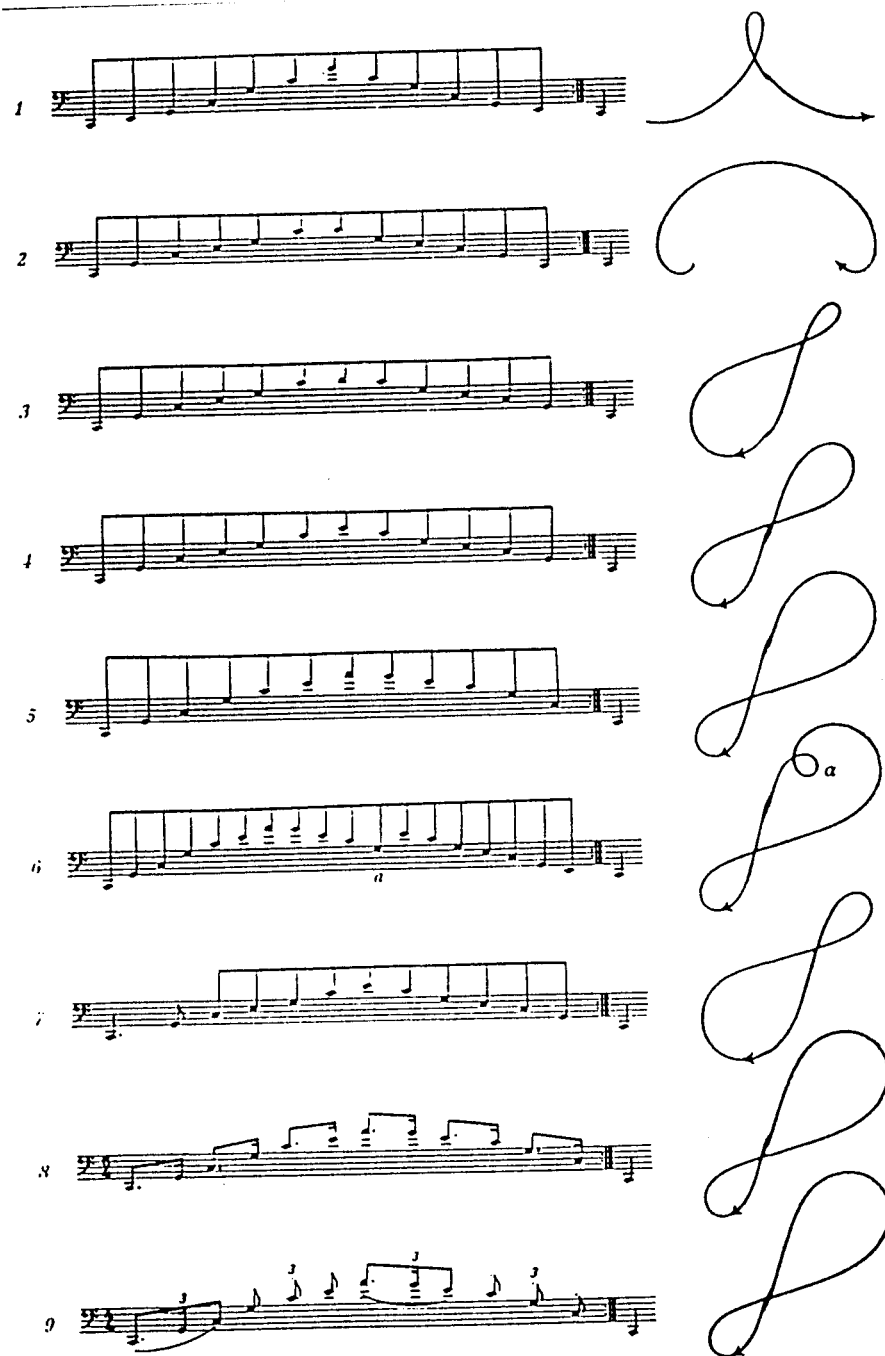


FIG. 4
Nine variations of an *arpeggio* and the corresponding motion curves.
(Reproduced from p. 137 of Truslit's book.)

in C minor, op. 10, No. 1, and of Schubert's *Ave Maria*. The former has a quiet, closed form, whereas the latter has a special winding form, which gives the motion a very different character. Schubert's motive starts with a closed form but then bends over to the left and moves away from the body, whereas Beethoven's motion curve returns to the body.

