

VERBAL DESCRIPTION OF MUSICAL SOUND TIMBRE IN CZECH LANGUAGE

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ABSTRACT

The words used for description of musical sound timbre were acquired. The research was carried out among people with active relation to the music (instrument players, conductors, composers, sound engineers etc.). Each of the respondents have filled out the questionnaire composed of two parts. In the first part personal background of the respondent (respondent profile) was collected, in the second part respondent wrote down particular expressions he uses for timbre description, synonymic and antonymic relations among them. Common frequency vocabulary and frequency vocabularies over the selected respondent classes were created from the data. Similarity of vocabularies and their differences in dependency on the respondent class are studied.

1. INTRODUCTION

The timbre of musical sound represents a subjective phenomenon which reflects the acoustic properties of musical signals in our consciousness in a complex manner, and which together with pitch and loudness represents a fundamental psychoacoustic quantity. The majority of contemporary researches regard timbre as multidimensional subjective quantity. In many timbre studies main features (categories, dimensions, factors) of some specific class of musical sounds are searched from the results of listening tests.

Method used for the interpretation of results is dependent on the method of listening test. Listened sound can be identified as like to a specific musical instrument [1]. When dissimilarities are judged in pairs of sounds, external interpretation of results may use either acoustic characteristics of listened signals [2] or spontaneous verbal descriptions collected in different listening of the same sound context [3]. It is also possible to select verbal attributes in advance [4]. The main problem in this case is the representativeness and method of selection: is it possible to use approved set of attributes or is it necessary to start new selection for every new context of sounds?

Our research group proposed a project leading to the selection of verbal attributes used for the description of timbre in Czech language. The basic aims of this project are:

- search for dimensions of perceptual timbre space and for their verbal descriptions,
- finding when all musicians share common perceptual space or certain groups (professional, age, etc.) use specific dimensions described by specific words.

The methods used in this study are based on sound-context free collection of verbal attributes and their evaluation used in pilot experiment with a group of violin players [5]. The results of the first stage of the project are summarised in this contribution.

2. METHOD

The research was carried out using questionnaire composed of two parts. In the first part respondents have described their personal profile – their age, years of musical experience, sex, the highest musical education, current and last music-related profession, position, instrument(s) they play etc. The second part of the questionnaire was divided into three subsections. In the first subsection respondents wrote down in free order the words and expressions which they use for the description of musical sound timbre, in the second one they wrote down groups of synonyms and in the third one they wrote down groups of antonyms.

The first part of the questionnaire was used for the description of population sample and for the discrimination of respondents into classes according to selected criteria. The second part as a whole was used for building of common vocabulary and partial vocabularies of individual respondent classes. The second and the third subsections of that part will be used for determination of word links in the next stage of the project.

The research was carried out among students and professors of Faculty of Music of Academy of Performing Arts in Prague, members of several symphonic and chambre orchestra from different regions of the Czech Republic, teachers from musical schools and people from recording studios. These groups overlap in some cases, e. g. professors of the musical faculty are often also members of chambre orchestra or solo instrument players. In the course of research several methods of population sample selection were tried [6]. The first one, contacting letter to the orchestra officials with request for cooperation remains with very poor response. Public addressing of musicians during orchestra rehearsal gave better but always insufficient return of questionnaires. The most effective way of collection was snow-ball technique and personal contact with individual respondents.

3. RESULTS

Finally 120 respondents sent back filled questionnaires. Distribution of respondents according to their main profession is displayed in Table 1 (120 respondents = 100%). Some respondents have stated more than one profession. Profession with highest priority (if stated) or profession with lower overall occurrence was used in such cases.

