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Personality, Intelligence and Musical Instrument

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Abstract

An empirical study examining differences in personality traits and general intellectual ability of academic musicians was conducted on a sample of Macedonian musicians, consisting of four different groups of instrumentalists, taken from four instrumental sections, respectively: a) piano (55); strings: violin, viola, cello, double bass (103); woodwind: flute, oboe, clarinet, bassoon (72); and brass: trumpet, trombone, French horn, saxophone (58). The sample included three age-based groups of musicians: music secondary school learners, music academy (university) students and adult professional musicians with music university degrees. Individual differences were examined employing four test instruments in total, including three personality inventories: R. Cattell's 16PF, H. Eysenck's EPQ, and Costa & McCrae's NEO PI-R, plus figural IQ test (TRL) as a measure of general intellectual ability.

Multivariate analysis of variance (MANOVA) based on computing (performed using SPSS 16.0) revealed results generally in accordance with previously known facts from the field of personology of musicians, mainly from the Anglo-American scientific environment. In terms of second-order factors, piano players are characterised with Originality (brass players), Anxiety (both brass and woodwind players), Self-discipline, Emotional Instability and Higher Intelligence. String players show Originality (brass players), Anxiety and Emotional Instability as well, plus Introversion. Woodwind players' attributes emerge pretty similar to string players: Originality (compared to brass players), Introversion and Anxiety. Finally, brass players emerge as the most distinctive profile in comparison to other groups of instrumentalists, showing Extraversion, Conventionality, Emotional Stability, Adjustment and Lower Intelligence.

***Key words**: intelligence; musician; musical instrument; personality*

Introduction

The differences in morphology, physical size, level of loudness, principles of sound production (string, reed, key, stick), way of control (fingers, lips, hands), position, i.e. level of exposure in the orchestra, the degree of social prestige etc. are just some of the objective parameters according to which musical instruments differ. The richness of these differences is undisputed and evident, so it is very logical that old ideas and discussions about relationship between the type of instrument and personality traits of the instrumentalist had fertile soil in heterogeneity of both entities. In literature (Tolstoy, Prous,) it is possible to observe motives such as "masculinity of trumpeters" or "gentleness of violinist's soul", which is not unusual if one is familiar with certain records of Versailles chronologists, which suggest that not only ladies from the French royal court, but the women of the plebs (the folks) as well, even during the 18th century, had a great admiration for trumpeters and French horne players because of their boldness and openness (O'Neill, 1997).

Indicators of potentially intriguing relations between the sort of musical instrument and the personality of instrumentalist, however, did not result in systematic scientific research until the 1980's and the now classic research of the British psychologist Anthony Kemp. Previously, several small-scale studies on music population had been recorded (Martin, 1976, according to Kemp, 1996), based on measuring individual differences utilising personality inventories, in which the type of the instrument exists as one of the independent variables. The most noticeable (and humorous) observations about the personalities of different instrumentalists come from John Booth Davies (1978), a British jazz trumpeter and psychologist. Davies published these in an almost anecdotic manner, and it is a bit of a curiosity that he did not base his major findings on personality inventory at all, but on the notes from interviews with approximately a third (approximately 20 respondents) of the members of the Scottish Symphonic Orchestra from Glasgow. The participants were asked to discuss freely their experience relating personality characteristics of the colleagues they share the same sort of musical instrument with, and afterwards about the instrumentalists from the other sections of the ensemble.

Davies reports that the main polarization occured between string instrument players and brass players, with woodwind players being positioned somewhere in between. The string players described the brass players as being *"odd, babblers, vulgar, too loud, fans of the alcohol, seek to be in the limelight position, do not know how to play quietly, do not practice, biggest jokesters in the orchestra, do not take things seriously"*. On the contrary, brass players give comments about string players such as *"a herd of sheep, (ironically) precious and irreplaceable, too sensitive and irritable, with no sense of humour, take themselves (and music) too seriously, overrate themselves musically, physically weak, interested about very few things outside the orchestra"*. Of course, somewhat different are the statements of musicians about themselves, but even so they still look like the previous descriptions given by their colleagues, naturally, without pejorative

statements. Brass players say that they are *"brave, courageous, eccentric and prefer clean situations"*, whereas string players consider themselves to be *"diligent, attentive, thoughtful, sensitive, aesthetically oriented"*. Probably the most illustrative individual expression in this report by Davies (1978, p. 203) comes from one of the interviewed clarinettists: *"The brass are drinkers, the strings are stinkers, the woodwind are thinkers"*.