The initial eight bars of Brahms' Second Rhapsody, op. 79, show a fine interplay of closed and winding curves. The next five bars, however, demand a single closed curve, with some small, imaginary loops. The part for the left hand, however, has a different pattern of two closed curves. It is not unusual to find different motion curves for different voices assigned to the two hands in piano music. This is seen also in the following seven bars (the second theme), where the right-hand melody has a winding, almost horizontal curve, whereas the left hand has simple closed arches. The 12-bar coda also requires a closed movement.

The graceful Rondo in E-flat major by C. P. E. Bach shows an open movement form. Brahms' famous *Lullaby*, on the other hand, has a horizontal, winding motion over two bars at a time. Often it is sung with an open motion, which corresponds to the shaking motion of a cradle rocked with the foot. The original motion, however, corresponds to an old-fashioned cradle suspended from the ceiling, which swings freely and is more effective in putting infants to sleep. This ancient form of rocking is the biologically correct one and probably very important for the development of the vestibular sense of motion.

The correct motion of a musical work cannot be found intellectually; rather, the "guiding hand" in this search is provided by a very fine sense for the (non)correspondence between the inner motion of the music and the movements we have assumed to be "correct". Therefore, it is difficult to describe this process. Usually one can only point to outward manifestations of one or the other movement.³¹

The impression that a certain tone has been played too loud or too soft, too long or too short, can only result from a conscious or unconscious *comparison* of what has been heard to a motion-based inner experience of the tonal events. The expressive quality of a tone can only be judged in the context of other tones, and only as expression of the particular local tension (*Spannungsstrecke*) of its motion trajectory. If we do not move along (inwardly) ourselves, then we have "no sense" for irregularities. Even though the vestibular reactions are automatic, they are easily "drowned out" by tonal sensations, metric impulses, etc.

The flux, liveliness, special sound quality, correct tempo, and especially the "comprehensibility" of music result directly from the correct motion. If the presentation of a musical work is "biologically" perfect (*i.e.*, if its inherent dynamo-agogics, resulting from the original motion, are realised), then we do not need any special "interpretation". The personality of the recreating artist comes through automatically in an appropriate way.

The Shaping and Mastery of Musical Motion

Motion-based shaping and its natural mastery. It is commonly believed that performance (*Vortrag*) relies on "inspiration", "intuition", "feeling", or the

like. However, these subjective states must not guide the recreating artist, because they do not give access to the original motion. Rather, the original motion may elicit them. Unfortunately, there are few artists today who can shape under the influence of inner motion.

Music teachers, even if they are highly talented, will use in their conscious teaching prescriptions such as "This tone must be the strongest" (but why?), "That tone should be extended" (but by how much?), "This *crescendo* must be natural" (but in what way?), etc. These are hints towards an external application of nuances, which can influence only the exterior of the performance; the inner motion remains obscure. The dynamo-agogic differentiations that express inner motion can be described in rules, but simple application of these rules does not result in living expression. The dynamo-agogics are so subtle that they cannot be grasped intellectually and applied in a calculated fashion. What is important is not the mathematically precise realisation of absolute temporal or dynamic values, but the "presence" of motion as a shaping force that realises *relative* values automatically with absolute precision.

Sonic shaping requires movement of the organs required for singing or playing. These movements have dynamo-agogics corresponding to those of the activating muscles. The sonic events thus correspond to the dynamo-agogic muscular events. If the latter are inhibited, angular, abrupt, or contrived, this will be mirrored in the sonic events; however, if they are holistically experienced, free and harmonious, so will be the sound.³²

As our investigations have shown, the inner motion of the performer leads to muscle actions, which in turn lead to sonic events that stimulate the listener's basilar membrane and vestibulum, and thus lead to auditory sensations paired with an inner motion experience and corresponding muscular reactions. All these stages *preserve the same dynamo-agogics*. It is now clear that a person must be *wholly* involved in the shaping and experience of music. Manual dexterity alone does not generate living music; it can dazzle listeners but cannot move them.

