

ORDER/DISORDER AS A FACTOR IN SHAPING A STYLE SCHEMATA OF REPETITION AND FORM

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Awards: Frank Peleg Prize, 1993, for the book *Contemplation and Experience in Music Education* (Jerusalem: Magnes Press, 1991).

Publications: *Symmetry in Music*, *Symmetry: Culture and Science*, vol. 8., no. 1.; *Symmetry in Music: A Historical Perspective*, *Symmetry: Culture and Science*.



Abstract: *In the present paper I have attempted to define repetition schemata in terms of the order of appearance (along the time axis) of similar and different sections and in terms of some of the structural properties of these sections, including order/disorder (of each section). I assumed that the concept of order is related to the sense of certainty regarding the musical progression; it contributes to "directionality" and may appear on various levels of musical organization. The type of repetition is essentially a system of rules of order on a higher level than in the isolated section. The characterization of repetition schemata is determined in light of their contribution to the types of "directionality" and complexity, which are some of the most important variables in determining the style and the "stylistic ideal." Characterization of the repetition schemata and types of directionality is determined by universal cognitive constraints, but the specific selection is determined in accordance with the stylistic ideal. These conclusions were obtained from theoretical considerations and musical analyses from*

various cultures and periods. As background for the definition of the repetition schemata, I first summarized the relevant concepts—"stylistic ideal" and "directionality and complexity" — and their main variables, in light of which the repetition schemata are examined.

INTRODUCTION

As is well known, most meaning in music derives from—or at least is related to—the manner of organization, i.e., types of order, unlike other arts, in which semantics plays a major role.

In music, the concept of order, which includes symmetry, is reflected most definitively, in our opinion, in the system of expectations and realizations of them (e.g., deviations from expectations) or in the predictability, to varying degrees of certainty, of the continuation of a musical progression on various levels of musical organization.

The concept of expectation and its realization as an important factor in shaping the musical experience occupies a more and more important place in theoretical and empirical musical research. Among the prominent examples are studies by Meyer (1956, 1973), whose ideas served as a basis for other research (particularly that of Narmour, whose formulations [1990, 1991] are being examined empirically), the experiments and summaries by Krumhansl (1990, 1993), and the studies by Granot (1996), who investigated brainwave responses (Event-Related Potential, or ERP) to series of musical stimuli. But the research is still limited to a few types of organization in certain selected parameters on the most immediate level, such as melodic or harmonic progressions in Western tonal music; no comprehensive explanations have yet been provided for the principles proposed; and hardly any attention has been paid to the ideals of the different styles.

Our assumption is that the type of order reflects not only a particular style (i.e., the principles of organization that can be realized in various musical pieces) but also the *stylistic ideal* (calm/tense, clear/unclear, static/dynamic, simple/complex). To our mind, this concept represents meta-principles that guide the specific choice of styles; it may vary among cultures, historical periods, geographical locations, and even individual composers; and it may serve as a reference point for both the composer and the listener. Thus, not only is order/disorder one of the general characteristics of the stylistic ideal, but it interferes with its variables.

In our study we tried to determine types of order/disorder, paying attention both to cognitive constraints and to the stylistic ideal, while looking at a selection of examples from the West and elsewhere. Here we will pay particular attention to the contribution of repetition to the type of order, against the backdrop of the relevant variables of the stylistic ideal, rules of excitement (as one of the variables of the stylistic ideal), and the main variables for determining order/disorder.

The paper will therefore be divided into two main parts: first, a summary of the assumptions regarding the collection of variables, and second, schemata of repetition with attention to all the variables.

ASSUMPTIONS

Most of the following assumptions regarding the relevant variables of the stylistic ideal, rules of excitement, and variables of order/disorder are based on my previous research, but there is, of course, much more to say about them.

A. The Main Variables in the General Classification of Styles by Ideal

1. *Relationship/lack of relationship* with extramusical factors. In the most general terms, we can say that the ideal that guides Western tonal music, in contrast to many non-Western musical cultures, considers the piece a sort of polished diamond that has many internal connections and is detached from its surroundings.
2. *A sense of calm versus tension* or emotions of various sorts. This factor, termed *ethos/pathos* by Sachs (1946), is part of what distinguishes different periods in Western music.
3. *Types of directionality and complexity* (Cohen 1994)
 - 3.1 The *range of "directionality,"* which allows for predictability concerning the continuation of the progression—from “momentary” directionality on the immediate level (as we found in many non-Western cultures and in some contemporary music) to “overall directionality” in a long-term superstructure. In vocal Renaissance music, for example, the primary directionality involves the unit of the musical phrase, which corresponds to the verbal sentence.