Davies concludes that it is symptomatic that the descriptions of French horn and double bass players' characteristics are not completely consistent with the general picture of brass and string players, even though horn belongs to the group of brass instruments, while double bass is a string instrument indeed. Horn players, aside from the basic set of characteristics typical for brass players, are also described as being additionally arrogant and prone to act in "prima donna-ish" manner, as well as to possess excessive risk-taking tendencies. Davies does not go into detailed elaboration of the possible background of observations about horn players, however as a possible clue, he mentions the "generally accepted" opinion among the symphony musicians that the horn as an instrument may be exceptionally capricious and difficult to control. Another interesting characteristic of horn players in the eyes of other instrumentalists is their sense of belonging and solidarity with colleagues from the same instrumental section (generally, present in other types of brass players as well), a pattern generally opposite to the one of string players, in whose section it seems that there is constant jealousy and rivalry (Davies, 1978). The latter is particularly visible in the relations between the violinists and the violists. It is very common for the violists to start their education by learning the violin, and to move to viola later. Thereby, reasons for changing the department are usually interpreted differently by the two groups. While violists defend their step to be a "transfer", violinists seem to tend to interpret it as "degradation", constantly teasing their colleagues calling them "failed violinists". Double-bass players, on the other hand, according to the perception of the orchestra colleagues, are in a chronic disbalance between the imposing dimensions of their "dinosaur" instrument and its usually "absurdly" minor sound exposition, almost without any chances for the instrumentalist to "touch" even a slightest piece of the pie in terms of the theatrical general dramatics, regularly consumed by solo instrumentalists, most frequently violinists (artistic dynamics of head and body movements, extravagant scales in higher registers, etc.).

Discussing the possible reasons underlying the described differences among the instrumentalists, Davies (ibid.) emphasizes the possible role of the different principles of tone production and control. While in case of the piano, a given pressure on the right key will always and regularly produce a tone with accurate pitch, the same principle applies to a much lower degree to string instruments, as a result of the absence of precise marking of the half-step intervals on the neck. A relatively secure "result" is also guaranteed at woodwind instruments department, since the accurate combination of closed and open ring-keys will always results in the desired tone, with a certain possibility of distortion or a wrong octave if one does not blow appropriately.

Finally, in the brass section, the technique of generating and controling the tone is the most difficult, the least reliable and thus the most easily amenable to mistakes. The first tone is the most delicate, since the accurate finger shifting determines only the harmonic series, but not the accuracy of the pitch itself. What ultimately determines the pitch accuracy is completely controlled by the level of tension of the lips, which as a muscular phenomenon cannot be visually controlled and verified, as opposed to keyboard (piano), string (string instruments) or system of ring-keys (woodwind). In other words, brass instrumentalists do not have a secure control of the first tone's pitch accuracy, up to the moment when it is already produced and heard. According to Davies (1978, p. 207), that means that for these musicians each initial tone is somewhat of a "step into the dark", which, as a situation, naturally generates higher levels of stress and anxiety. A specific additional debilitating circumstance for the trumpeters could also be the unusually strong dynamics, in terms of the loudness of the instrument, since a single trumpet may effortlessly dominate over the entire orchestra, which is not the case with any other instrument.

Apart from physical, technical and tone characteristics of the instrument itself, as a possible factor for the personal diversity among the musicians from different orchestra sections, Davies also mentions the role in terms of the level of exposure and instrumental responsibility of the specific instrument. Namely, one of the easily perceptible differences between string and wind instrument players is the number and the role of the musicians in these sections. In the string section, the tunes are usually played unisonously, i.e. identical notes are played at the same time by several or more instrumentalists. The unisonous playing in the section of the first and the second violins, for instance, offers these instrumentalists certain "security" in the sense that chances are next to nil for the possible minor technical imperfection to sound extremely wrong. In other words, all the chances are that minor imperfections will be "silenced" inside the very section. The situation is completely opposite in both wind instrument sections. There, a proportionally lower number of musicians play a pretty large portion of tunes solo or in a duet, without unisonous support. In conditions like these, the identical minor technical imperfection would be much more explicit, and what is even worse, it would be additionally amplified since the "correct address" of the guilty party would be much more easily noticeable. In this sense, it is completely understandable that the wind instrument sections, especially their leading members, are exposed to higher levels of stress and anxiety. Taking into account these problems, an imperative characteristic of the brass player's personality, according to Davies (1978), must be a well developed tolerance, or even better, *resistance to their own mistakes*, i.e. the ability to *overcome their personal mistakes* (which will definitely happen sooner or later, especially during the initial tone) *without too much stress, in order to move to the next tune with a normal level of self-confidence and fine concentration, to be played the right way*. Without this ability, the first mistake could be merely an introduction to a series of similar ones, resulting in a poor concert evening for the indisposed musician, and probably for the orchestra as a whole, resulting in

disappointment of the auditorium as well. According to the musicians themselves, the brass players use defensive strategies as indifference, rationalization of the mistakes as "amusing" or "funny", etc. In this context, their confirmed propensity for jokes and alcohol could probably have a function of reducing the tension to which the musicians of this instrumental section are naturally exposed.

