

## **New Approaches to Musical Interpretations from a Psycho-Physiological Point of View. Analysis of Some Instrumental Interpretations.**

In this research we intend to present an experimental contribution to the »aesthetic« analysis of musical interpretation. In other words, our intention is to examine the significant elements that in one particular musical passage differentiate one interpretation from another, and that produce in those who decode them a different experience in their aesthetic and emotional sensations. Therefore we divided our research into two fundamental phases:

1. The first consists of isolating one or more of these significant elements of aesthetic relevance, transforming them in such a way they might be more easily described and quantified and therefore, more easily compared.
2. The second consists of examining the effects produced by the different characteristics of these elements on the listeners.

As to the first point, we believe that one interpretation differs substantially from another in its possible variations of length (compared to the text) and the intensity of one single note.<sup>1</sup>

The latter aspect is musically known as »dynamics« (it refers to phenomena such as crescendo-diminuendo, forte-piano, accents, etc.). This aspect offers the problem of a graphic realisation of the dynamics, in order to be able to single out adequately what constitutes the differences between two interpretations. Several studies have already been devoted to this subject.

Seashore (1938, 1947) tried to connect some of the aspects of sound waves (intensity and frequency) examining them in the light of an abstract and diffuse idea of aesthetic beauty or of good performance without considering the aspects produced on the listener.

<sup>1</sup> Other authors have also located the presence of minimal oscillations of frequency around the basic height of the single notes (Francès 1958, Seashore 1938).

Other authors (Sacerdote and Gemelli, 1954, 1956) have traduced the intensity variations in singing, but their conclusion was that such method is not applicable to aesthetic analysis. Concerning musicians' and non-musicians' decoding of signals, there is now plenty of literature emphasizing the effects of musical stimuli patterns (different tonalities, different authors, different musical periods, etc.) (Francès 1958, 1968; Hevner 1936; Watson 1942; Rossi 1982; Tessarolo 1979).

Usually the analysis of the listeners' experience is carried out by inviting the subjects to choose from a list of adjectives those that most closely describe the effect which that particular musical stimulus has caused. Sometimes the semantic differential is used. In the present study we intended to examine first of all the possible differences in the dynamics of the different interpretations of the same musical phrase. We choose two phrases: one for flute and one for piano.

The first phase of this analysis consists of a graphical realisation of the intensity variations of the six interpretations and of setting-up a reading method for the graphic results. The second part consists of an analysis of the judgments that musicians and non-musicians gave on the different interpretations.

Even though we can not predict the direction it will take, our hypothesis is that there are significant relationships between the variations of sound intensity which a performer produces and the aesthetic-emotional reactions. Furthermore, we transfer on to graphs the reproduction to each phrase's melodic line which gave us informations regarding the frequency variations. The possibility of a »comparison« of the two parameters, intensity and frequency, seemed to us particularly interesting, because, as has been noted in music didactics, there is a tendency for the intensity to increase as the frequency increases and vice versa.

## Method

*Subjects:* We had two groups of subjects, musicians and non-musicians. The first group was made up of 20 music conservatory stu-

dents, attending the most advanced courses of »History of Music«. The second group was made up of 29 students chosen at random among the student population. In both groups the age ranges from 18 to 25 years.

*Materials:* Classic instrumental compositions were chosen, composed for solo instrument and interpreted by different performers. A significant phrase was picked out of each composition lasting no more than 20 seconds, and for each phrase the sound intensity was measured in decibels (dB), using a Bruel & Kjar phonometer connected to a printer.

On the resulting graph the analogical variations of intensity are reproduced in dB on the ordinate and the time on the abscissa. The musical compositions which we chose are the following:

1. *Partita in A minor for flute*, by J.S. Bach
2. *Polonaise No. 6 in A flat major op. 53 Eroica*, by F. Chopin.

The performers of the first composition are: Aurele Nicolet (record ARCHIV 253369); Jean Pierre Rampal (ERATO STU, 0820); Severino Gazzelloni (RICORDI ARCL 227000). The performers of the second composition are: Artur Rubinstein (RCA LSC 20103), Maurizio Pollini (Deutsche Grammophon 2530695), Jan Ekier (Telefunken KT 11005/2). The compositions were recorded on records available in the State Gramophone-Record Library of Rome which made the tape-recordings possible by letting us use its high-fidelity equipment. The recording volume was identical for all compositions. Therefore it is not the absolute intensity which is measured, but rather the relative analogical variations. The graphs are transferred on two different types of figures. The figures 1, 2, 3, 4, 5, and 6 consist of three parts:

1. the original score of the musical phrase
2. the same phrase enlarged and correlated to the graph under it: we traced a line to show the melodic modulation
3. the graphic representation of the sound intensity variations (the graphs referring to the 1st composition have been enlarged.) Arrows point to the notes which correspond to the intensity variations.

Figures 7 and 8 consist of the musical phrase and of the three reliefs of the sound intensity in real dimensions.

As far as concerns the expression of aesthetic criticism, eight pairs of opposite adjectives have been used, some taken from musical reviews, some from previous research on the enjoyment of music. The adjectives are the following: aggressive-calm, heavy-light, unexpressive-expressive, weak-vigorous, pleasant-unpleasant, mild-harsh, relaxed-tense, introvert-extrovert. Each pair of adjectives is placed on the ends of an axis which is divided in 7 segments, each of which is given a scoring: each axis presents values ranging from  $-3$  to  $+3$ , 0 meaning neutral. The subjects are invited to give a valuation for each interpretation, by filling out a special questionnaire in which they pass judgment by planing a cross on the axis' segment.

*Procedure:* Small groups of subjects were asked to listen to the two musical phrases (the same chosen for the phonometric analysis): for each group the sequence of both compositions and performances was changed. The tests took place in the Psychology Department, in rooms which were isolated from outside noises. The subjects, seated in comfortable chairs, listened to the music played on a stereo-set, with the intensity level remaining constant throughout the test. The subjects listened first to the first phrase in three different performances. They were asked to pay more attention to the performance rather than to the composition's characteristics. Each performance was played two more times, then the questionnaire was filled out. The same procedure was followed for the second phrase.

