

# IN SEARCH FOR OBJECTIVE EVALUATION OF SELECTED FACTORS PREDICTING SUCCESS IN MUSICAL PERFORMANCE – A PILOT STUDY

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## ABSTRACT

**Background.** When evaluating students' progress, music teachers frequently refer to behavioural aspects of musical performance, hoping that correct usage of playing apparatus is a necessary condition for proficient musical production. Thus extended experimental foundations for diagnosing breathing disturbances in singers and musicians playing wind instruments would help teachers in evaluating a student proficiency level as well as in planning cure exercises.

**Aims.** A pilot study was administered to verify possible ways of correlation of teachers' evaluations of vocal and wind instrumental performance with registered breathing and a pulse rate irregularity.

**Method.** Performances of songs by Mieczyslaw Karłowicz (N=5), and items 7, 8 and 9 taken from the *Watkins-Farnum Performance Scale* (N=5) were audio recorded, and the parameters of two breathing factors and blood pulsation were registered on a computer disc. Music recordings were evaluated by music teachers who marked beats in printed music on which they observed specified errors. These evaluations were projected against plots representing an acoustical form of the performance (sampled SPL), movements of chest and diaphragm, and the pulse. All dimensions were co-ordinated on the level of a musical beat. The inter-judge consistency was estimated, and clusters of error markings were examined against the behavioural parameters by a team of music educator and a medical doctor.

**Results.** Depending on a composition from 39 to 56 percent of errors marked in songs formed clusters of marks given by three or more teachers. In wind music from 47 to 85 percent of errors clustered at particular beats of music. Remaining error markings dispersed over compositions forming no clear patterns. Breathing disorders depended upon the subject musical advancement. Most commonly a lack of synchronisation between the chest inhalation phase and diaphragmatic movements was diagnosed, frequently accompanied by a paradoxical diaphragmatic movements. Blood pulsation changes were less frequent. In several cases clusters of musical errors coincided with the breathing irregularity. However, no patterns have been disclosed suggesting that breathing disturbances generate musical errors.

**Conclusions.** The method of paralleled observations seems to be promising but still needing elaboration. Particularly a set of correct breathing graphs should be collected and classified

to serve as the reference for various incorrect instances. Thus examination of performances by professional musicians is planned at the next stage of the study.

## 1. BACKGROUND

When evaluating students' progress, music teachers frequently differ in using particular criteria (Manturzevska, 1970; Jordan-Szymańska, 1990). In many cases they apply musical and behavioural criteria at the same time. Directions elaborated in 1967 by the Educational Centre for Art School for use in the vocal department of Polish secondary music schools, not substantially modified till now, suggest that posture, voice production, and clarity of text delivery is taken into account along with correctness of notes, musicality and the complexity of prepared repertoire (Miklaszewski, 1980). All these lead usually to low consistency of evaluations (Nowacki, 1974; Jordan-Szymańska, 1981). However, informal discussions suggest that teachers seem to like to refer to behavioural aspects of performance, and that they hope that correct usage of playing apparatus is a necessary condition for proficient musical production.

## 2. AIMS AND THE PROBLEM

The aim of the project is finding relationship between behavioural disorders and musical deficiencies of the performance. Particularly we are interested in the succession of the events: whether the behavioural disturbance precedes a musical error, thus causing it, or comes after and so is the result of it. Thus a pilot study was administered to verify possible correlation of teachers' evaluation of vocal and wind instrumental performance with registered breathing and pulse rate irregularity. Its results are presented here.

## 3. METHOD

Performances of songs by Mieczyslaw Karłowicz (N=5), and items 7, 8 and 9 taken from the *Watkins-Farnum Performance Scale* (N=5) were audio recorded. The songs were different for each voice and unequal in length. WFPS items were the same for all wind players. Performers were students of the vocal department of the Chopin Academy of Music in Warsaw of whom one was advanced, one intermediate and three beginners, and students of the wind music department of the Szymanowski Music Lyceum – two beginners and three intermediately advanced. During the