At the very end, Davies (ibid.) gives the results of testing his interlocutors with one of the Eysenck personality inventories. The highest level of neuroticism was detected in the string section, the lowest in the brass section. The latter were also the most extravert, while on the opposite extreme of this Eysenck's dimension, as most introvert, emerged their colleagues, the woodwind players. The string players also displayed the highest levels of anxiety, while the woodwind players the lowest. Davies is aware of the limitations of his findings, primarily in the sense of insufficient size and non–representativeness of the sample, as well as too prominent individual differences, thus clearly rendering the value of these results only as a possible clue and direction for further research to come.

Method

Hypothesis and Variables

The basic problem question this paper is dealing with is operationalized as detection of the distinctive characteristics of personality and general intelligence of musicians with academic music education (ongoing or finished) in the area of classical music, in accordance with the type of musical instrument they play. The aim of the paper is the basic identification of the elements of differentiation among instrumentalists from different instrumental departments or sections, referring under this term to classes of musical instruments grouped according to the way of producing sound or according to the material of which they are made. According to that, the research hypothesis which will be tested is that *the academically educated musicians differ among each other in relation to personality traits and level of general intellectual ability, depending on the type of musical instrument they play.*

The researching design of the *"ex post facto"* type, which the research procedure in this paper is based on, largely renders relative categorisation of the variables into dependent (criterion) and independent, i.e. behavioural and stimulus ones. Apart from the fact that personality and intelligence are antecedent (come before) categories compared to the choice of the instrument in music education, this paper treats them nominally as the criterion, while the chosen instrument has the position of the independent variable.

Measuring Instruments

Measuring of the individual differences in this research has been conducted employing four measuring instruments. Three personality inventories were used as measures of personality traits, i.e Cattell's 16PF, Eysenck's EPQ and Costa & McCrae's NEO PI-R , as well as Daniels's Figure reasoning test (TRL) as a measure

of general intellectual ability. All the used measuring instruments were subjected to preliminary reliability check, whereby it was concluded that they showed satisfactory internal consistency: 16PF (Cronbach Alpha, 86 respondents) in the range 0.61-0.90, depending on the subscale; NEO PI-R (Cronbach Alpha, 79 respondents) 0.59-0.75, depending on the subscale; TRL (Spearman-Brown, split-half, 104 respondents) 0.91.

Subjects

The sample consisted of a total of 288 respondents, stratified in three categories according to the level of music education (Table 1): (a) students from the third and fourth years of secondary music school (69), (b) students at the faculty of music (104) and (c) professional musicians with university degrees in music (115). The first two categories consisted of students from the MBSC "Ilija Nikolovski – Luj" and students from the Faculty of Music Arts in Skopje, while the professional musicians were mostly full-time or part-time members of the Macedonian Philharmonic Orchestra (37) or the Macedonian Opera and Ballet Orchestra (33), plus a part (mainly piano players) consisting of teachers and accompanying staff from both MBSC "Ilija Nikolovski – Luj" (9) and Faculty of Music Arts (17) in Skopje, as well as freelance artists (19).

Table 1. *Gender and level of music education*

		Level of music education			
		pupils	**university students**	**university degree in music**	**total**
Gender	females	33(11,5%)	56(19,4%)	54(18,8%)	143(49,7%)
	males	36(12,5%)	48 (16,7%)	61(21,1%)	145(50,3%)
	total	69(24,0%)	104(36,1%)	115(39,9%)	288

The preliminary range of respondents was significantly wider compared to the final selection of 288 participants. The reason for the reduction of the preliminary list was the insufficient number of available musicians from several instrumental departments (vocal, percussion instruments, guitar, folk instruments). The instrumental departments (school, faculty) and sections (orchestra) with a sufficient number of respondents suitable for planned statistical procedures in this paper were: *(a) piano, (b) string instruments* (violin, viola, cello, double bass), *(c) woodwind instruments* (flute, oboe, clarinet, bassoon) and *(d) brass instruments* (trumpet, trombone, horne, saxophone). The ratio of gender distribution through the mentioned categories of instrumentalists in the sample was not equal (Table 2), with the category of brass instrumentalists, in which all the respondents were male, being an extreme case.

Table 2. *Structure of the sample of musicians: gender and music instrument of choice*

		Type of music instrument				
		piano	string	woodwind	brass	total
Gender	females	29(10,1%)	70(24,3%)	44(15,3%)	/	143(49,7%)
	males	26(9,0%)	33(11,5%)	28(9,7%)	58(20,1%)	145(50,3%)
	total	55(19,1%)	103(35,8%)	72(25,0%)	58(20,1%)	288

Data processing

The interval variables, such as data received from both the scales of applied personality inventories and test of general intelligence dominate the data matrix. Other levels of measurement have a minor presence (nominal level in case of variable musical instruments). Considering the assumed intercorrelations among measured personality traits as a group of criterion (dependent) variables, a natural choice of statistical procedure for processing such structure of data, using which the research hypothesis was tested, was the *Multivariant analysis of variance (MANOVA).* As elements of supporting analyses, procedures of the rank of descriptive statistics were used in continuity, i.e. as *the measures of central values and variability*. As an auxiliary procedure in particular parts, the *Univariant analysis of variance (ANOVA)* was used. Data processing was performed in SPSS 16.0 (Statistical Package for the Social Sciences).