## Results

### *Analysis of the variations of the stimuli graphically traduced.*

For the morphological analysis of the curves we adopted the following standard of analysis: Some »A« complexes consisting of ample upward and downward slopes, whose height, measured from the highest point to the base, ranges from a minimum of 15 mm to a maximum of 90 were individuated. Minor peaks of 3 types could be

established: type »a« (1–2 mm), type »b« (3–4 mm), and type »c« (5 or more mm). The top of the peak represents the vertex of a triangle whose height is calculated from a base which connects the deflection's ascending and descending point.

### *Common Characteristics:*

For each composition the following common characteristics could be found in all interpretations:

1st composition: *Partita in A minor for flute solo*: (fig. 7)

The variations in intensity do not follow the variations of frequency. A progressive descent of the three curves is noted, a decrease of intensity which might be due to the performers' aesthetic choice. However, in our opinion, this decrease in intensity might be due to a lack of breath. The curves are marked by the absence of big peaks which appear instead in the »piano« passages. We note in the outlines an »A complex« marked in the first two slopes by an initial ascent, followed by a descent while the third lacks the ascending point. Numerous type »a« peaks are established in all three curves, while peaks of type »b« are established on the first and third slope.

2nd composition: *Polonaise No. 6 in A flat major* (fig. 8)

Three large »A complexes« mark the outlines (which on the third slope, however, are flattened and hardly noticeable); on these are established peaks a, b, and c. This particular configuration follows the melody modulation of the musical phrase. The third interpretation tends to conceal the intensity variations of the last two complexes.

### *Analysis of the Single Performances as related to the Listeners' opinions*

The mean scores and the *t*-values (Student) of the listeners judgments are indicated in the tables 1, 2, 3, 4; the same scores are shown in figures 9, 10, 11, 12. Table 5 shows the statistically significant *t* which resulted from comparing the two groups of subjects.

## 1st COMPOSITION

### Stimulus 1: Nicolet's Performance (fig. 1)

There are no differences of judgment between musicians and non-musicians ( $p < 0.05$ , tab. 5). The passage is judged as pleasant, mild, light, relaxed, expressive (fig. 9). All the adjectives concur to give an idea of the passage as »fluid mellowness« corresponding to a performance that has only one big peak A which rises and falls smoothly following the frequency modulation. On this ample smooth curve, type »a« peaks are established which appear somewhat regularly corresponding predominantly to higher notes in every group of semi-quaver. These small waves are established on large type »b« waves.

J.S. Bach – *Partita in A minor for flute solo* –  
Performer: Aurele Nicolet

from bar 1 to bar 4

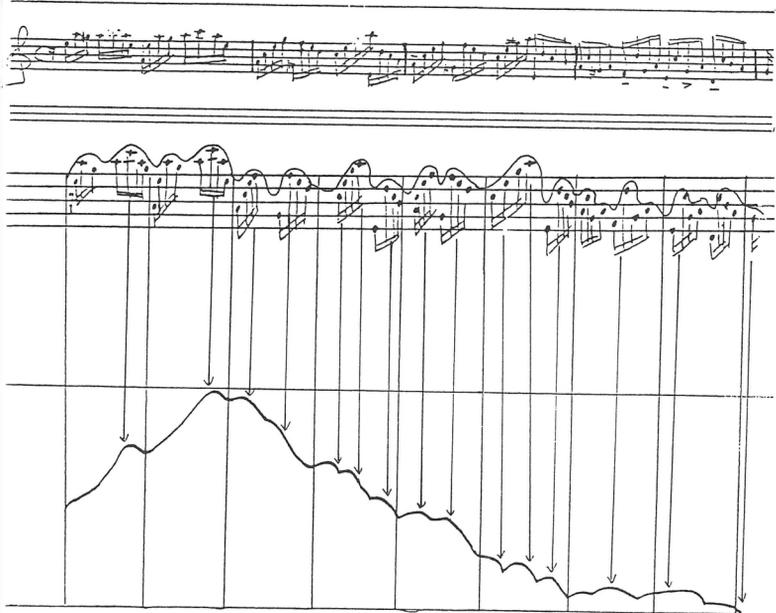


Fig. 1: For figure reading see text.

Stimulus 2: *Rampal's Performance* (fig. 2)

There are substantially similar judgments by musicians and non-musicians (tab. 5). The passage is perceived as aggressive, vigorous, tense, expressive, pleasant, and extrovert by both groups (fig. 9). Such tension which the listeners emphasize corresponds to a base stimulus which can be subdivided in a somewhat squared »complex A« whose vertex is made up of an horizontal line. The complex acquires the shape of a plateau which in a way reproduces the »sharpness« of the performance. The curve which is formed after a sharp rise, and on which are established very small type a curves, remains constant for a fairly long time: all the energy is employed not to create ample oscil-

J.S. Bach – *Partita in A minor for flute solo* –  
Performer: Jean Pierre Rampal

from bar 1 to bar 4

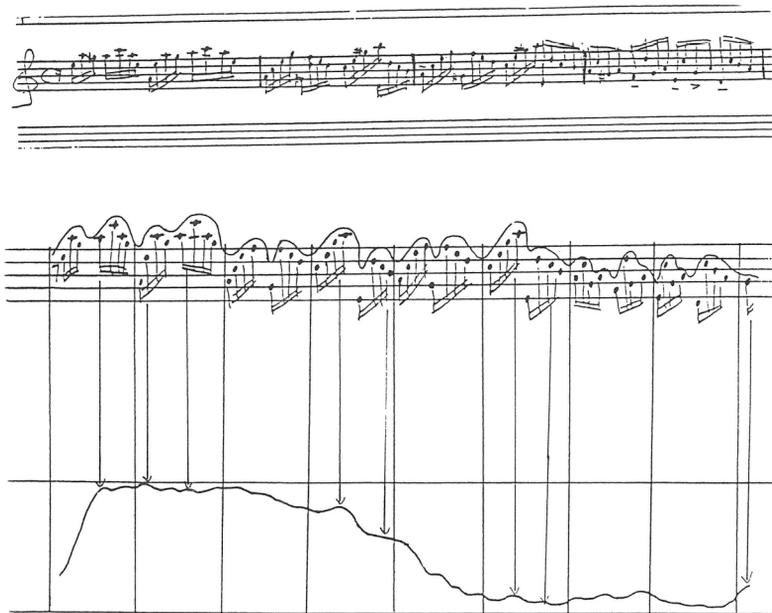


Fig. 2: For figure reading see text.

lations, but rather to maintain the basic sound level high. Unlike the preceding performance, this shows no connection between the peaks and the higher notes in the groups of semiquavers.