performance the parameters of two breathing factors – chest and diaphragm movements – and blood pulsation were registered on a computer disc. Changes in chest measurement were registered with a help of two inductive bands placed at the chest's top and at the level of a diaphragm. Heartbeats were registered by a photo diode attached to an earflap. At the same time a musically qualified listener moved his hand in front of another photo diode synchronously with beats of performed music. All these signals were sampled at the 500 Hz frequency and processed by the custom made computer program FON, resulting with a plot representing an envelope of recorded musical signal, performer's breathing movements and heart rate, and musical beats. Music recordings were then evaluated by music teachers. Two groups of vocal teachers (N=12 and N=16), participating in a summer course for the secondary music schoolteachers, rated performance of songs by Karłowicz, and two smaller groups (N = 6 and N=5) evaluated wind instrument recordings. All teachers worked in a group settings having printed music and a short description of proposed evaluating criteria in their evaluating forms; all participated in a short training session prior to the evaluation, during which the technical aspects of their task along with the meaning of evaluating criteria were explained. The criteria were selected after a profound discussion with vocal and wind instrumental expert teachers. Judges marked beats of music on which they observed specified errors, which included shortcomings in (1) *appoggio*, (2) *passaggio*, (3) *legato*, (4) text delivery, and (5) music related breathing for songs, and (1) sound quality, (2) passing to another register, (3) sound attack, and (4) breathing for winds. These evaluations were then projected against plots produced by the FON computer program. All dimensions were co-ordinated on the level of a musical beat. The inter-judge consistency was estimated, and clusters of error markings were examined against the behavioural parameters by a team of music educator and a medical doctor. Medical diagnosis was based on a work by Siegert (1980), that had attempted to characterise correct and incorrect breathing in vocal production. Besides the graphs a detailed protocols describing every performance were prepared.

#### 4. RESULTS

Depending on a composition from 39 to 56 percent of errors marked in songs formed clusters of marks given by three or more teachers. In wind music from 47 to 85 percent of errors clustered at particular beats of music. Remaining error markings dispersed over compositions forming no clear patterns. Because of a small number of judges evaluating wind performances the inter-judge consistency was estimated only for the 12 and 16-person groups of vocal teachers. Correlation coefficients for pairs of judges varied from close to zero (-0.06) to very high (-0.96) with a great majority near zero (the highest mean value 0.24, for the song *Idzie na pola* and the *appoggio* criterion). The consistency of ratings did not change with the advancement of the performer and criteria of evaluation while the total number of error marked by judges differed significantly according to level of advancement. The most advanced singer (a soprano) has collected total of 162 *appoggio* errors, what made 1.18 error per beat of music, while the least advanced singer (a tenor) has got 818 error markings for the same criterion, what made 8.80 error per beat. (Figures 1, 2, 3, 4)

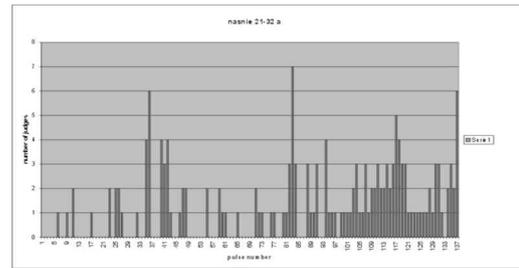


Figure 1: Distribution of errors in the most advanced performance (song *Na sniegu*, criterion *appoggio*)

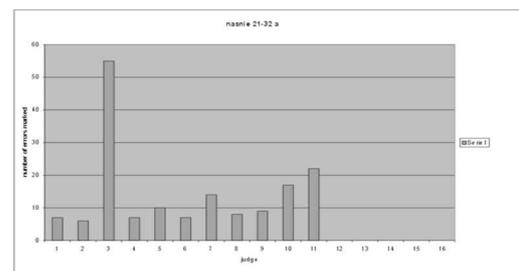


Figure 2: Differences between judges evaluating the most advanced performance (*Na sniegu / appoggio*)

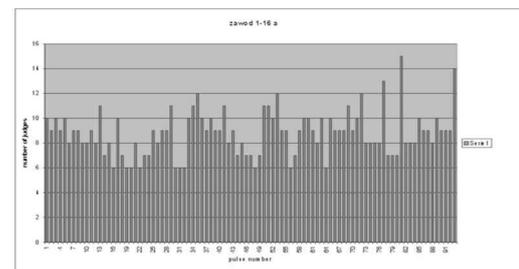


Figure 3: Distribution of errors in the performance by the least advanced singer (*Zawod / appoggio*)