- 3.2 The *degree of clarity or lack of clarity* of directionality on various levels. When the directionality is clear we know where we are going, when we will arrive there, and how we will get there. In the most general terms, we can say that most of Mozart's works have clearer directionality than Bach's.
- 3.3 The *degree and range of complexity* of units of varying directionality (for example, in African polyrhythmic music there is a great deal of momentary complexity but a total absence of overall complexity and directionality; Western tonal music since the seventeenth century has been marked by complexity and overall directionality; in India we find complexity and directionality on the immediate level and that above it, as well as simple overall directionality).¹

These variables may appear in various combinations, but with restrictions resulting from their interdependence.

B. Rules of Excitement (Cohen 1971, 1983)

1. *Intensification of energy* in the different parameters (higher, stronger, faster, etc.)
2. A *sudden change* in each parameter: In pitch, a large "leap" (melodic interval); in intensity, *sforzando*; in density, a sudden switch from quick to slow notes and vice-versa; and so on. There is good reason why, in a style whose ideal is tranquility (as in the rules of Palestrina counterpoint), there is strong limitation on the interval sizes, the "spaces" formed by them must be filled by stepwise motion (seconds) in the opposite direction, phrases must be started and ended with slow notes, and so on.
3. Moving to the two extremes in an "*inverted U function*," based on the existence of a normative optimum in various parameters. Thus, in exciting music, the range of occurrence (in various parameters) may be very high or very low in the pitch register, density, intensity, ambitus, and so on. For example, the rules of organization in Renaissance music, whose ideal is calm and tranquility, are conspicuous in Western tonal music in that they are in the optimal range of neither too much nor too little; outside the West, Tibetan religious singing, which is supposed to transfer from the materialistic to the spiritual, is very tense, and it is conspicuous in that its register is extremely low and its ambitus is very narrow.

¹ The most complex and directional overall schema is probably expressed in the well-known "Schenkerian graphs," which relate to many schemata on various levels of the parameter of pitch only, in Western tonal music. This schema deliberately ignores stylistic differences, i.e., differences resulting from deliberate distortions of directionality in accordance with the various stylistic ideals in the different eras.

4. *Deviations from expectations* (in addition to the deviations in point no. 3): breaking of learned schemata or deviation from expected natural schemata such as a convex curve and the rules of Gestalt, which essentially reflect limits to change (Lerdahl and Jackendoff 1983). This is very common in the Romantic period, and it is particularly salient in Schubert's later pieces, in which the deviation appears in the midst of a particularly directionality section.
5. *Uncertainty* of various sorts due to "nonconcurrence" (between simultaneous behaviors of various parameters or between different units), randomness (disorder), extreme equality, strong zigzag, and so on. Note that there is reason why the convex curve, which creates maximum predictability concerning the continuation of the progression, was dominant in the rules of Palestrina counterpoint regarding both pitch and duration, on the immediate level, on the level of the phrase, and even on the level of the piece as a whole (Guletsky 1995). Similarly, most folk tunes are convex (Nettl 1964; Huron 1997). Randomness, however, may in rare cases engender tranquility in the stage preceding the formation of basic measurable parameters such as intervals, durations, and beats, which are the important contributors to the existence of a system of expectations. For example, meditative music, which calls for absolute tranquility, is based on indefinability and randomness in non-salient events. All these tension factors may serve as a distinguishing mark of the styles in accordance with their ideal.

C. The Variables of the Rules of Order That Contribute to Types of Directionality

1. *The quantity of different elements*: In the short term, directionality and complexity are inversely related (increasing the quantity increases complexity and reduces directionality); in the long term, up to a certain point, the quantity contributes both to complexity and to directionality.
2. *Types of schemata*. Today we know that listening is always done in relation to schemata that take shape in our minds. Some of the schemata can be considered "natural" (e.g., the "Gestalt rules" and rules relating to texture [Cohen and Dubnov 1997]); others are "learned," culture-dependent, and not found in nature (e.g., scales, chords, and rhythmic patterns). (In our opinion [Cohen and Granot 1995], even the learned ones are not arbitrary; they are determined in accordance with the stylistic ideal and cognitive constraints.) Here we expand the concept of the schema to refer also to the most basic raw materials; to the rules of composition, such as various operations that can be considered cognitive; to meaningful curves of change such as the convex curve; and to types of texture. The schemata are the main factors in

shaping the order, the system of expectations, and types of directionality and complexity. Different kinds of styles are based on different types of schemata or different ways in which they are realized.