Stimulus 3: *Gazzeloni's Performance* (fig. 3)

Here statistically significant differences between the musicians and the non-musicians could be found (tab. 5). The non-musicians consider the passage aggressive, light, expressive, vigorous, pleasant, mild, tense, extrovert (fig. 9). The musicians (on a less higher scale) consider it calm, light, expressive, weak, pleasant, mild, relaxed, introvert (the significant  $t$  appears for some adjectives, see table). Such discre-

J.S. Bach – *Partita in A minor for flute solo* –  
Performer: Severino Gazzelloni

from bar 1 to bar 4



Fig. 3: For figure reading see text.

pancies of judgment are due to a phrase-stimulus which shows a single descent (an ample »complex A« in which the ascending part is missing). On this curve, four type »b« peaks are established, on which are applied further minimal type »a« oscillations. In the overall descending modulation a tendency to ascend is noted at the end of the third bar. The overall course is that of a smooth descent without any cuts or harshnesses: dynamically rather uniform, without strong stresses on the single notes, as if all blended together. This lack of accents, this particular dynamic is perceived as relatively tense by the non-musicians, and moderately relaxed by the musicians.

### *Comparison between performances*

A comparative analysis of the three performances (see fig. 11) shows some distinct differences in the overall aesthetic judgments; in other words, there is a sort of coherent confluence of the single opinions in the final evaluation. For example, Nicolet's interpretation is considered clearly more tranquil, light, pleasant, mild and relaxed compared to the others; the differences are statistically significant (non-musicians, Tab. 1). A clear tendency can be thus observed which denies tension, aggression, and heaviness and at the same time emphasizes the smoothness of it, which lacks cuts or sharp falls, all of which we had already noted in the graphs. The curve is in fact rather smooth. It is interesting to note that this overall judgment is the same with the musicians, who evaluate it positive by judging it »expressive«. The second interpretation shows a totally different effect. The judgments stress aggressiveness, strength and tension (non-musicians Tab. 1). It is judged as more aggressive than the other two and as more vigorous and tense than the first. The third interpretation as a whole follows the judgments of the second, though not so remarkably. The musicians show the same tendency as with the first interpretation, except that they add heaviness and harshness to their judgments of aggressiveness, vigorousness and tension (Tab. 2).

The overall judgment of the musicians regarding the third performance came rather close to that of the first, even though it is relatively

	st. 1 Nicolet		st. 2 Rampal		st. 3 Gazzelloni		t		
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	1-2	1-3	2-3
aggressive calm	5.172	1.627	2.828	1.692	3.517	1.617	5.940*	4.036*	-2.313*
heavy light	5.276	1.533	4.310	1.755	4.517	1.526	2.285*	2.856*	-0.516
inexpressive expressive	5.483	1.864	5.690	1.538	5.931	1.223	-0.606	-1.353	-0.756
weak vigorous	4.517	1.375	5.828	1.002	5.655	1.495	-3.623*	-2.918*	0.486
pleasant unpleasant	2.103	1.455	2.483	1.745	2.862	1.620	-0.975	-2.525*	-0.822
mild harsh	2.517	1.455	3.793	1.590	3.966	1.918	-3.350*	-3.576*	-0.381
relaxed tense	3.069	2.017	4.724	2.034	4.586	1.937	-3.176*	-3.269*	0.290
introvert extrovert	4.000	2.053	4.621	2.111	4.207	2.007	-1.369	-0.425	0.808

\*  $p < 0.05$  d.f. = 28

Tab. 1: First composition (*Partita in A minor for flute solo*) – Mean values and Standard Deviations of the scores of the considered dimensions of the group of non-musicians, for each stimulus-performance. *t*-values (student) for dependent means among the judgments of the three performances are also indicated.

less unbalanced; the difference lies in terms of pleasantness and expressiveness (diminished compared to the first). In our attempt to connect the aesthetic judgments with the analysis of the slopes, we can say that the first and the third interpretations, which are similar in some of their morphological aspects (at least from the second bar on) have turned out to be substantially similar judgments. Gazzelloni's interpretation lacks the initial ascending component, but shares the tendency to a smooth progressive decline until the end of the phrase. There are, however, further differences to which the graph draws our attention: while Gazzelloni's smooth descent is marked by some »b« waves that appear »pure«, we can clearly notice that in Nicolet's decline every »b« wave shows some type »a« under-waves: in our

	st. 1 Nicolet		st. 2 Rampal		st. 3 Gazzelloni		t		
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	1-2	1-3	2-3
aggressive calm	4.850	1.565	3.050	1.761	4.600	1.536	3.943*	0.560	-2.922*
heavy light	5.200	1.436	3.500	1.670	4.850	1.348	3.451*	0.892	-2.526*
inexpressive expressive	5.750	1.020	4.450	2.064	4.450	1.906	2.795*	2.351*	0.000
weak vigorous	4.450	0.999	5.000	1.257	3.750	1.070	-1.565	1.889	3.966*
pleasant unpleasant	2.050	0.945	3.550	1.959	3.650	1.565	-3.032*	-3.875*	-1.160
mild harsh	2.800	1.106	4.350	1.631	3.150	1.040	-3.538*	-0.979	2.281*
relaxed tense	3.250	1.410	4.700	1.625	3.050	1.432	-2.660*	0.433	2.954*
introvert extrovert	4.400	1.314	5.100	1.518	3.850	1.040	-1.584	1.432	2.347*

\*  $p < 0.05$  d.f. = 19

Tab. 2: First composition (*Partita in A minor for flute solo*) – Mean values and Standard Deviations of the scores of the considered dimensions of the group of musicians, for each stimulus-performance.  $t$ -values (student) for dependent means among the judgments of the three performances are also indicated.

opinion, these waves though they do not alter the basic system, make the performance's dynamics much richer. Rampal's interpretation differs considerably from the others: in fact, one can observe the tendency following a rapid ascent to maintain the sound level constant, or rather, to prevent for a certain period the natural tendency to a progressive descent. One can observe on this overall system other very small type »a« waves, which signal the presence of minimal sound variations, which, however, do not reach the level of real dynamic variations. The effect of tension, aggressiveness and vigorousness which the subjects pointed out, is probably due to all these components.