Results

In the research methodology in the social sciences, the limits of the research design of the "*ex post facto*" type, on which the methodological organization of this paper is based, are stipulated very clearly. However, "*ex post facto*" is generally still the most common type of research design in psychology, mainly because in this science the major part of research problems are not subject to experimental but only to the so-called "measured" manipulation, most often due to ethical or various practical limitations. The basic conceptual weakness of this approach is, of course, the inability to control a multitude of relevant variables, and because of this, it is sometimes difficult to estimate with certainty the point to which the received measures of criterion variables are a consequence of the influence of the factor variable itself, and from where the same become artefacts of the hidden influence of the relevant variables. One of the most common patterns of this type can be found in the overlapping of the grouping of the respondents into two (or more) different independent variables, in which fairly homogenous group of respondents emerges in two (or more) independent measurements of the criterion variable. In such a case, the researchers need to ask themselves whether the received measures of the criterion variable are a consequence of the influence of one or another independent variable (Leech et al., 2005). A typical example from the corpus of our measurements, which fully corresponds to the mentioned pattern, is the coincidence in the dispersion of the respondents according to (a) independent variable *musical instrument of choice* and (b) the relevant variable (previously confirmed as such, in another research by this author) of *gender.* We remind that in Table 2 explicit disparities may be seen in the sample when these two variables cross, i.e. in three out of four groups of instrumentalists. Of course, the most extreme example is the gender distribution in the brass section, where literally all participants were male (58 male, 0 female). Considering previously confirmed (Mihajlovski, 2010) position of gender as a factor of differences in the personality

structure of musicians, it is clear that the unequal distribution of the respondents through several instrumental sections would be a problem in the interpretation of the measurements of the criterion variable, because, obviously, simultaneously with the choice of the musical instrument, the gender would also most likely influence the results of subjects on both personality inventories and IQ test. In a situation like this, the choice of researcher was still to convey the planned measurements entirely, without the elimination of respondents (full line of brass players, partly strings and woodwind players) following gender as a guideline, but with the necessity of increased caution in the interpretation of these results, with the emphasis on their problematic capacity for generalization.

The calculated multivariant MANOVA F-test, in any of the four available default solutions (Pillai's Trace; Wilks' Lambda; Hotelling's Trace; Roy's Largest Root) in SPSS MANOVA protocol, is statistically significant at the 0.001 level (Table 3), which indicates *significant differences among the four tested groups of instrumentalists regarding the linear combination of criterion variables.*

Table 3. *MANOVA: Tests of null hypothesis(differences among the four types of instrumentalists, N=288)*

	Value	F	Hypoth. df	Error df	Sig.	Partial eta^2	Partial eta
Pillai's Trace	1,869	5,622	153	603	0,000**	0,423	0,650
Wilks' Lambda	0,034	6,943	153	597	0,000**	0,475	0,689
Hotelling's Trace	7,574	8,017	153	593	0,000**	0,516	0,718
Roy's Largest Root	4,670	14,449	51	201	0,000**	0,624	0,790

The result of the accompanying Box's test of equality (homogeneity) of covariances into criterion variables (Table 4) was favorable, with the value of the Box's M index below the critical table value for statistical significance, which indicated an acceptable level of nonhomogeneity in the matrixes.

Table 4. *MANOVA: Box's method of equality of co-variances matrix(four types of instrumentalists, N=288)*

Box's M	2422,578
F	0,673
df 1	1326
df 2	2173
Sig.	0,107

The calculated partial ANOVA tests (Table 5) indicated *24 individual criterion variables in which the differences among the four groups of instrumentalists were significant*, out of 51 tested in total. In other words, *24 individual variables significantly saturated the supreme vector criterion variable.*

Table 5. *MANOVA: Differences among four types of instrumentalists: effect size (statistically significant partial ANOVA tests)*

Effect size			
Small *eta ≈ 0,14*	***Medium*** *eta ≈ 0,36*	***Large*** *eta ≈ 0,51*	***Very large*** *eta ≥ 0,70*
		TRL *0,539*	
	A *0,409*		
		B *0,449*	
		C *0,540*	
		E *0,470*	
	F *0,425*		
	G *0,407*		
	H *0,429*		
	I *0,315*		
	M *0,354*		
	O *0,369*		
		Q2 *0,497*	
	Q3 *0,399*		
	Q4 *0,428*		
	Nepq *0,274*		
		Eepq *0,487*	
	N4 *0,392*		
	N5 *0,288*		
	E5 *0,382*		
		O1 *0,465*	
	O2 *0,430*		
	A1 *0,335*		
	A3 *0,409*		
	C5 *0,298*		