3. The *degree of definability* of the elements (pitches, intervals, chords, rhythm, and units) on different levels
4. *Different hierarchies* in schemata and ways in which they are organized
5. The *breaking of schemata* (deviation from expectations) detracts from directionality; when the breaking is entrenched one can talk about a schema of deviation. In extreme cases the deviation is like a “shock,” and it stands out from the background of an “orderly” style.
6. *Concurrence or nonconcurrence* between different parameters or different schemata that are based on the same or different parameters. We can also speak of schemata of concurrence and nonconcurrence (Cohen and Dubnov 1997, pp. 400–401).
7. *Repetition*: Different kinds of repetition may contribute both to enhancement of directionality and to uncertainty.
8. *Form organization*

Each point deserves a special discussion, especially the schemata. In the present paper, we chose to focus only on the last two points: the types of repetition and one important aspect of the form that is defined as a schemata of repetitions with respect to order/disorder, such that the form represents a kind of hyper-order/disorder. In our discussion we refer to the other variables presented here without mentioning them by name.

REPETITION

The idea of repetition has served as the focal point of many studies (for an overview, see Ockelford 1991). Note that Meyer refers to an immediate repetition as a “natural” process: “Once established, a patterning *tends* [my emphasis—D.C.] to be continued until a point of relative tonal-rhythmic stability is reached” (Meyer 1973, p. 130). Boroda (1990) and Voss (1988) refer to some “natural” optimum (part of the “inverted U function”) governing how often various units “should” be repeated in a piece of tonal

music. (Voss discusses repetition of notes and Boroda discusses repetition of motives.) We should also note the emphasis on the importance of repetition to “order.” For example, Ockelford (p. 139) states, “The source of perceived musical order lies in repetition.” Taking a more extreme position, Feibleman (1968, pp. 3–5) argues, “Order can be identified with similarity and disorder with differences.”

We believe it important to distinguish between different kinds of repetition (in addition to the three types pointed out by Schoenberg [1967, p. 9]: “The repetition may be exact, modified or developed”), and we shall try to characterize them in terms of their contribution to the characteristics of the stylistic ideal—directionality and tension.

Repetition refers to the minimum comparison between units of various kinds—only with regard to whether they are different or similar, which is a basic property of our cognitive activity (Tversky 1977). It is meaningful even aside from the “content” of the repeated unit. This meaning, which stems from similarity or difference, was corroborated in ERP experiments (studies of brainwave responses to various stimuli) in which the reactions to two consecutive patterns of identical or different notes were obtained (Cohen and Erez 1991). The result was a strong reaction to the first difference in the successive series, with the intensity of the reaction growing stronger the later the difference appeared in the series. Biologists explain the sensitivity to difference as a necessary condition for ongoing awareness of the environment for the sake of biological survival. In music, however, the situation is not so simple—not even on the most immediate level. For example, a strong ERP response is obtained (as expected) for every deviation from an expectation (as in a sudden violation of the schema). If a note is repeated, we may expect a change (due to the longing for a directional process or in order to prevent boredom), in which case a lack of change will be unexpected!

In music repetitions are manifested in various ways in different parameters and on different levels, so much so that one can speak of schemata of repetitions. Some types of repetition have even been given names, such as “*binary form*” (AA’ or AA), “*ternary*” (ABA), “*rondo*” (with refrain, ABACA). Nevertheless, there is no consensus as to the interpretation and terminology of the types of repetition.

In general, in the most preliminary stage we can speak of six types of repetition.

1. A A' (or 2ⁿ) one repetition
2. A A A A . . . many repetitions
3. A B A
4. A B A C A . .
5. "Mosaic composition"—random combination of units from a specific group (units are repeated with varying degrees of randomness)
6. "Negative repetition" or rarity—the appearance of a significant event *without* repetition
7. Simultaneous combinations as in the polyphonic form

In our opinion, the types of repetition should be further divided according to various criteria pertaining to the content of the units and their interrelations. (In reality there are also various combinations of types of repetition.)

The main criteria for classifying the types of repetition (in accordance with the "content" of the units and their interrelations) are as follows:

1. The "content" of the repeated and different units in terms of structural properties: the level on which they appear (immediate or deeper); their size; their definability with respect to the learned and natural schemata and with respect to their separation from their surroundings; their degree of divisibility; their status as "open" or "closed"; their function as background or as a frontal event; and their "orderliness."
2. What is considered different and what is similar? In what way are units that are considered different similar to each other, and in what way are units that are considered similar different from each other? The answers to these questions may vary widely among different styles from different cultures and periods.
3. The existence of directional links: between two similar units (AA') that are linked by a schema to form overall units (e.g., the harmonic schema $V \rightarrow I$, in which the open unit A ends on V and the closed unit A' ends on the tonic I); between two different units (ABA), where B is an unstable development of A, such that the A that follows B is, in a sense, a resolution of B, in contrast to an independent B, which is stable and opposed to A; and links between the units in an entire series (e.g., the principle of intensification or the convex curve).