	st. 1 Rubinstein		st. 2 Pollini		st. 3 Ekier		t		
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	1-2	1-3	2-3
aggressive calm	3.034	1.210	2.207	1.521	1.828	1.605	3.041*	3.650*	1.160*
heavy light	3.724	1.533	3.034	1.658	1.966	1.500	2.453*	4.627*	3.111*
inexpressive expressive	5.414	1.680	5.690	1.583	4.690	2.123	-0.955	1.855	2.693*
weak vigorous	5.276	1.556	5.828	1.416	6.034	1.523	-1.428	-2.491*	-0.648
pleasant unpleasant	3.172	1.692	3.483	2.230	4.759	2.029	-0.964	-3.833*	-2.932*
mild harsh	4.793	1.346	5.069	1.771	6.034	1.322	-1.322	-4.032*	-2.685*
relaxed tense	5.069	1.486	5.586	1.086	6.034	1.592	-2.440*	-2.461*	-1.536
introvert extrovert	3.172	1.583	3.690	1.892	3.207	2.128	-1.596	-0.087	1.119

\*  $p < 0.05$  d.f. = 28

Tab. 3: Second composition (*Polonaise no. 6 in A flat major op. 53 » Eroica«*) – Mean values and Standard Deviations of the scores of the considered dimensions of the group of non-musicians, for each stimulus-performance. *t*-values (student) for dependent means among the judgments of the three performances are also indicated.

## 2nd COMPOSITION

### Stimulus 1: *Rubinstein's Performance* (fig. 4)

Both groups considered this passage expressive, vigorous, pleasant and moderately heavy; (as can be noted in fig. 10, the musicians' criticism is not too distant from the neutrality point), the non-musicians consider the passage more aggressive, more tense, more introvert (Tab. 5). The stimulus is made up of three large complexes of successively three, four and three bars (the two sharp falls correspond to the bass clef quatrains). All together, the complexes show rather smooth

lines despite some high intensity variations. The marked configurations are established on the »A« complexes: on the upward slope of the first two curves short and smooth »b« curves appears with ample base, and three type »a« curves on the downward slope. In the third complex the upward slopes are followed by other type »a« curves that reach the maximum level of intensity for the whole phrase. Besides, there is a tendency for the sound intensity to rise: the three complexes' bases and vertexes increase progressively.

F. Chopin – *Polonaise no. 6 in A flat major op. 53 »Eroica«* –  
 Performer: Artur Rubinstein

from bar 1 to bar 10

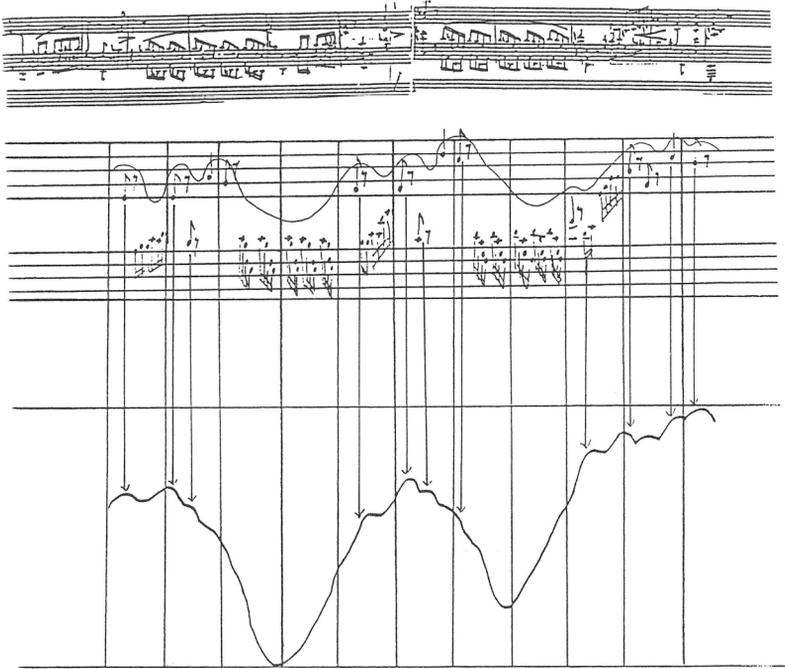


Fig. 4: For figure reading see text.

Stimulus 2: *Pollini's Performance* (fig. 5)

Both groups consider him very expressive, very vigorous and pleasant (fig. 10); the significant differences are in tension, harshness, heaviness, aggressiveness and introversion ( $p < 0.05$ , Tab. 5). Overall speaking, this stimulus is perceived very differently by the two groups of subjects: in fact, the non-musicians judge it heavy, harsh, tense and introvert, and the others light, mild, relaxed and extrovert (see figure). Also here, as in the preceding stimulus, three large »A« complexes are shown. What is most evident is the very sharp fall of the sound intensity (in the first complex) which starts off from a rather high level. The central curve corresponds to a rise and fall of the

	st. 1 Rubinstein		st. 2 Pollini		st. 3 Ekier		t		
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	1-2	1-3	2-3
aggressive calm	4.000	1.589	3.850	2.007	3.050	1.538	0.389	2.009	1.466
heavy light	3.800	1.508	4.100	1.683	2.150	1.461	-1.189*	3.885*	3.901*
inexpressive expressive	5.000	1.522	6.300	0.979	2.350	1.694	-2.795*	5.490*	8.354*
weak vigorous	4.450	1.761	6.050	0.759	4.450	2.139	-3.310*	0.000	3.170*
pleasant unpleasant	3.400	1.465	2.600	1.903	5.750	1.410	1.479	-5.378*	-5.788*
mild harsh	4.050	1.146	3.850	1.268	5.200	1.240	0.890	-3.437*	-3.777*
relaxed tense	3.950	1.276	3.900	1.804	4.450	1.317	0.106	-1.173	-0.967
introvert extrovert	4.450	1.146	5.300	1.838	3.350	1.348	-2.378*	3.101*	4.513*

\*  $p < 0.05$  d.f. = 19

Tab. 4: Second composition (*Polonaise no. 6 in A flat major op. 53 »Eroica«*) – Mean values and Standard Deviations of the scores of the considered dimensions of the group of musicians, for each stimulus-performance. *t*-values (student) for dependent means among the judgments of the three performances are also indicated.

sound level, the third curve is almost specular compared to the first. In each of the complexes (on the descent, on the plateau, and the next ascent) one can observe characteristic successions of intensity variations. In »A2« and »A3« type »c« wave is followed by two or three type »a« curves, and followed again by another type »c« wave. All three complexes share the presence of an ample type »c« wave. The curve is characterized by steep rise and fall lines of intensity; one can also observe the presence of rather elevated peaks of type »c« which correspond to rather marked accents. These factors are due to strong contrasts of dynamics, which probably explain the listeners' impressions of expressivity and vigorousness.