Table 2 shows distribution of respondents according to the instruments they play (109 respondents = 100%). There are also included respondents who did not state playing the instrument as their main profession. Distribution is rather disproportionate but it approximately corresponds with some exceptions to the distribution of instrument players in symphonic orchestra. In the following analysis the division to only main instrument groups (bow, wind, keyboard) is used in order to reach sufficient amount of respondents in individual classes. Respondents wrote

down 1964 different words and expressions in total. Each respondent wrote at least one its own “new” word, so only 230 words (i. e. 12 %) from common vocabulary have relative frequency greater than 5 % (the word was used at least by 6 respondents).

Main profession	Respondents	%
teacher	41	34.2
composer	6	5.0
conductor	3	2.5
instrument player	53	44.2
other	17	14.2

Table 1: Respondents according to their main profession.

Instrument	Respondents	%
violin	30	27.5
viol	9	8.3
violoncello	7	6.4
double bass	2	1.8
flute	6	5.5
oboe	1	0.9
clarinet	6	5.5
bassoon	3	2.8
trumpet	6	5.5
trombone	1	0.9
french horn	1	0.9
organ	4	3.7
piano	30	27.5
other	3	2.8

Table 2: Respondents - instrument players according to instrument they play.

Class		Respondents	Relative frequency of words			
			$\geq 5\%$	$\geq 25\%$	$\geq 30\%$	$\geq 50\%$
All		120	230	30	25	5
Sex	Male	87	214	36	23	6
	Female	33	237	35	25	6
Instrument	Bow	48	206	28	22	5
	Wind	24	173	36	21	10
	Keyboard	34	279	25	19	5
Age	< 30	37	274	27	20	5
	30 - 50	40	369	41	30	8
	> 50	43	186	31	26	8

Table 3: Number of respondents in selected classes and number of words in partial vocabularies with relative frequency greater than indicated level.

Expression	All			Rank in class		
	f_{abs}	f_{rel}	Rank	Bow	Wind	Keyb.
ostrý – sharp	94	78.3	1	1	1	1
temný – gloomy	79	65.8	2	5	2	2
měkký – soft	78	65.0	3	2	3	4
jasný – clear	75	62.5	4	3	4.5	4
sametový – velvety	61	50.8	5	7	6	4
kulatý – round	58	48.3	6.5	14.5	4.5	8
jemný – delicate	58	48.3	6.5	9.5	11.5	6.5
tupý – unpointed	55	45.8	8	11	8	10
tvrdý – hard	54	45.0	10	9.5	8	15.5
světlý – bright	54	45.0	10	16.5	11.5	10
drsný – harsh	54	45.0	10	12.5	19.5	6.5
sladký – sweet	53	44.2	12	4	15	22
plný – full	51	42.5	13	12.5	8	15.5
tmavý – dark	46	38.3	14.5	21.5	15	15.5
hrubý – rough	46	38.3	14.5	7	15	37
teplý – warm-hot	43	35.8	16	21.5	23.5	15.5
zářivý – radiant	42	35.0	17	16.5	45	22
vřelý – warm-hearty	40	33.3	18.5	7	31	78
čistý – clear	40	33.3	18.5	26	15	19
barevný – colored	38	31.7	20.5	19	45	12
zvonivý – ringing	38	31.7	20.5	39.5	19.5	10
průzračný – lucid	36	30.0	23.5	24	65.5	15.5
úzký – narrow	36	30.0	23.5	39.5	8	37
široký – wide	36	30.0	23.5	32	15	37
chladný – cool	36	30.0	23.5	14.5	31	61.5
kovový – metallic	34	28.3	26.5	32	31	22
studený – cold	34	28.3	26.5	27.5	31	37
svítivý – shining	32	26.7	28	48	19.5	37
zastřený – blurred	31	25.8	29	19	23.5	28.5
hladký – smooth	30	25.0	30	39.5	45	28.5

Table 4: Thirty the most frequently used words from common vocabulary with their relative frequency and rank (including ties) in common and partial vocabularies of selected instrument group classes.