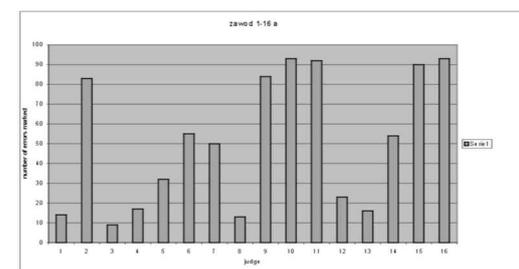
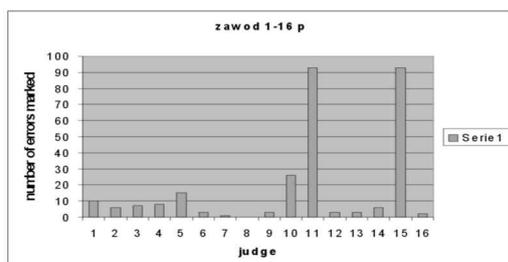


Figure 4: Differences between judges evaluating the least advanced performance (*Zawod / appoggio*)



**Figure 5:** Extreme differences between judges evaluating the same performance according to the same criterion (song *Zawod*, criterion *passagio*, least advanced singer)

The ranking in advancement appeared to be exactly the same as the ranking based on a mean number of error markings per musical pulse unit. However it was not uncommon that regarding the same song and the same criterion one judge marked the entire piece sung wrong (the number of error markings equalling the number of beats) while another judge, working in the same group, marked for the same criterion no error at all! (Fig. 5)

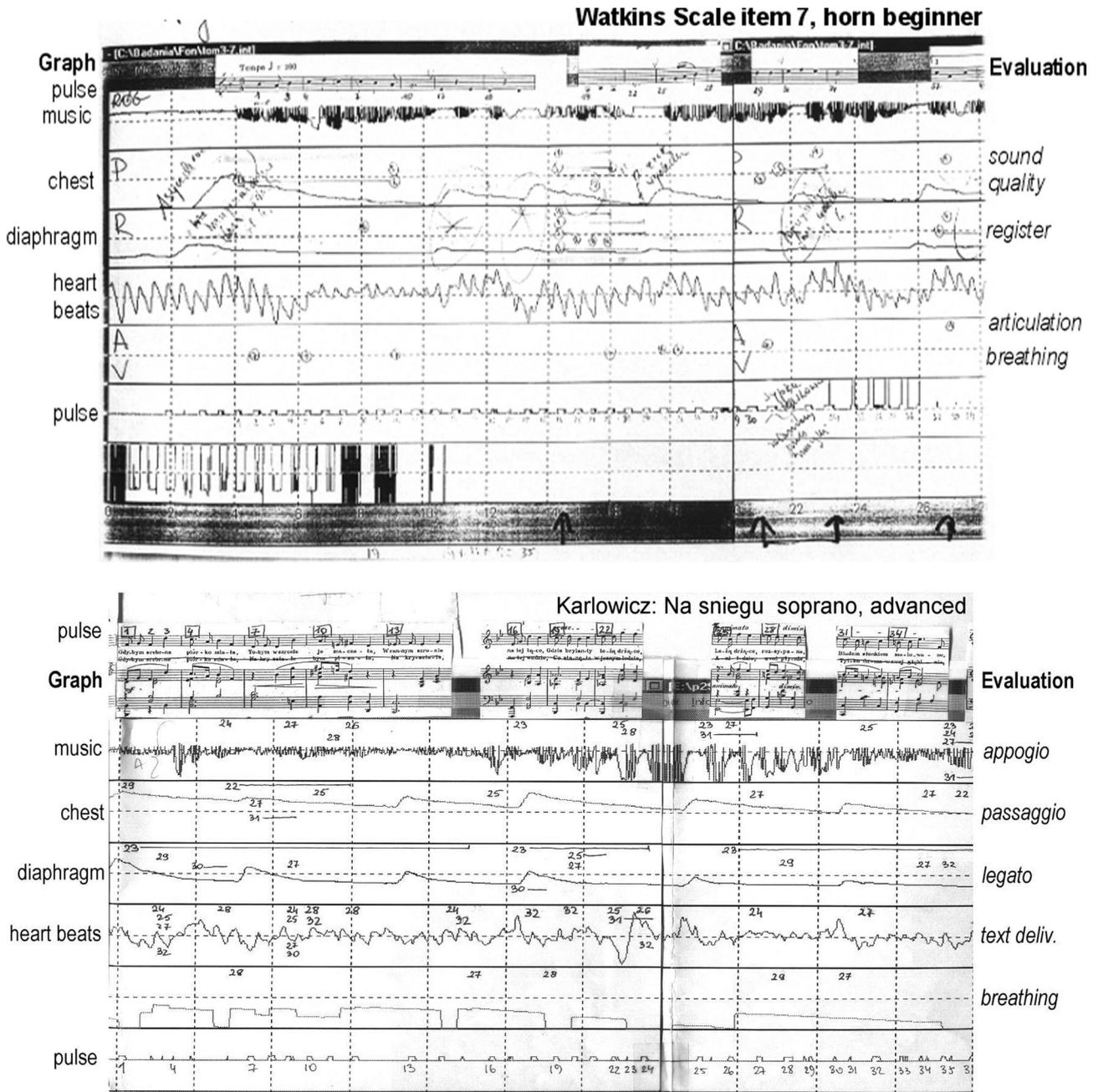
Breathing disorders depended upon the subject musical advancement, and thus upon the total number of errors marked by music teachers. Most commonly a lack of synchronisation between the chest inhalation phase and diaphragmatic movements was diagnosed (Fig. 6), frequently accompanied by a repeated minute inhalation before a whole air is spent, called paradoxical diaphragmatic movements. Also inhalation done too early before a new musical phrase was observed which usually led to keeping air in lungs till singing begins, and then paradoxical movements. Blood pulsation changes were less frequent and seemed not to synchronise with musical errors. In several cases clusters of musical errors coincided with the breathing irregularity. However, pauses within musical phrase and repetition of the same word in song's lyrics caused paradoxical diaphragmatic movements, which were probably desirable ingredients of musical expression, and as such should not be classified as disorder. Also no clear patterns were noticed which could suggest whether breathing disorders cause musical errors or are the effects of them.