F. Chopin – *Polonaise no. 6 in A flat major op. 53 »Eroica«* –  
 Performer: Maurizio Pollini

from bar 1 to bar 10

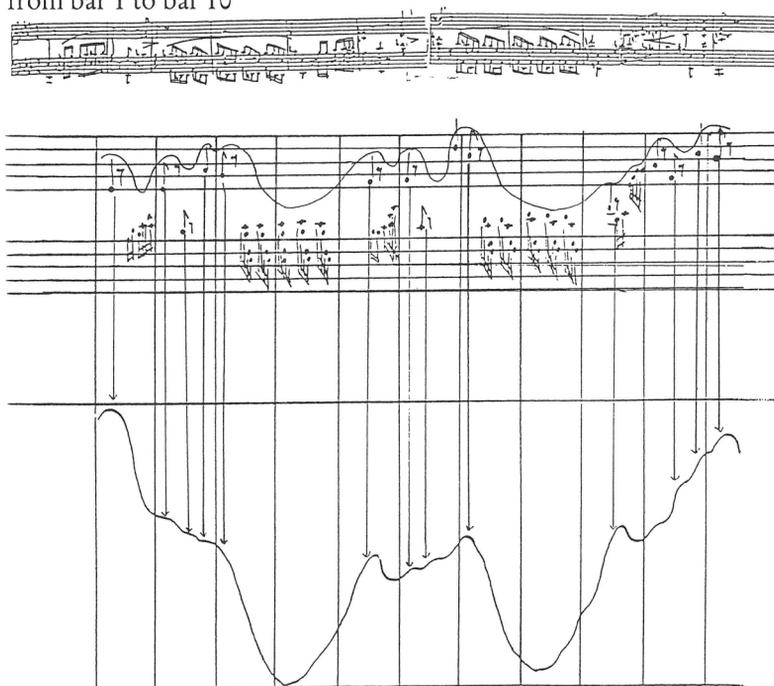


Fig. 5: For figure reading see text.

Stimulus 3: *Ekier's Performance* (fig. 6)

Both groups considered this interpretation aggressive, heavy, vigorous, unpleasant, harsh, tense, introvert: the non-musicians find it more »expressive« (fig. 10). They are very radical in their judgments which show, however, the same tendency of the others: significant differences appear for the adjectives »aggressive«, »vigorous«, »harsh« and »tense« (tab. 5). The analysis of the graphic realisation of the stimulus does not point out any large »A complexes«, as if all developed on the same »sound plateau«. The intensity variations are formed by two type »a« waves. It is difficult to find a regular correspondence to the latter, either at the beginning of the bar or at the highest musical points. This effect of relative flatness is probably due to a wide use of the pedal.

		agress.	heavy	inexpress.	weak	pleasant	mild	relaxed	introvert
FLUTE	st. 1 Nicolet	-	-	-	-	-	-	-	-
	st. 2 Rampal	-	-	2.410	2.560	-	-	-	-
	st. 3 Gazzelloni	-2.351	-	3.318	4.894	-	-	3.020	-
PIANO	st. 1 Rubinstein	-2.414	-	-	-	-	-	2.740	-3.090
	st. 2 Pollini	-3.260	-2.188	-	-	-	2.647	4.084	-2.962
	st. 3 Ekier	-3.558	-	4.106	3.207	-	2.226	3.973	-

$p < 0.05$  d.f. = 47

Tab. 5: Statistically significant *t*-values (student) for independent means between the two groups (musicians and non-musicians) of scores of the considered dimensions.

F. Chopin – *Polonaise no. 6 in A flat major op. 53 »Eroica«* –  
Performer: Jan Ekier

from bar 1 to bar 10

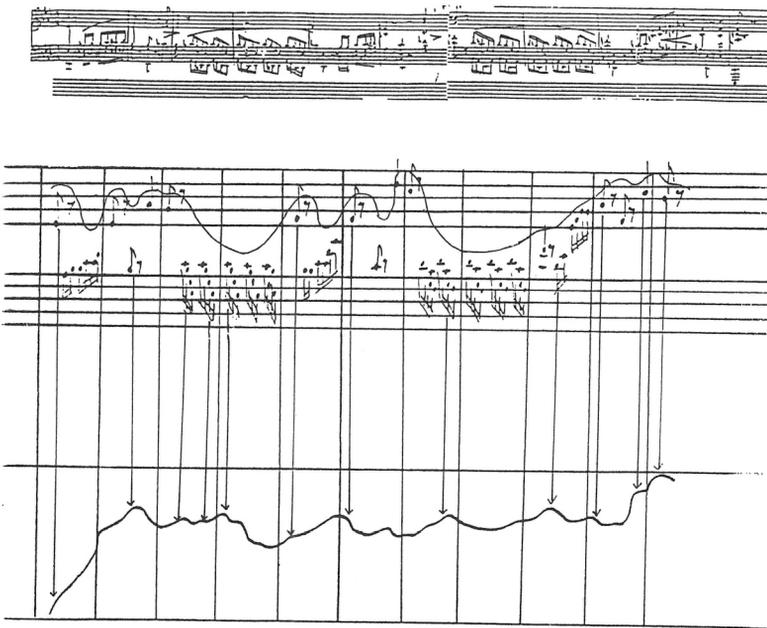


Fig. 6: For figure reading see text.