The natural development of mastery of movement (education of ear, sense of motion, and the body). Attempts to bring people closer to music by educating their bodies, such as practiced by Dalcroze and his successors, are based on a good idea but suffer from a focus on rhythm. The true musical motion, which is primarily melodic, is easily destroyed by the rhythmic element, which affects the limbs. To get hold of our body musically, we must move it as a whole; its movements must be melodic without losing the rhythm.

These movements are of a different character than the rhythm-oriented ones.³³ They are not gymnastic or dance-like, nor do they represent a translation (*Verdolmetschung*) of the music. They merely open a path to establish the inner link between the original motion of the music and the melodic movements of the body. They magnify and bring to consciousness the subtle muscular reactions to music.³⁴ Unlike rhythmic movements, they are not swinging or driven by gravity. Rather, they are intensively *guided*, especially in the large curves. The most important muscle is the *latissimus dorsi*, whose pattern of tension follows the corresponding motion curve. The muscular tensions are very different for the (superficially similar) beginnings of a winding and an open curve; they anticipate the further course of the

movement. The different forms of movement also affect the diaphragm, which accounts for different sound qualities in singing or blowing a wind instrument. An elastic connection between the limbs and the torso is essential. The body leads the movement, and the arms follow like a single limb.

As the bodily mastery of these movement exercises progresses, so that even the finest musical motions can be experienced with the whole body, the sonic shaping also becomes more perfect, lifelike, and free. There is no need to worry, however, that mastery of the original motion will always and in everyone lead to the same stereotypical sonic expression. The executant's personality, temperament, mood, etc., will introduce differences, while preserving the original form. Nor does the inner motion experience interfere in any way with the playing of music; it only manifests itself as a natural suppleness of the body. Through its effect on the diaphragm, motion-based music making also influences breathing patterns in both performer and listener, and thereby may even have a stimulating and beneficial effect on blood circulation.

Prerequisites for sonic shaping. Before we perform a musical work, we must clarify its original motion. By carrying it out internally, we derive the motion impulses that shape the dynamics and agogics. The performance should not be "thought out"; rather, the musician should concentrate fully on the inner motion experience. There should be no unmotivated tensions or relaxations, which will be perceived as unnatural deviations from the original motion. The inner energy must be maintained across pauses and *fermatas*. The engagement of the body should be intensive but not external. The movement exercises described above are merely preparatory; the exaggeration demanded by them automatically disappears in the actual musical shaping.

The graphic movement curve reproduces only a small part of the actual content of the motion. For example, dynamics and agogics cannot be seen directly in the curve. Only the *experience* of this schematically sketched movement allows these details to be felt. There are many other subtle differentiations to be realised. A natural movement is rarely without a goal, content, or expression. A motion may be filled with passionate impatience or with subdued anger. This essential aspect of musical motion is often difficult to render in words, but it is conveyed by the finely differentiated movement of the tones.

The motion must begin before the first tone is sounded; this avoids unclear or sharp attacks. Successive tones should be regarded as signs of particular motion events, even if they are a series of *staccato* chords. Accents should not be "applied" but should grow out of the special form of motion as sudden condensations of tension.

The sign of a perfectly natural performance is that it *seems* "metronomically accurate". Since the listener moves along with the natural musical motion, the agogic deviations are subjectively compensated, and there are no "double contours". An actually metronomic playing, on the other hand, seems deadpan and stiff. *Naturalness of a performance results when its dynamo-agogics lead to the experience of natural movement events.* Once the motional shaping is completely mastered, the consciousness of the form and manner of movement actually recedes, while the finest details of dynamics and agogics

are experienced more fully and the motion itself proceeds more precisely and freely.

The relation of musical motion to the other elements of music. It is not necessary to have a virtuoso *technique* to be able to shape according to motion. On the contrary, the "technique" should be born out of the wish to be musically expressive. The meaning of making music is not in the acquisition of a fluent technique, but in the artistic shaping of inner experience. From the very beginning, technical exercises should be guided by motion. Not only can even the simplest forms of musical expression be imbued with meaning and living warmth, but the technique is furthered and differentiated until it dissolves completely in the artistic shaping. Seen in that way, the technical differences among string, wind, and percussion instruments are immaterial; they all serve the same end—the sonic expression of experience. This also applies to conducting, in so far as it indicates the original motions rather than just the beat.