Table 3 shows numbers of respondents in selected classes built on the following criteria:

- all respondents
- sex (male, female)
- instrument group (bow, wind and keyboard instruments)
- age (under 30, from 30 to 50, over 50 years)

and number of words with relative frequencies $f_{rel} \geq 5\%$, $f_{rel} \geq 25\%$, $f_{rel} \geq 30\%$, $f_{rel} \geq 50\%$ for each class. All relative frequencies are computed from word occurrence in partial vocabulary of respective class.

In Table 4 thirty the most frequent words from common vocabulary are presented. Each table row contains the Czech word together with its approximate English equivalent, absolute and relative frequency of word in common vocabulary and rank of occurrence of word in common and partial vocabularies of classes of bow, wind and keyboard instrument players.

Table 5 gives overview of prominent differences in rank of words in partial vocabularies in comparison to common

vocabulary (class All) extracted from Table 4. Rank difference of words is greater than five positions.

Word rank against All	Class		
	Bow	Wind	Keyboard
more used	sweet rough warm-hearty cool blurred	narrow wide shining	ringing
less used	round bright dark clear ringing narrow wide shining smooth	delicate harsh warm, hot radiant warm-hearty colored lucid cool smooth	hard sweet rough warm-hearty narrow wide cool cold shining

Table 5: Words from partial vocabularies with prominent difference in rank in comparison to common vocabulary (rank difference greater than five positions).

Table 6 shows differences between partial vocabularies of selected instrument classes (bow versus wind instruments, bow versus keyboard instruments and wind versus keyboard instruments). All words in table have relative frequency greater than 25 % in class with more frequent use, words with difference in relative frequency in respective partial vocabulary greater than 20 % are listed.

Δf_{rel}	Bow - Wind	Bow - Keyboard	Wind - Keyboard
1. > 2.	warm, hearty (+ 20.8 %) sweet (+ 20.8 %)	warm-hearty (+ 33.0 %) sweet (+30.1 %) rough (+ 25.3 %) cool (+ 22.1 %) honeyed (+ 21.5 %)	narrow (+ 29.5 %) hard (+ 20.8 %) full (+ 20.8 %) warming (+ 20.5 %)
1. < 2.	narrow (- 29.2 %) round (-25.0 %)	dry (- 20.8 %) ringing (- 20.2 %)	---

Table 6: Words from partial vocabularies with differences in relative frequencies greater than 20 %

4. DISCUSSION

Sound-context free collection of verbal attributes used for the description of musical sound timbre resulted to rich set of words and expressions. Many respondents have stated not only the words describing sound timbre as property of musical instrument (e.g. *sharp, bright, round*), but also the words encompassing artistic expression into sound timbre (e. g. *sweet, warm, cool*)

which may have influence on the definition of timbre space dimensions. Such words have usually smaller relative frequency than words describing sound timbre as instrument property so their effect is not extremely significant.

As Table 3 shows, the decrease of number of words with increasing frequency is well balanced among all indicated respondent classes. It can be mentioned from Table 4 that the four words most frequently used by all respondents are also most frequently used by respondents in indicated classes. On the other hand, there is no word written by all respondents.

Even if professional musicians have very complex experience with all kinds of musical sounds, results from Tables 5 and 6 suggest that respondents of individual classes prefer some expressions. For example bow instrument players use more frequently the words *sweet* and *warm-hearty* in contrast to both groups of wind and keyboard instrument players; the word *narrow* is preferred by wind instrument players.

5. CONCLUSIONS

The set of words selected in the questionnaire shows its richness and multiformity and also strong view of musical professionals. The most frequently used words were not a surprise for us; the majority of them is known from spontaneous verbal description of timbre. Even if simple translation into English (or any other language) cannot be precisely correct, their closest English equivalents are known from many published studies of musical sound timbre and thus they confirm internationality of the perception of musical sound and its verbal description.

Further stage of the project will be focused on the reduction of the number of representative expressions, definition of links among them and on more detailed description of differences among classes of music professionals.

6. ACKNOWLEDGEMENTS

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7. REFERENCES

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