### *Comparison between the three performances*

In order to compare the judgments we must point out that we looked for adjectives that might be characteristic of some shades of dynamics. Therefore the adjectives: relaxed-tense, heavy-light, aggressive-tranquil, weak-vigorous are to us related to the same semantic meaning; while introvert-extrovert, expressive-unexpressive, mild-harsh, pleasant-unpleasant are semantic sets relatively more independent. In fact, by observing fig. 12, it can be noted that for the non-musicians the sets of the same semantic meaning take the same course. For example within the dimension aggressive-tense, one can observe an increasingly negative judgment from the first to

J.S. Bach – *Partita in A minor for flute solo* –

A) Aurele Nicolet      time: 11 «

B) Jean Pierre Rampal      time: 11 «

C) Severino Gazzelloni      time: 11 «

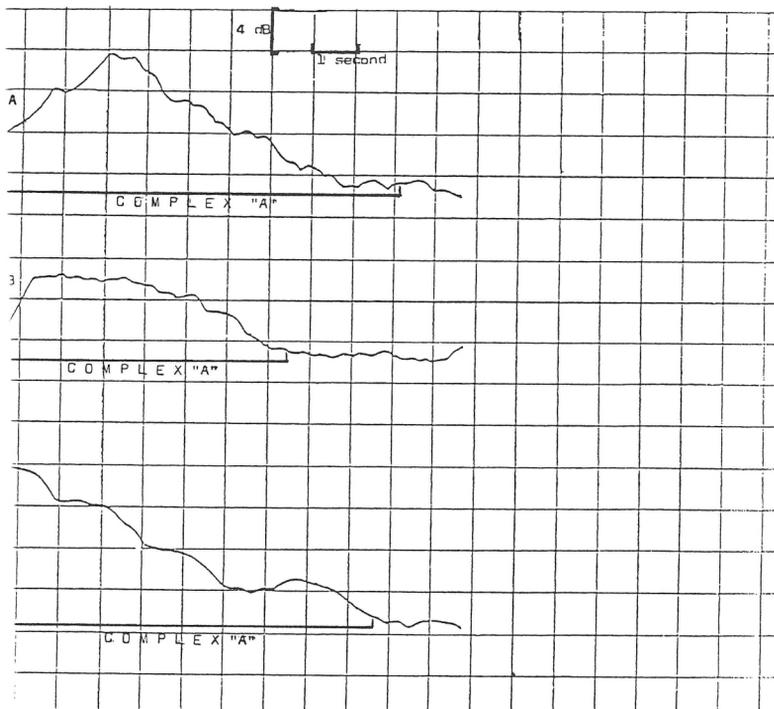


Fig. 7: For figure reading see text.

the third passage; the same can be applied to the category heavy-light, where Rubinstein's interpretation is found to be less heavy than Pollini's which in turn is significantly less heavy than Ekier's. The course is similar for the adjectives relaxed-tense and also for the adjectives mild-harsh; likewise, it is overall similar in pleasant-unpleasant and weak-vigorous. This homogeneity of judgment ends with the set unexpressive-expressive; in fact, in this case the passage which is con-

F. Chopin – *Polonaise no. 6 in A flat major op. 53 »Eroica«* –

A) Artur Rubinstein      time: 19«

B) Maurizio Pollini      time: 20«

C) Jan Ekier              time: 18«

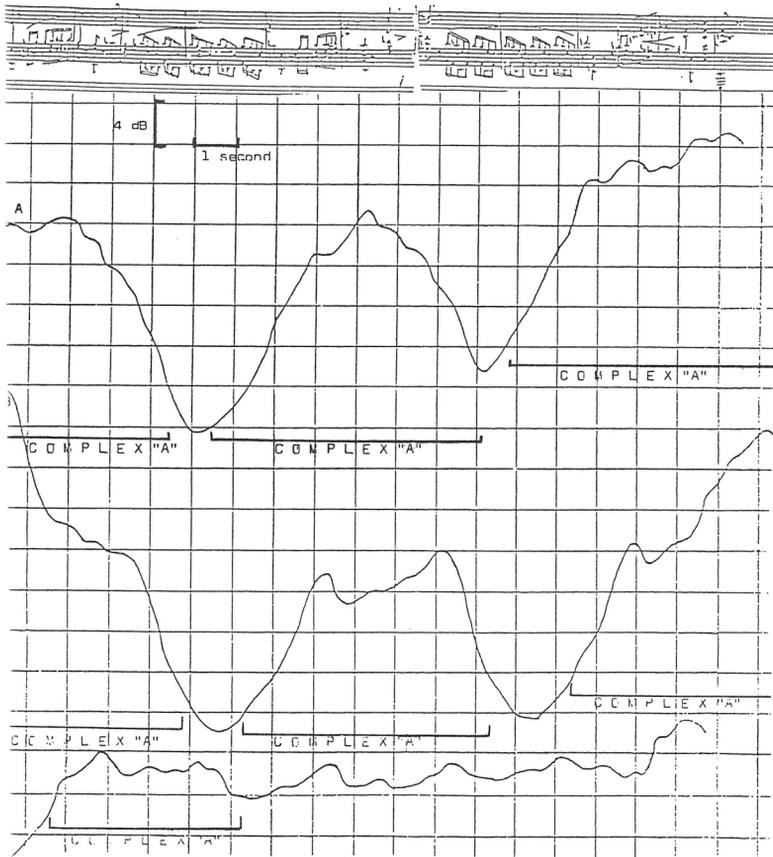


Fig. 8: For figure reading see text.

sidered most expressive is Pollini's, the most unexpressive Ekier's, and in the judgments of the non-musicians all three interpretations are considered introvert, but Rubinstein's and Ekier's more so (Tab. 3).

As for the musicians, their judgments are rather homogeneous in the categories of similar semantic meanings (aggressive-calm, heavy-

FLUTE (Part IIa In A minor for flute solo)