4. Precise or imprecise repetitions (in addition to the aforementioned repetition AA') with operations, with variations based on a single schema or "family resemblance" relationship, and so on.

Below we discuss only type 1 (AA'), type 2 (AAA . . .), and type 5 ("mosaic" composition), while referring minimally to the "content" of the repeated unit.

1. One successive repetition: This appears mainly in two ways:

- 1.1 A single repetition of a medium-sized or large directional unit, which is part of a movement (in a suite or sonata). This is found only in the West and enhances directionality. Directionality is greatest when the repetition is not precise, and the change represents a schema linking the two—A and A'—to form an overall unit. In the West the schema $V \rightarrow I$ (where A ends on V and A' on the tonic I) is widespread. It appears in the phrases of the "Classical period" and in the sonata form between the exposition and the recapitulation.
- 1.2 One imprecise repetition by means of extended doubling (1+1+2+4...)—which may be regarded as a natural schema—up to a certain size enhances directionality. This schema of 2^n which can also be obtained through successive divisions by two (16, 8, 4, 2, 1, $\frac{1}{2}$), is discussed in the West for the first time only in the eighteenth century (Ratner 1980). Until recently, it was regarded as the main representative of symmetry phenomena in music. It is typical of many children's songs, of the Classical period in the West, and of various types of organization in the Far East, in both the past and the present. Thus, the repetitive, rhythmic *gongan* pattern (in Indonesian *gamelan* music) has 2^n beats ($n = 3-8$, meaning that the pattern may contain 256 beats!). The existence/nonexistence of 2^n is an important characteristic of the style.

2. Extended additive successive repetitions: These appear in many ways:

- 2.1 The repeated events are small units that serve as a measurable background (such as meter or accompanying patterns) that plays a role in defining the meanings of frontal events and make it possible to measure and compare the different units. This background (calm or excited) may promote clear directionality.

- 2.2 As frontal events, multiple exact repetitions in all the parameters produce tension (due to uncertainty regarding the continuation of the process) up to the “boredom threshold” at which the events turn into background. (“Equality” prevents hierarchy and directionality, and it serves as a contrast to “inequality” in many musical systems.) This is in contrast to information theory, which does not take into account the natural expectation of change. Thus, it is no wonder that it was forbidden in the Renaissance but common in the Baroque (Cohen 1971). Interestingly, this type of repetition was not taken into account in the various relevant theories (Meyer 1973; Narmour 1990).
- 2.3 Repetition that can be thought of as extending the duration of the repeated event, thereby making it more prominent (e.g., repetition of the target note in the main *balungan* melody, whose notes are equal in duration [Benamou 1989]).
- 2.4 Repetitions of complex, predetermined rhythmic patterns that also pertain to timbre. These can be thought of as learned schemata that combine meter and rhythm, and they are characteristic of non-Western cultures (e.g., the *tala* in Indian music and the *mizan* in Arabic music). The repeated patterns may serve both as background for a frontal musical event such as a melodic line or improvisation of the pattern itself; in the latter case the pattern in its various realizations is the frontal event. The directionality lasts throughout the pattern, and the improvisation may either sketch directionality on a level above the pattern or blur it.
- 2.5 Multiple repetitions of a series of non-directional events characterized by only one parameter, such as the 12-tone pitch series in the dodecaphonic system (also called “serial composition”). In contrast to the seven-tone diatonic system, the 12-tone equal-interval system (from which the seven-tone system is derived) contains no predetermined hierarchy. Moreover, the system of exact repetition of all pitches in a series (with the possibility of change in the octave state) prevents internal repetitions and makes it difficult to produce directionality. This is in accordance with the idea set forth explicitly by the initiator of the system, Arnold Schoenberg (1975), who recommended avoiding tonal schemata and repetitions of patterns within a row. In fact, however, whether overtly or covertly, composers do create relationships within series by means of various operations, or they limit themselves with respect to the series of intervals between notes. Thus one can speak of types of rows.

Despite theoretical studies on the system's inherent regularity, which has also been expanded to include serialism in parameters other than pitch (e.g., Babbitt 1960; Perl 1962), no research has yet been done on the meaning of repetition from the directional standpoint, taking into consideration the constraints of musical perception and cognition. Therefore this extreme form of organization has not yet been fully explained.