Beside TRL IQ test, this is the case with majority of Cattell's primary personality factors (majority of 16PF scales, except L, N and Q1), two dimensions of Eysenck's EPQ test (Nepq and Eepq), as well as a part of the subscales from the NEO PI-R inventory, more precisely N4, N5, E5, O1, O2, A1, A3 and C5. *The magnitude, i.e. the effect size of each individual statistical significance reflected the strength of the same as a potential estimation of the trend in the population.* The series of "eta partial" indexes (estimated effect size of each calculated statistically significant difference) for our sample is presented in Table 5. The effect size of all the individual statistically significant differences, as may be seen in the table, *completely gravitated into the zone between medium (17) and large (7), with the tendency to be closer to the border value for the large size of the effect.* In other words, the recorded differences among the tested groups of instrumentalists were externalized with strong above-average intensity, which suggests *above-average potential for generalization of the results towards a wider population of musicians.* However, considering the previously noted undesired coincidence in the grouping of the subjects

in the variables regarding gender and choice of a musical instrument, *this potential for generalization could be problematic.*In this sense, a significantly sharper image for the real degree of relation between the choice of a musical instrument and personality of instrumentalist could be gained through additional comparison of the effect size *between gender and the chosen musical instrument* (Table 6).

Table 6. *Comparison of the effect size: gender differences against differences in the choice of music instrument*

Effect size		
eta (gender)	*Personality traits*	*eta (music instrument)*
0,237	*Reserved – Warm (A)*	*0,409*
0,205	*Weaker ego – Stronger ego (C)*	*0,540*
0,217	*Submissive - Dominant (E)*	*0,470*
0,239	*Serious - Carefree (F)*	*0,425*
0,342	*Threat-sensitive – Adventurous (H)*	*0,429*
0,205	Realistic - Sensitive (I)	0,315
0,207	Practical – Imaginative (M)	0,354
0,179	Self-assured – Apprehensive (O)	0,369
0,170	Group-oriented – Self-reliant (Q2)	0,497
0,237	Relaxed - Tense (Q4)	0,428
0,164	Introverted – Extraverted (Eepq)	0,487
0,173	Self-consciousness (N4)	0,392
0,207	Excitement-seeking (E5)	0,382
0,257	Fantasy (O1)	0,465
0,274	Aesthetics (O2)	0,430
0,134	Trust (A1)	0,335
0,190	Altruism (A3)	0,409

In this sense, a significantly sharper image for the real degree of relation between the choice of a musical instrument and personality of instrumentalist could be gained through additional comparison of the effect size *between gender and the chosen musical instrument* (Table 6). This comparison suggests some exceptionally large differences in the effect size between the two variables, whereby the indices in the second were comparatively much stronger in all the 17 criterion variables, without any exceptions.

Accepting gender as a relevant variable, the influence of which on the characteristics of the personality was incorporated in advance in the measured differences among the instrumentalists, *it could be assumed that the remainder of the effect size was due to the influence of the chosen musical instrument as an independent variable.* The noted difference in the effect size, in favour of the observed differences among the instrumentalists, is considered a healthy argument for accepting the research hypothesis in this paper, meaning that *the academically educated musicians differed among each other in personality traits depending on the chosen musical instrument.*

At the very end of the presentation of the results, the differences among the four groups of instrumentalists will be systematized. MANOVA post hoc tests (Parameter

Estimates) revealed in which types of instrumentalists, what direction and to which intensity the observed differences were externalized.

PIANISTS They diverged from the remaining instrumentalists in a total of 18 out of 51 tested traits: *I+, M+, Q4+, N5+, E5-, O1+* (to brass players); *C-, N4+, O2+, A1+,C5+* (to both groups of wind instrument players); *TRL+, B+, E+, G+, Q3+, Nepq+ and A3+* (to all others). On the level of second-order factors, pianists were characterized by: (a) *Originality (I+, M+, O1+, O2+)*, in comparison to brass players; (b) *Anxiety (C-, O+, Q4+),* in comparison to wind instrument players from both groups; and generally with (c) *Self-discipline (E+, G+, Q3+, TRL+, C5+);* (d) *Emotional instability (C-, Nepq+, N4+, N5+);* and (e) *Higher intelligence (TRL+, B+).*

STRING INSTRUMENT PLAYERS They displayed a distinctive profile in 19 out of 51 tested characteristics: *I+, M+, Nepq+, O1+* (to brass players); *E-, Q4+, E5-* (to pianists and brass players); *C-, N4+, N5+, O2+, C5+* (to both groups of wind instrument players); *A-, F-, H-, O+,Q2+,Q3- and Eepq-* (to all others). As second-order factors the following appear in the string instrument section: (a) *Originality (I+, M+, O1+, O2+),* in comparison to brass players and in general (b) *Introversion (A-, E-, F-, H-, Q2+, Eepq-, E5-),* with a reminder about an opposite polarity of Q2 factor, which thus matched the very structure of Cattell's *Invia* factor; (c) *Emotional instablity (C-, Nepq+, N4+, N5+);* and (d) *Anxiety (C-, O+, Q3-, Q4+),* with a note that the primary factor *Q3-* was not extracted as a partial trait into the factors derived from our measurements, but it existed as a component of the same named Cattell's second-order factor (*Anxiety*).