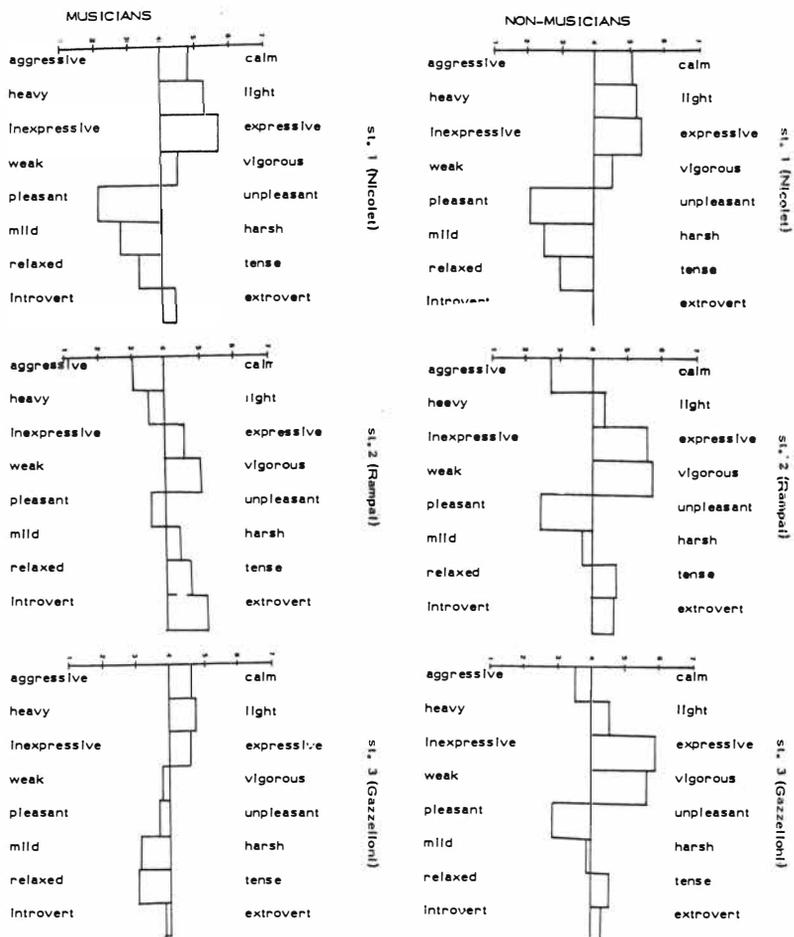


Fig. 9: Means of the responses to three musical stimuli

light, etc.). Relatively neutral judgments with minimal differences appear in the first two passages which differ considerably from the third; the latter is significantly more aggressive, heavier and more tense. Generally, the musicians do not give distinct judgments. Rubinstein's interpretation as well as Pollini's are relatively neutral regarding heaviness, aggressiveness and tension (Tab. 4).

PIANO (Polonaise n° 6 in A flat major op. 53 "Eroica")

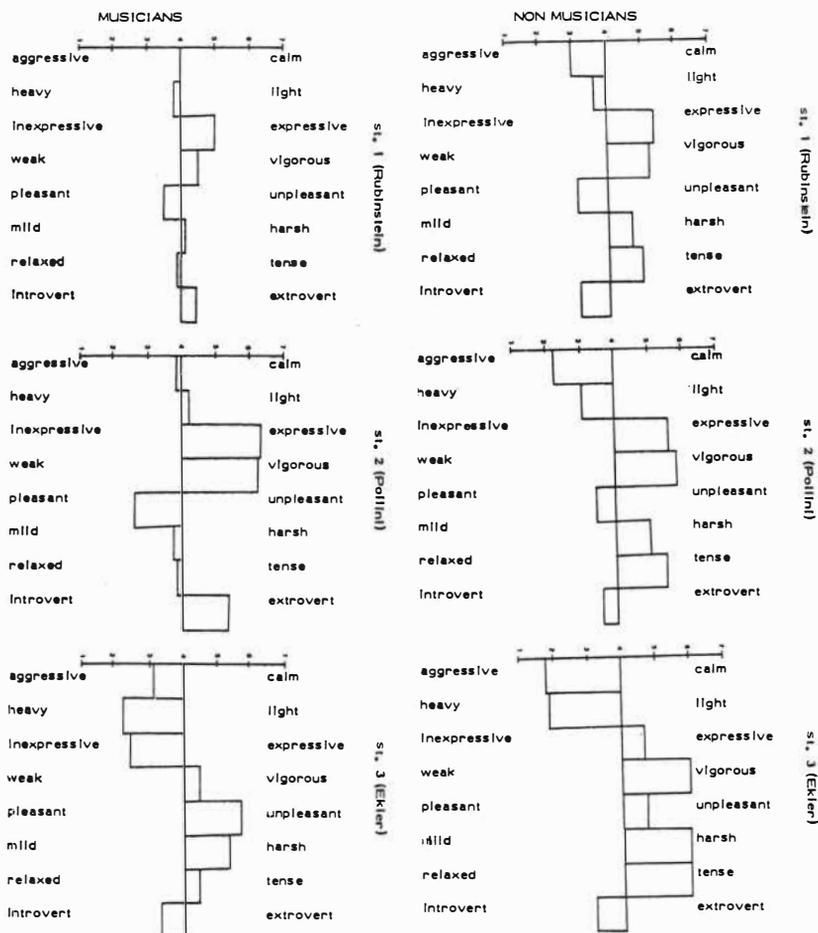


Fig. 10: Means of the responses to three musical stimuli

Concerning the categories weak-vigorous and unexpressive-expressive, the course is not homogenous: Pollini's performance turns out to be the most expressive, the most vigorous, the most pleasant, and moreover remarkably more extrovert. In conclusion, Ekier's interpretation which shows a uniformly high level of intensity (on single plateau) causes judgments such as tense, heavy, aggress-

FLUTE (Partita in A minor for flute solo)