- 2.6 Multiple repetitions with a shift in accordance with the elements of a directional schema such as a tonal scale, producing inexact units (the unit, which is like a link in a chain, appears on various degrees of the scale, and the process is known as a "sequence"). These repetitions have two opposing influences: the multiple immediate repetitions enhance the uncertainty as to the rest of progression, but the directional (unequal) schema to which the repetition is attached enhances directionality. The sequence is most often a transitional segment, in which case it may underscore the units before and after it and contribute to more general directionality. This was forbidden in the Renaissance and common in the Baroque. It is prevalent in Arabic music but not in *gamelan* music.
- 2.7 Repetition of a medium-sized, closed directional unit, with variations only, enhances directionality on the level of the unit but not overall. In most cases the series of variations has no overall schema that unifies the variations into a single unit (sometimes we find the intensification schema or a convex curve), but there is certainty regarding the schema of the next variation (which is uniform for all its variations). This form, which does not require long-range resolutions, is generally relaxing; naturally therefore, it often appears in the second movement of a sonata, balancing out the first, dramatic movement. The variations may also appear in succession, not as closed units, and with the repeated factor blurred. One expansion of the Classical variations—in which a single schema common to all is repeated—is a "family resemblance" relationship between successive sections. In this relationship the repeated factor is not fixed and may change from variation to variation, in which case the directionality is much less clear. In Bach's chaconne for violin solo, the two types of variations appear as complementary contrasts. The chaconne opens with a series of six variations, each of which is similar to the preceding one with respect to a different factor. After this non-directional series, Bach presents a clear series of seven variations based on a single harmonic formula (Figure 6).

- 2.8 Latent repetitions (not always successive), with various operations (such as expansion of the idea inherent in a motive over a large segment) enhances complexity and overall directionality, which is generally unclear.

A striking example of contrast between the two types of repetition that contributes to the overall structure is found in the famous Piano Fantasy in D Minor (Mozart, K. 397). The piece is composed of two diametrically opposed sections. In the first section (d-minor), multiple repetitions of small, non-directional units (repetitions of a single note, of a descending half-tone step, of a motive, etc.) produce tension; the second (D-major) section is characterized by an extremely large number of single precise repetitions of a directional unit.

3. Mosaic composition technique



Figure 1a

According to this technique, the musical structure is a juxtaposition of a limited number of predetermined basic units that recur with some possible variations in the combinations and with various degrees of freedom. The freedom in the arrangement of the elementary units hampers directionality on a level beyond the dimensions of the units themselves. This technique is prevalent in some non-Western music (e.g., Idelsohn 1944, Avenary 1963, Wellesz 1961, Cohen 1973) and is found in contemporary works, too.

In Figure 1 we see an illustration of mosaic composition, which governed the Israeli Arabs' oral tradition of singing neo-Byzantine liturgical hymns. The illustration is based on the cadential motives of the phrases in different performances of the same hymn.

FORM AS DEFINED BY “REPETITION SCHEMATA” WHOSE ELEMENTS ARE DEFINED BY MEANS OF ORDER/DISORDER

A specific form can be defined as a schema that represents a principle of overall organization and may appear in two areas: (1) a natural schema that represents various (meaningful) curves of change in the parameters; and (2) schemata of repetition that mean organization based on the difference and similarity between the units. Of course, each form's schema may be realized in many ways. In most styles the schema of the form is predetermined, as in the Classical period, when most pieces were governed by a single structure, the sonata form. However, we can find one-time overall structures even in tonal music, such as Bach's works. In atonal contemporary music most of the forms are one-time overall schemata. This in itself reduces the clear directionality. Some of the predetermined forms also relate to the content. The addition of content conditions naturally enhances directionality and makes possible a long-range increase in complexity. Interestingly, in the West the content combines with the form mainly through learned schemata (which relate to tonality and leave a great deal of freedom for the composer), whereas in many non-Western musical cultures the form is defined by means of natural schemata as well.

Here we present schemata of forms based on only two types of content: orderly and disorderly (hereinafter: O and D).

SOME EXAMPLES OF SCHEMATA OF FORMS WHOSE ELEMENTS REPRESENT (RELATIVE) ORDER AND DISORDER

“Disorder,” which may result from many factors—indefinability of units, nonconcurrence, breaking of schemata, etc.—can be thought of as a tension phenomenon that “demands” resolution, like dissonance that is resolved to consonance. Just as dissonance may appear in order to highlight both consonance (as the theoretician Zerlino noted in the sixteenth century) and dissonance (in styles in which the ideal calls for expressions of tension), D may appear with various functions. Another analogy would be putting a tiny bit of salt on watermelon to bring out its sweetness or using the salt for its saltiness.