WOODWIND INSTRUMENT PLAYERS differed from the other three groups in 15 out of 51 tested characteristics: *A-, C-, F-, H-, I+, M+, O+, Q4+, O1+, O2+, A1+* and *A3+* (mostly to brass players); *E-, Q2+ and E5-* (in comparison to pianists and brass players). The following appeared on the level of second-order factors: (a) *Originality (I+, M+, O1+, O2+),* in comparison to brass players, and in general (b) *Introversion (A-, E-, F-, H-, Q2+, E5-);* and (c) *Anxiety (O+, Q4+).*

BRASS INSTRUMENT PLAYERS Tested musicians from this group manifested a distinctive set of performances in 22 out of 51 tested characteristics: *A+, E+, F+, Q2-* (in comparison to strings and woodwind players); *Eepq+* (to string players); *TRL-, B-, C+, H+, I, M-, O-, Q4, Nepq-, N4-, N5-, E5+, O1-, O2-, A1-, A3- and C5+* were personality traits in which musicians from this section diverged compared to all the other groups. The indicated characteristics could be focused to several second-order factors: (a) *Extraversion (A+, E+, F+, H+, Q2-, Eepq+, E5+),* with a reminder about the inverse polarity of Q2 factor, which thus matched the very structure of Cattell's equivalent factor *Exvia;* (b) *Conventionality (I-, M-, O1-, O2-);* (c) *Emotional stability(C+, Nepq-, N4-, N5-);* (d) *Adjustment (C+, O-, Q4-);* and(e) *Lower intelligence (TRL-, B-).*

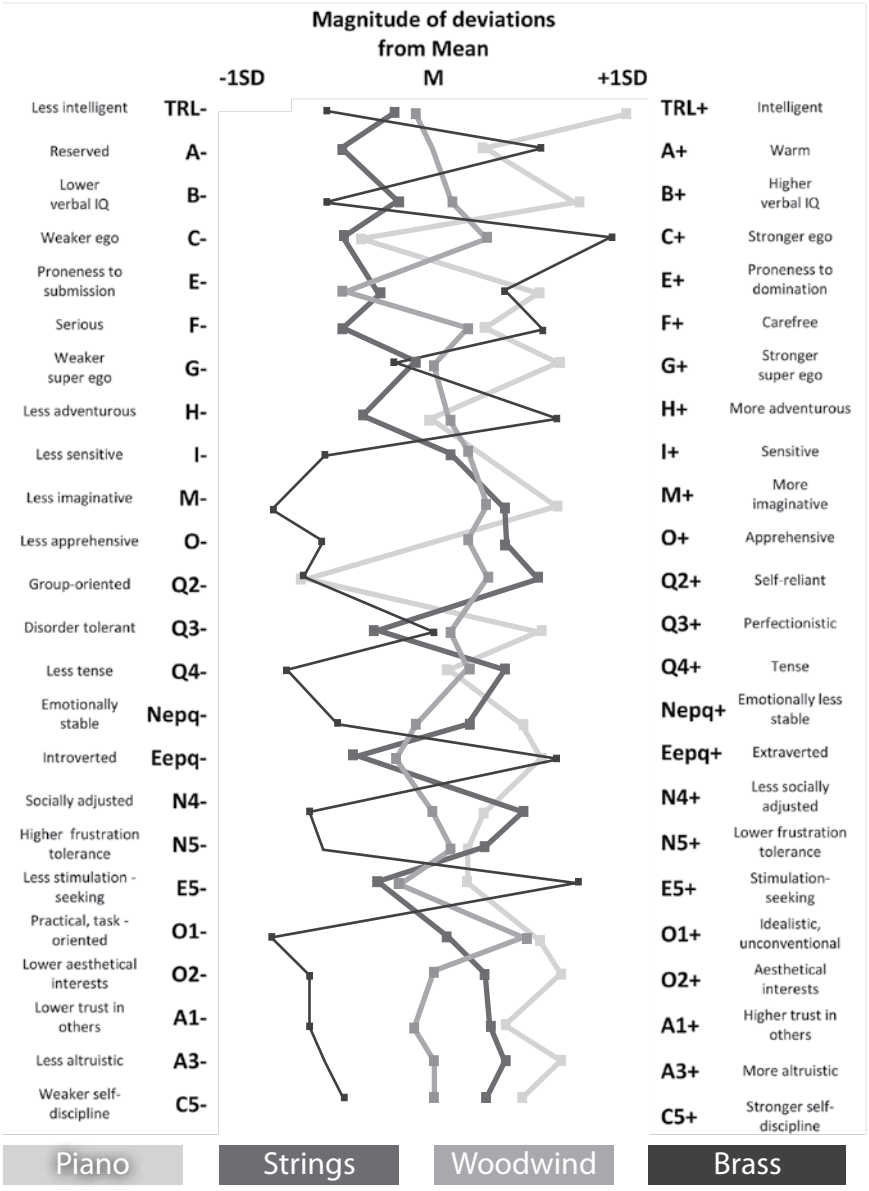

Figure 1: *MANOVA: four groups of instrumentalists, deviations from the arithmetic mean*