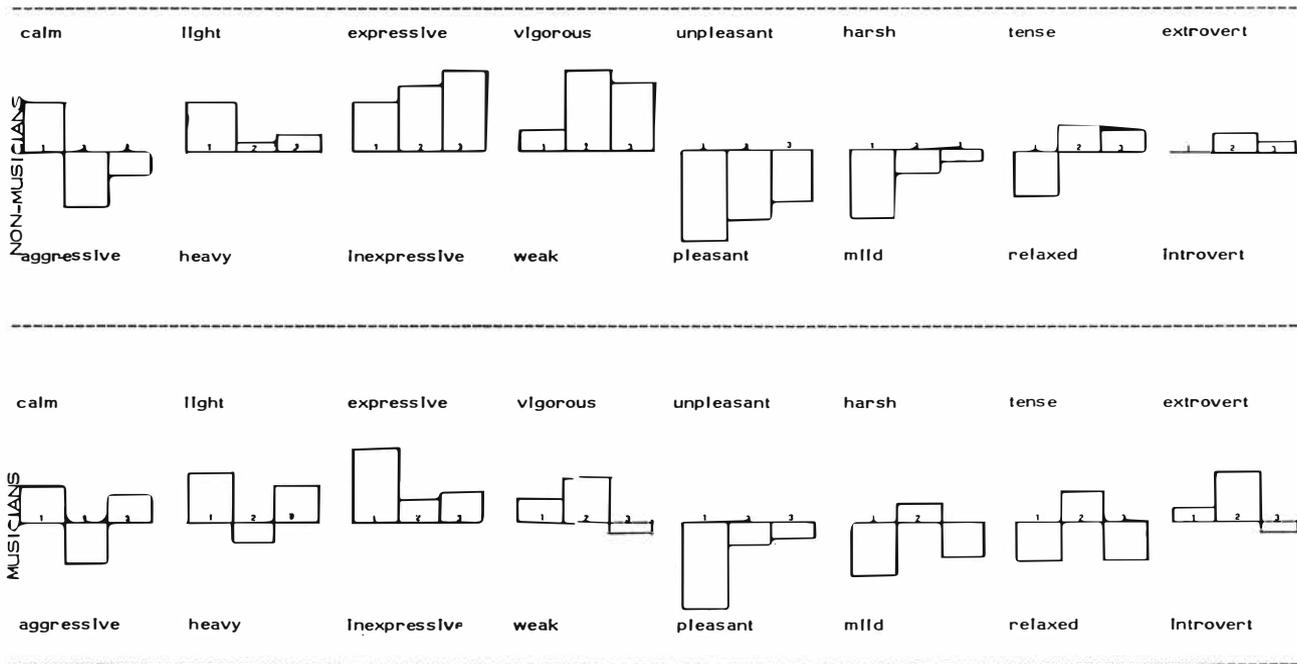


Fig. 11: Means of the responses to three musical stimuli 1 = Nicolet 2 = Rampal 3 = Gazzelloni

PIANO (Polonaise n° 6 in A flat major op. 53 "Eroica")

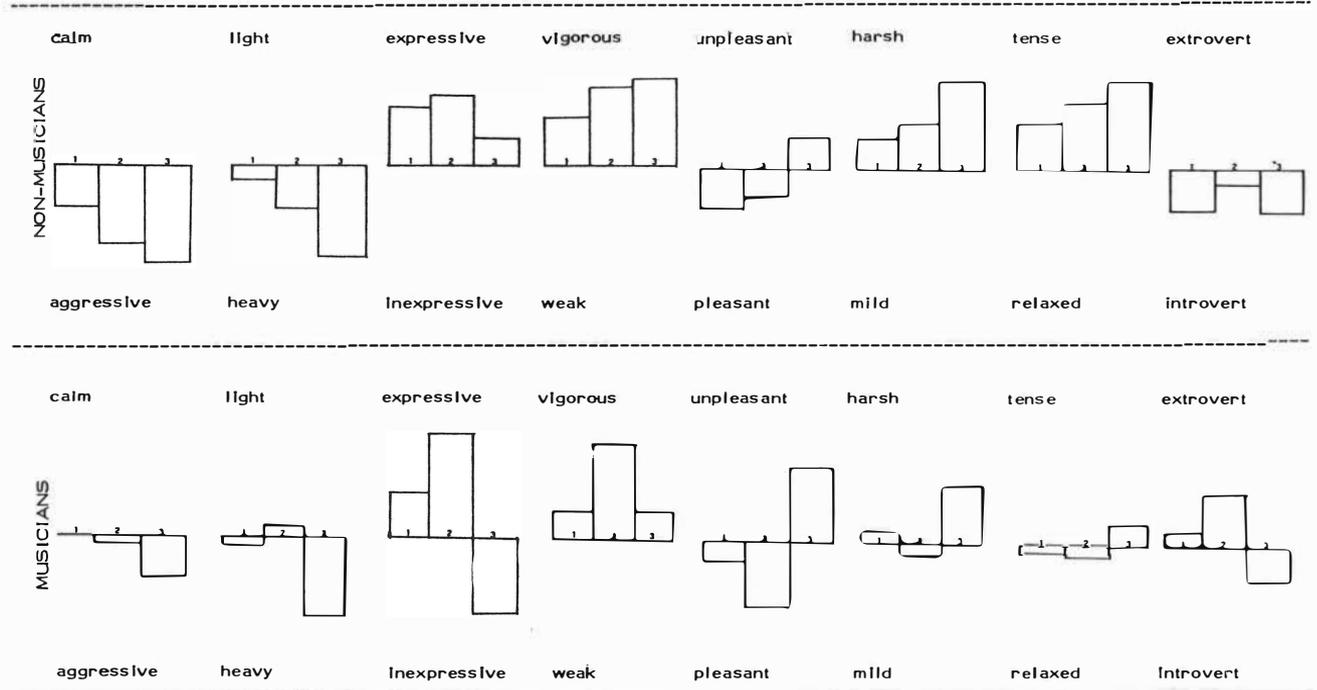


Fig. 12: Means of the responses to three musical stimuli 1 = Rubinstein 2 = Pollini 3 = Ekier

sive, unpleasant in both groups of subjects. Rubinstein's smooth course with ample oscillations, which lacks uniform parts of intensity levels, causes judgments which hardly or never include heaviness, tension and aggressiveness, and which give an overall idea of pleasantness.

Pollini's interpretation has the tendency to exhibit ample and rather sudden variations of intensity as well as maintaining the sound level constant for some time. This performance shows some aspects of the first interpretation and some minimum components of the third. This fact influences substantially the judgments of the non-musicians regarding weight, aggressiveness and tension, as they give a significantly higher score compared to Rubinstein. On the other hand, it is hardly significant for the musicians, where the emerging overall judgment is one of expression, vigour and extroversion. Although this interpretation differentiates the subjects' criticism, it allows for overall judgment of high expression and vigor.

## **Conclusion**

In conclusion we may say that analysis of the dynamics in their graphic transduction has supplied us with interesting data for beginning to understand some of the significant components that contribute to forming aesthetic criticisms broadly speaking. However, these are obviously initial researches which should be followed by further investigations.

## **Summary**

We examined the differences in variation of intensity between three different musical interpretations of the same musical phrase. (One for piano and one for flute, each played by three different performers.) The analysis was made with the help of a graphic realisation of the intensity (in dB) by a phonometer.

Then we examined the effects of the different interpretations on the »aesthetic judgments« of 20 musicians and 29 non-musicians. A hypothetical relationship between dynamics (variation of level of intensity) and aesthetic judgments followed.

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