A	a	h	b	a	d	f				
B	c	h	b	h	j	c	f			
C	c	h	ḥ	c	ā	h	c	a	b	ḏ f
D	b	h	b	d	h	j	a	f		
E	c	h	b	d	h	j	f			
F	f	c	h	c	ḏ	b	h	ḥ	f	
G	ḥ	h	c	b	h	j	ā	f		
H	c	h	b	h	j	c	a	f		
I	b	h	b	ḏ	f	c	b			
J	b	h	b	b	h	f				
K	b	ḥ	b	d	b	h	c	b		
L	c	h	a	ḏ	h	j	f			
M	b	h	b	b	d	h	c	a	c	
N	b	h	b	ḏ	h	j	a	f		
O	ḥ	h	b	ḏ	h	j	b	f		
P	c	h	b	e	h	j	c	f		
Q	c	h	b	ḏ	h	j	c	a	f	
R	b	h	b	b	j	b	ḥ			
S	b	h	j	a	b	h	j	f		

Figure 1b

Figure 1: ["Mosaic composition" in the performance of the "Resurrection Hymn" in the third *lahan* (mode) by 19 Christian Arab singers in Israel. Freedom in selecting the order of the cadential motives in the different performances is limited. The restrictions are particularly marked in the finale and in the second phrase.]

The most directional schema in which D highlights O will be O, D, O (the realization formula of A, B, A; this can also be regarded as a convex curve of tension as a function of time. Indeed, there is good reason why this schema underlies the movement in the sonata form, which is the form with the most directional superstructure. In the Romantic period, in contrast, sometimes we find the opposite structure D, O, D, which can be represented by a concave curve, followed by a coda.

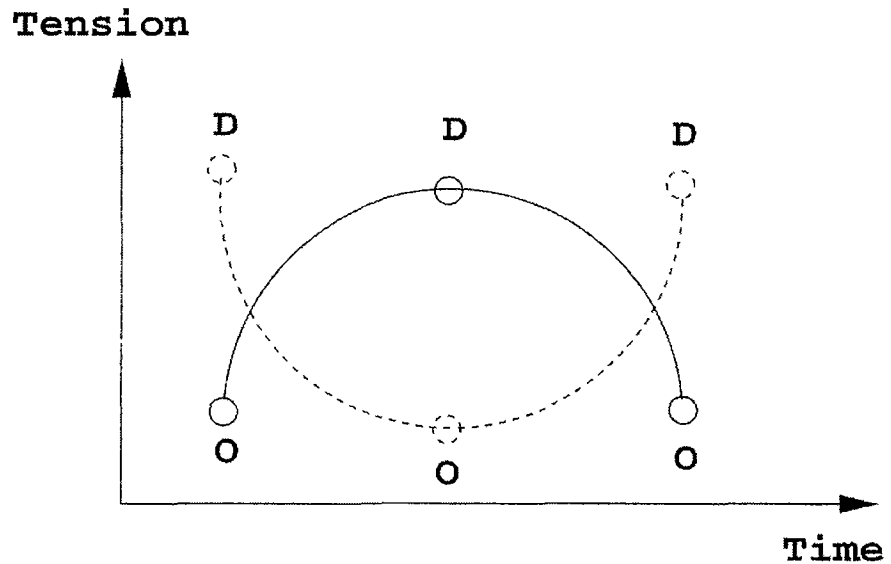


Figure 2: [Two realizations of the repetition schema ABA with O (order) and D (disorder)
 — ODO in the Classical sonata form
 - - - DOD in Romantic music]

Another common schema is a gradual transition from D to O by means of a transition from undefined to defined. This schema has various aspects. In non-Western cultures it is related to the schema of intensification in various parameters. It has even been given names: *alap-jor-jahala* in Indian music, *jo-ha-que* in Japanese music.

Thus, in some forms of Indian music, a piece opens with a slow, low, quiet section, with no meter or beat, and in extreme cases, without even a sense of duration and interval. Then directionality is extremely momentary and a “perpetuation” of time is achieved. The gradual, unclear beginning (so unclear that we do not know whether it is a tuning of instruments, a “warming up” of the musician’s hands and soul, or the beginning of the piece) dismantles barriers between the piece and its surroundings in accordance with the ideal of Indian music and in contrast to the ideal that guides Western tonal music.

In Indian music we find a gradual increase in the definability of notes and intervals in the *raga*, of durations, and of the beat until the predetermined metric pattern—the *tala*—appears. This increase, as stated, entails intensification of all the parameters (including tempo, density, ambitus, intensity, and equality) that promote excitement, as well as uncertainty from the other direction. After the clear appearance of the meter (which is complex and repetitive, with improvisations all the way to the end of the piece) comes the resumption of an intensification process that increases equality and uncertainty. Without going into detail, we shall note that the tension curve, which is determined both by the intensification of the parameters and by the uncertainty, is in part parallel and in part opposite to the curve of definability.