Additional insight into directions and the amplitude of the differences among the tested groups of instrumentalists may be seen in the figure bellow (Figure 1). The diagram shows clearly noticeable divergence of the curve in the brass players (black) in comparison to all the remaining, particularly to pianists and, in some characteristics, to string players. On the other hand, what is also obvious is the relative synergy between

the curves of strings and woodwind players, which display a noticeable level of mutual differences in significantly lower number of tested personality traits.

Discussion

The distribution of the differences clearly indicates that brass players emerged as the most noticeable distinctive profile. On the other hand, the woodwind players displayed a relatively minor range of recorded differences. On the whole, it seems that the majority of the results were in synergy with Kemp's reference findings (1981a, 1981b, 1981c, 1982a, 1982b, 1996), including several differences, especially in the case of the pianists, and with somewhat widened insight into certain personality characteristics gained employing measuring instruments (IQ test, EPQ, NEO PI-R) which were not used in this author's research.

As previously mentioned, *as a result of exceptionally pronounced gender disparity (58 male, 0 female respondents) in sub-sample of brass players, the results of analysis in this part will be interpreted with a certain amount of reserve and with full awareness of the problematic capacity for generalization.* The findings of the previous researchers render this category of instrumentalists as a group the cognitive style of which in many aspects diverged from the established general profile of the wider population of musicians. Kemp (1996) reported about a pronounced realism (I-), lower intelligence (B-), carefree enthusiasm (F+), group orientation (Q2- and expedience (M-), thus confirming the stereotypes of Davies (1978) relating their healthy sociability and cheerful nature. In the study of Builione and Lipton(1983), brass players were assessed as most extravert, but also prone to give themselves a noticeably higher level of extraversion than received from colleagues from the other sections. Bell and Cresswell (1984) reported a weaker super-ego (G-), a more pronounced group–orientation (Q2) and non–discipline, i.e. poor self–control (Q3-). In this study they also proved as more resourceful (N+) than woodwind players and, finally, more dominant (E+) and carefree (F+) than string players. Wills (1984) reported a comparatively lower degree of neuroticism in these players even in a sample with a different musical orientation (popular music, jazz, blues), using a different measuring instrument (EPQ). The brass players from our sample displayed noticeable extraversion (*A+, E+, F+, H+, Q2-, Eepq+, E5+),* in terms of warm openness (A+), positive energy and enthusiasm (F+), uninhibited initiative (H+), cooperation, a pro-group sense and group belonging (Q2-), above-average tendency to seek new experiences and stimulation (E5+), as well as competitiveness, independence, self–promotion and dominance drive (E+). Also clearly noticeable were the *higher level of emotional stability, personal strength and a lower degree of neuroticism and frustration (C+, Nepq-, N4-, N5-, O-, Q4-),* all sublimed in two similar second-order factors: *Emotional stability* and *Adjustment.* The impression about the profile of brass players is supplemented by the clearly visible factor of *Conventionality,* via descriptive characteristics of *realism, practicality, temperance* and *independence (I-, M-, O1-, O2-).* This category of instrumentalists obviously did not

confirm the popular stereotype about musicians as mostly impractical, unresourceful people, dedicated to their art and not overly familiar with the everyday, practical side of life. The indicators of *Lower intelligence (TRL-, B -)* were also in accordance with Kemp's findings, but in our sample the same was statistically confirmed only in comparison to pianists.