It is very difficult to achieve an unconscious engagement of the sense of motion through technical exercise alone. The easier way to a perfect performance and technique is to develop technique out of motion. The usual "practicing" works against this effort because it involves only individual limbs; it often results in the loss of the natural motion instinct. Many "technical problems" disappear once motion-based shaping and the resulting natural co-ordination of the muscles are introduced.

The sense for motion also provides the correct *tempo*. It is the movement trajectory that determines the time needed for negotiating it. The beat (*Zählzeit*) is often mistaken for the motion itself. In fact, although an Adagio and a Presto differ widely in their beat count, their motions may be very similar, spanning one bar in one case, but three or four bars in the other. In general, these temporal spans do not vary widely, hence the speed of motion is also approximately the same. If there is a lot "happening", the motion will hold back a little; if there is less, the motion will go faster. To give a performance "pull", rather than speeding up the tempo, it is sufficient to give it motion. Fast tempo, if it is not motivated by motion, creates the impression of rushing, whereas natural motion gives even the fastest piece inner calm. Similarly, accelerations and decelerations will enliven a performance only when they result naturally from the inner motion.

In conveying the melodic motion, a player often must pursue two or more curves simultaneously (e.g., in the Adagio of Beethoven's Piano Sonata op. 27, No. 2). They interweave and form an harmonious whole after having been consciously guided for a while. As far as *rhythm* is concerned, its clarity and precision do not lie in sharp accentuation but in motion-based naturalness. Moreover, as an act of combining, rhythm contains movement elements that tend towards melodic forms. The execution of rhythmic motives must likewise grow out of motion. If they represent a periodic event (such as the "tolling bell" in Chopin's Prelude in B minor), the corresponding activity must be carried out in one's imagination, otherwise it will remain "unexperienced" and not be properly translated into the acoustic domain.

The *meter* should be felt more agogically than dynamically; if it is marked too strongly, it has a disturbing effect. The same applies to *articulation and*

phrasing; the onset of the first and the offset of the last tone under a slur are especially important and must not be too sharp or abrupt. *Pauses and fermatas* are given life by motion, which bridges them and thereby determines their correct duration. *Expressive markings* in the score are generally imprecise and more a danger than a help to the performer. The original motion provides a much more precise regulation of dynamo-agogics.³⁵

Iconicity (Bildhaftigkeit) and *gesture (Gebärde)* result from a correspondence between the musical motion and natural forms or activities. *Moods and emotions* give the original motion its special character; these fine details cannot be represented in the graphic curves.

Interpretation (Auffassung), a purely intellectual function, must be distinguished from the ability to shape according to motion. However, when the correct motion is found, the "character" of a piece is usually grasped as well. The peculiarities of a given *style*, be it that of a period or of an individual composer, are contained in the original motion, which was formed under their influence. Therefore, a style can be grasped only if the original motion is grasped. (We do not refer here to the external manifestations of style, which are the subject of stylistics and have little significance for shaping.)

The sense of motion also provides a significant aid in *memorising* music. Sequences of tones are conceived as wholes (*Ganzheiten*), which provides the psychologically correct foundation for memory performance.

Motion-based music experience as "shaping along" (Mitgestalten). The listener must follow the musical motion actively, by "shaping along" inwardly. Even persons with little musical education may be receptive to musical motion, and the conscious experience of motion may generate interest in and enjoyment of music. The ability to experience music as motion constitutes true musicality.

Translator's Epilogue

Truslit's book provides no clue about the author's background. Only one other publication is cited, an obscure paper on tonal dissonance (cf. Footnote 28). Most likely, he was a music teacher rather than an academic; his theories seem to derive from an intensive active involvement with music. His systematicity and clarity of thought must be admired, and even though his empirical methods are woefully inadequate by today's standards, the fact that he saw the necessity of objective tests and measurements adds to his credits.