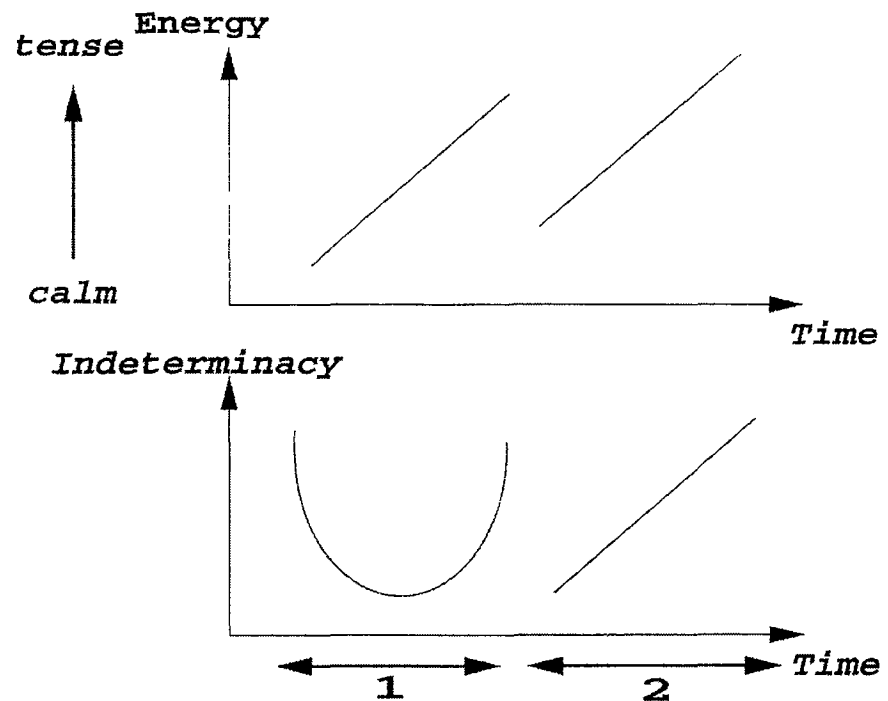


Figure 3 [The ratio of the intensification curve (following the *alap-jor-jahala* principle) regarding energy and tension to curves of uncertainty (disorder) in the performance tradition of the *raga* in northern India.

(a) The non-metric opening

(b) The metric (*tala*) part]

Another manifestation of the transition from D to O (from chaos to order) is typical of the works of Beethoven, who was guided by the principle of transition from indecision to assertiveness. In his music, however, the organization begins on a higher level than in

clearly and concentrated in two measures, and the third time doubled in octaves and loudness. The series also appears (inverted) after the second theme and in the development section. At the end of the movement (in the coda) it is expanded to six measures with clear emphasis of each note and the addition of resolution to the tonic.

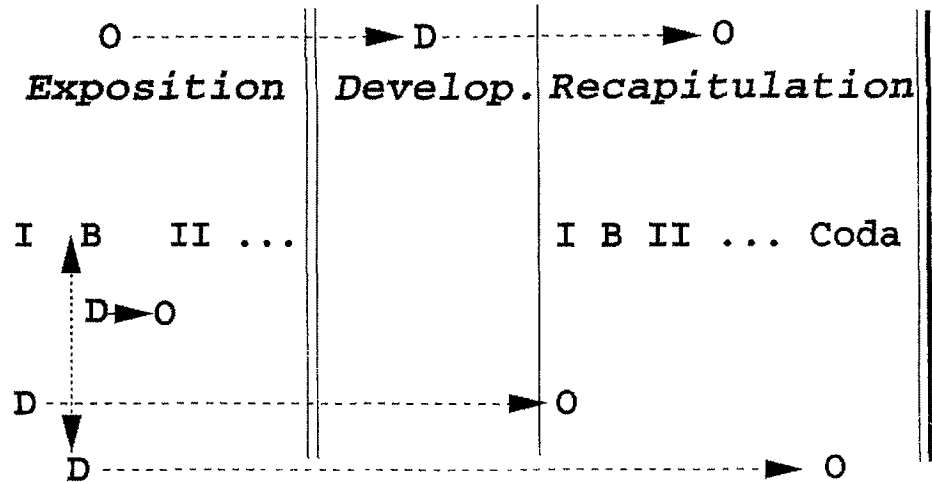


Figure 5b: [Summary of the $D \rightarrow O$ schemata in Beethoven's sonata (Fig. 5a) within the overall schema $O \rightarrow D \rightarrow O$ (in addition to the binary schema AA)]

The peak of the schema $D \rightarrow O$ in Beethoven's works appears in his Ninth Symphony, where the schema is manifested explicitly on a few levels, within the movements (especially in the final movement) and in the piece as a whole, which opens with extended hints that are open to various interpretations.