## 5. CONCLUSIONS

The method of paralleled observations seems to be promising but still needing development. Particularly a set of correct breathing graphs should be collected during the performance of a musical composition and classified to serve as the reference for various incorrect as well as correct but irregular instances. Thus examination of performances by professional musicians is planned at the next stage of the study. The next, perhaps equally important problem relates to training of musical judges. Substantial differences between the persons listening to the same performance and using the same criterion should be eliminated, and a number of unique dispersed markings limited. Group work in evaluation should be avoided, so more time and effort will be needed for conducting the research. However we believe that an evaluating and diagnostic tool which could be eventually developed will help teachers and students in their work.

## 6. REFERENCES

1. Jordan-Szymańska, A.(1981). Wpływ kompetencji oceniającego i kryteriów stosowanych przy oceniania na trafność i charakter ocen wykonan muzycznych [The influence of evaluator's competence and the criteria applied in evaluation on the validity and content of evaluations of musical performance]. Unpublished master dissertation. Dpt. of Psychology, University of Warsaw.
2. Jordan-Szymańska, A. (1990). Psychologiczne mechanizmy oceniania wykonań muzycznych [Psychological foundation of music performance evaluation]. In M. Manturzevska and H. Kotarska (eds.). Wybrane zagadnienia z psychologii muzyki [Selected issues in music psychology]. Warsaw: WSiP
3. Manturzevska, M. (1970). Rzetelność ocen wykonawstwa muzycznego wydawanych przez ekspertów muzycznych [Reliability of evaluations by musical experts], part I and II. *Ruch muzyczny*, 24, Nos. 21 and 23.
4. Miklaszewski, K. (1980). Koncepcja kryteriów oceny wykonawstwa muzycznego [Concepts of music performance evaluation criteria]. In *Podstawy kształcenia muzycznego II* [Fundamentals of music education II]. Warsaw: MP-COPSA.
5. Nowacki, R. (1974) Ocena wykonań konkursowych na przykładzie konkursów chopinowskich [Evaluation of contest performances exemplified by the performances during the Chopin Piano Competitions]. Warsaw: PWN
6. Siegert, C. (1980). Problematyka foniatryczna głosu śpiewaczego ze szczególnym uwzględnieniem metod instrumentalnych w pedagogice głosowej [Phoniatric problems in singer's voice and instrumental methods in vocal pedagogy] (translated from German). *Zeszyty Naukowe PWSM w Gdańsku*, vol 22 (special issue). Gdansk: Moniuszko Academy of Music.



**Figure 6:** Top: Asynchronous chest and diaphragm movements. Horn player, beginner. Bottom: Perfect breathing. Soprano, advanced.