Truslit's ideas are original, coherent, and important. They are delivered in a concise and forceful manner, often reminiscent of James J. Gibson's style, and they antedate by several decades modern developments in psychology and psychomusicology. His assumption that the dynamo-agogics of music constitute auditory information for motion perception presages the tenets of ecological acoustics (see, e.g., Jenkins, 1985). His idea of the transmission of motion information from the musician to the listener via the acoustic medium is essentially a "motor theory", such as proposed by Liberman and his colleagues for speech perception (see, e.g., Liberman and Mattingly, 1985). One of his most intriguing and speculative proposals, that the vestibulum is the organ of musical motion perception, has recently been revived quite independently by Todd (1992a, 1992c). Several authors (Feldman *et al.*, 1992;

Repp, 1992; Todd, 1992b) are currently pursuing the question of how to characterise "natural motion" in music performance. There are many affinities between Truslit's ideas and those of Clynes (1977, 1983, 1986, Clynes and Nettheim, 1982) and Gabrielsson (1986, 1988), although these latter authors focus more on the rhythmic level, the one Truslit associates with limb movements. The strong biological flavour of Truslit's theory puts him especially in the vicinity of Clynes, whose theories originate in biocybernetics.

As far as I know, no contemporary author has based his or her theories or experiments directly on Truslit's ideas. Perhaps due to the political upheavals of the time, his book seems to have been forgotten as soon as it appeared. I hope to have convinced the reader, however, that Truslit's work deserves to be widely known. It is probably the most coherent and convincing theory of the basis of common music experience—of musical as distinct from musicological listening (cf. Cook, 1990). Approaches towards understanding the latter abound in current music psychology. It is time to give the former its due, and there is no better way to start than by reading what Truslit had to say.

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Footnotes

1. *Gestaltung* (literally, "form-giving activity") is rendered as "shaping" here, *Bewegung* alternately as "motion" or "movement".
2. Two others, according to the *National Union Catalog*, are at Northwestern University (Evanston, Illinois) and in the Library of Congress (Washington, DC).
3. Only recently—too late to take into account in this paper—I learned that the Library of Congress has a complete set of these recordings, the only one currently known to me.
4. Truslit provides few indications of how broadly he conceived of "music"—whether he included the music of other cultures as well as popular music and the new music of his time. Judging from his musical examples, he probably had in mind primarily the music of the great masters of the 18th and 19th centuries—by no means an exceptional attitude.
5. Truslit is referring here primarily to the writings of musicians and educators, a number of which he cites on the following pages. He was apparently unaware of the scientific work of Carl Seashore and his associates (see Seashore, 1938) or even of the similar work of Hartmann (1932) in his own country. Undoubtedly, however, and with justification, he would have accused these performance studies of focusing on physical variations as such, rather than on their underlying shaping forces.
6. A most intriguing observation, the source of which is not revealed.
7. Standard pitch designations (C4 = middle C) are used here. Truslit's "g1" and "d3" thus become G4 and D6, respectively.
8. Several pages of graphic examples follow, some elicited from experienced synoptic observers, others from three apparently naive subjects who were presented with the same melody played in two different ways. (A more detailed analysis of these acoustic materials, which are among the sound examples accompanying the book, is presented below.) The drawings, some of them quite elaborate and in colour, essentially follow the pitch contours of the melodies, but their relative roundness or jaggedness reflects more subtle aspects of motion character.

9. The names of Palagyi and Klages are mentioned in this connection, but without specific references.

10. These forms of motion are represented by curves whose nature is not well explained at this point but that suggest *crescendo*, *decrescendo*, and *crescendo-decrescendo*, respectively. The pitch of the tones was also varied. Truslit does not mention whether the violinist (possibly, he himself) was in view. Needless to say, his use of only two subjects makes the results less than conclusive.

11. A final sub-section omitted here, *Formulation of the law of motion*, summarises the most important claims and raises a few questions for the next section.

12. This hypothesis, recently (unknowingly) resurrected by Todd (1992a, 1992c), is elaborated below and in an Appendix to the book, which is not included in this translation.

13. These experiments are described in more detail in Truslit's Appendix.

14. The nature of these explanations is not described, nor is it clear whether the curves were presented merely on paper or were also acted out in space.

15. These details are illustrated schematically in Truslit's Plate 1.

16. Truslit says they were multiplied by 2 or 3, respectively, though it is not clear why or when either of these factors was employed. The amplitude measured is presumably the maximum excursion for each tone.