Beethoven is an extreme example. Generally, in the Classical period we find the reverse situation: from order to disorder. However, we find $D \rightarrow O$ on extremely rare occasions in works by Haydn and Mozart, too. Haydn uses it explicitly in the beginning of *The Creation*, whose title proclaims a transition from chaos to order; it is also prominent in Mozart's Dissonant Quartet. In both cases the indefinability is manifested mainly with respect to harmony, which is not crystallizing into a clear schema and contains many violations of the rules.

Beethoven's Piano Sonata op. 2, no. 1

I
(1st theme)
Exposition

Allegro

1.

I
Recap.

Coda

Bridge
theme

Figure 5a: [Musical notation of several themes in the D → O process, from the first movement of Beethoven's First Piano Sonata (Op. 2, no. 1): between the first theme (I) in the Exp. and the Rec ; in the bridge (B); between the end of I and the coda.]

Another interesting manifestation of organization guided by the overall schema $D \rightarrow O$ is found in Bach's chaconne movement in the Partita in D Minor for Violin Solo. As we saw earlier, one of the manifestations of $D \rightarrow O$ is a transition from a series of variations that are related to each other through "family resemblance" to "regular classical variations" that are all based on the same harmonic schema.

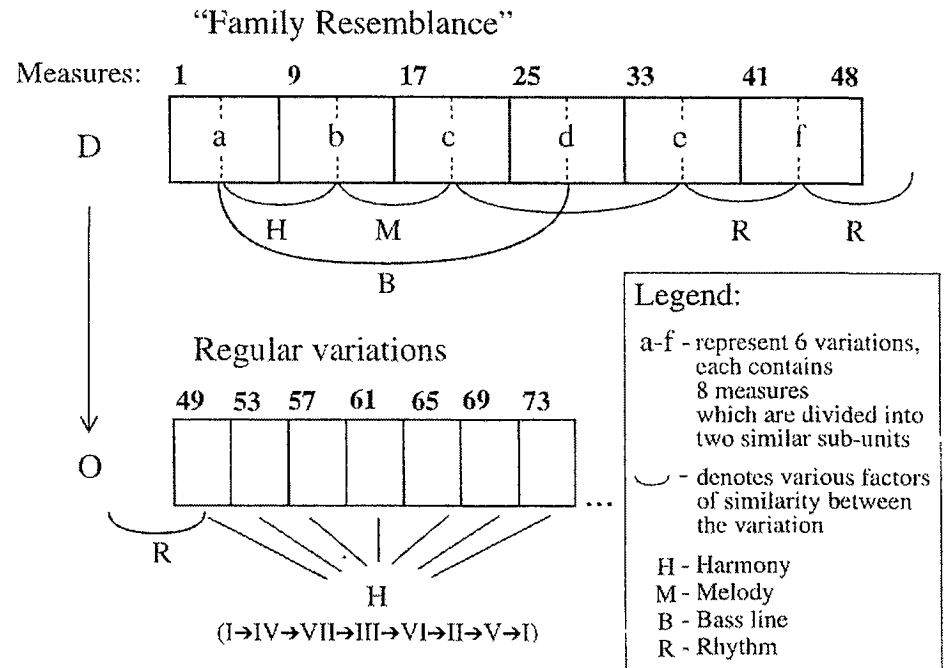


Figure 6: [The $D \rightarrow O$ ratio in the opening of Bach's chaconne for violin solo of a group of variations with "family resemblance" relationships to a group of four-measure variations that are all based on the same harmonic schema of descending fifths.]

To sum up, based on theoretical assumptions, many musical analyses, and empirical studies, we have tried to summarize in brief the variables of order/disorder (types of schemata, degree of definability, types of repetition, etc.) that are the determining factors in shaping a style. We suggested that in music the concept of order is reflected in the system of expectations and their realization and we paid attention to cognitive constraints and the stylistic ideal (e.g., calm/excitement and types of directionality and complexity). Of these, we focused on the variable of repetition against the backdrop of the other variables, and we examined examples from various styles in the West and elsewhere. We defined repetition schemata that contribute to types of order and proposed a way of determining schemata of forms by means of repetition schemata

whose units are characterized by order/disorder (O/D); in this way varying levels of order/disorder are obtained. For example, the repetition schema A B A may be realized in various ways, of which O D O is the most directional (expected) and therefore the most orderly. In the form based on "mosaic composition," there may be order in the small units and disorder in the overall unit.

The types of forms (definition of which is just beginning) and of the repetition schemata were defined on the basis of general structural characteristics and therefore allow for comparisons and analogies with order in other, non-musical fields. Further research is, of course, necessary (as is attention to the psychoacoustic constraints on perception of specific parameters). Already, however, we believe that the results obtained thus far contribute to a deeper understanding of learned and natural schemata and of the concept of order on different levels and to expansion of the possibility of comparing styles.

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