17. This figure was newly drawn from the numerical data provided by Truslit (pp. 88–89). He graphs the same data in his Plate 3, with a separate panel for each movement. The duration variations are difficult to see in his figure, however. He plots the amplitudes as a function of real time rather than of score distance, so that the tones are not evenly spaced and also not vertically aligned for the four movement types. He also superimposes idealised amplitude functions over the data; for this purpose, his representation is in fact preferable.

18. Again, this seems to be true mainly for the open movement. I have difficulty seeing differences in the other functions.

19. In contrast to this general statement, Figure 2 does not show much precision in the timing of the three moving scales, which Truslit evidently attributes to the inexperience of the performer. The only systematic timing pattern seems to be a slowing down at the extremes of the scales in the winding movement.

20. Truslit glosses rather quickly over the amplitude data. He does not mention the slower decrease in amplitude in the closed movement, nor the fact that the amplitude peaks occur beyond the top of the scale (C5). Several functions also have a local amplitude peak during the ascending portion of the scale. The straight scale has a curious amplitude drop near its apex, especially on the seventh scale step (B4).

21. Numerical data (p. 94) and a graph (Plate 5) are provided for the violinist's performances. These data seem rather more variable to me than Truslit's discussion suggests and therefore are not included here.

22. At this point follow several pages of discussion of music examples that illustrate different movement forms. Movement curves (more complex than those of Figure 1) are shown as well as some oscillograms, whose amplitude envelope (drawn somewhat impressionistically) is said to indicate the movement form. In addition to the already mentioned excerpt from *Tristan und Isolde* (open form), there are Elisabeth's prayer from Wagner's *Tannhäuser* (closed), Schubert's *Ave Maria* (winding), and the aria *Holde Aida* (*Celeste Aida*) from Verdi's *Aida* (winding).

23. In a footnote, Truslit reminds the reader that these curves are not simply portrayals of the melodic pitch contours. Their precise shapes depend on the dynamic processes resulting from the underlying movements, which do not always coincide with the pitch contour.

24. It is not quite clear how much detail Truslit means to include in the "original motion". His statements seem less controversial if they are understood as referring merely to the distinction between the three basic types of motion (cf. the preceding paragraph).

25. The subjects are not further identified. Of subject N. it is said that he/she "had mastered inner motion". Subject T. may have been the author himself.

26. There follows a discussion of three pairs of recorded musical examples; in each case, one performance represents the correct original motion, according to Truslit, whereas the other

reflects an incorrect or degenerate motion. Motion curves, temporal measurements, and oscillograms are provided for some of the examples.

27. This observation is still largely accurate today, with the significant exception of Alf Gabrielsson's work (see Gabrielsson, 1986).

28. Truslit's idea of dissonance as "competition of tone sensations" and his description of the resulting tensions as "inner contraction or dilation" due to "nerve excitation", seem esoteric.

29. These forms constitute about the first and last 60%, respectively, of the first cycle of the closed curve shown in Figure 1c.

30. The preceding paragraphs have been translated almost completely, to convey these important examples in detail. Due to space limitations, the following discussion of more complex musical examples, while equally instructive, can be reproduced only in rough outline.

31. There follows a discussion of a more complex example, the first 28 bars of the Prelude to Verdi's *La Traviata*, which is omitted here because it makes extensive reference to sound recordings. Truslit compares in detail two performances by well-known (but unnamed) conductors, one of which shows the correct movement whereas the other does not. The following two, more general paragraphs are embedded in that discussion. Discussion of another sound example, from a Haydn Symphony, concludes the section.

32. This is illustrated with a sound example, an excerpt from a Chopin Nocturne, played by a pianist first without any instructions, then with the intention of conveying the appropriate motion, which was presented by the experimenter as arm movement and as a drawn curve. A substantial improvement is pointed out.

33. A series of still photographs illustrates phases in movements corresponding to two of the musical examples, as acted out by a man (presumably, the author).

34. According to Truslit, the celebrated dancer Isadora Duncan fully recognised the importance of movement in music and, by reproducing its curves, created her unique art in which dance and music fused into a single original motion. He further cites the work of the piano pedagogue Elisabeth Caland.

35. In a footnote, Truslit argues in favour of performances of Bach's harpsichord works on the modern piano, and of including the dynamic variations that are possible on this instrument, even though they are not "in style".

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