The performance of pianists in our measurements to some extent differed from Kemp's findings, mostly in the insufficient profiling of *Extraversion*, since some partial descriptive characteristics *(A+, Q2-)* were not statistically confirmed as significant. In comparison to brass players, pianists in our sample displayed clear signs of problematic adaptation, with majority of descriptive traits grouped around two second-order factors of affective nature: *Emotional instability (C-, Nepq+, N4+, N5+)* and *Anxiety (C-, O+, Q4+).* In our opinion, the roots of this sort of an affective profile should be looked for in the nature of the very instrument, which in the standard concert repertoire most commonly appears as a solo instrument, in duet or as a part of small chamber ensembles. In these variations, particularly in the solo and duet forms, the piano with its unlimited harmonic potentials, superior dynamics and distinctive timbre is an instrument in an exceptionally complex position, by rule responsible for explicit solo parts and complex harmonic passages, plus with an informal task to "carry" the complete harmonic and rhythmic structure of the score. Apart from the imperative for superior technical mastery of the instrument, the pianist is also regularly faced with high expectations in terms of perception of tempo, considering the position of the "implicit director" in one, for example, chamber ensemble, in which the player is expected to control the complete dynamics and rhythm of the score. This extremely responsible position of the piano as an instrument naturally by itself puts the instrumentalist in a difficult position of constant facing with the imperatives of superior concentration, control, high expectations and error orientation, which, taken altogether, are likely to reflect on the affective status of the player. Under described conditions, many pianists face constant high levels of performance anxiety and stress, which as a model probably reflects on their cognitive and wider lifestyle (including behaviour on personality inventories). The reasons for affective maladjustment of pianists can be also looked for in the zone of the widely popular stereotype about relationship between intelligence and neurotic potential, according to which more intelligent individuals are also more neurotic. *The pianists in our measurements manifested a higher level of fluid intelligence in comparison with the other instrumentalists' groups, with at least one standard deviation (SD) apart. Fairly similar was also the score of the B-scale (verbal, i.e. crystallized intelligence) from Cattell's inventory 16PF, even with a somewhat wider range of differences.* In Kemp's research there was no data about confirmed differences in intelligence between pianists and other instrumentalists, while in case of other researchers, the pianists were proportionally less frequently present in the measurements, probably due to the difficulties in finding a satisfactory number of these musicians (considering their

status of mostly solo performers, out of the body of grand symphony orchestras in which this sort of research is mostly conducted). Regarding the possible origin of the indicated explicit differences in intelligence in favour of pianists, it is our opinion that the same could most probably be largely attributed to *the principle of selection, i.e. to the social–cultural profile of the average family environment from which as a rule, the future pianists are recruited.* Namely, the popular widely accepted stereotype is that piano departments generally enroll children from families with a better socio-economic status, intellectuals or artists, i.e. generally from the middle or upper-middle class, which by itself is essentially tightly connected with the higher educational status of the parents, their parents and even the extended family. On the other hand, it is also well known that, based on numerous research in the area of the psychology of intelligence, children from such environments as a rule achieve higher scores on general intelligence tests. This category of families will probably also create a specific family cultural profile, continuously cultivating highly stimulating intellectual environment, with predominant prototypes of initiation and nurturing of higher achievement motivation in their children, directing them towards elite schools and professions, with an assumed high level of care, support, expectations and supervision. In terms of musical professions, with its undoubtedly superior harmonic, rhythm-dynamic and melodious potentials, but also with exceptional demands it poses to the the musician, the piano is undoubtedly appreciated as an elite, extremely complex and highly sophisticated instrument, and by this as a highly preferable choice for children from the indicated category of families. On the level of second-order factors, *Self-discipline (E+, G+, Q3+, TRL+, C5+)* also stands out in piano section. In terms of behavioural traits, the research found responsible attitude and persistence in the responsibilities and goals, conscience, determination and consistency (G+), alongside with the willpower, organization, high level of discipline and self-motivation (Q3+, C5+), also including characteristics of leadership (E+).

The results of the instrumentalists of the string instruments in our sample were largely in synergy with previous findings, but also offered some new elements. The other researchers mainly agreed regarding the characteristics of these players, such as *reserved formality A-* (Kemp, 1981; Bell & Cresswell, 1984; Martin, 1976, according to Kemp, 1996), *introversion* (Builione & Lipton, 1983) *and weaker ego-strength C-* (Bell & Cresswell, 1984), which was confirmed as well in our sample of string players, through the dimension of *Introversion (A-, E-, F-, H-, Q2+, Eepq-, E5-).* This group of instrumentalists showed a tendency towards an introvert, reflexive profile, with behaviour which is described as *remote, reserved (A-), temperate, careful, with a tendency towards introspection (F-), uncertainty, indolence (H-), orientation towards oneself in the sense of being self-sufficient (Q2+), caution, reasonableness, calmness, with reserve towards people and places they do not know as well as risky situations (E5-).* Very similar behavioural characteristics of *Introversion* were displayed by the woodwind players, but with noticeable differences between scores on Cattell's primary factors *F and H,*

on which musicians of this group had significantly higher scores. *This means that the behavioural categories such as reserve, caution and introspectiveness (F-), i.e. uncertainty and passiveness (H-)* emerged as distinctive quality characteristics of introversion in string instrument players, but these were not components of introversion in woodwind players. *In the latter, introversion occured more as a pattern in social relations, in the form of reserve, more difficult interpersonal bonding and intertwining, rigidity and distance in relations to others (A-), and orientation towards oneself, i.e. self-sufficiency (Q2+).* The finding of Bell and Cresswell (1984) was similar, reporting *Independence (E+, F+, H+)* as a second-order factor in woodwind players when compared to string players. Kemp did not report any data about *F and H* traits as distinctions between these two groups of instrumentalists, however he stressed the age-based transformation of the primary factor *H* in woodwind players, from being adventurous *(H+)* in secondary school years to being timidly bashful *(H-)* during college, interpreting it as an indicator of deepened introversion induced by the imperatives of the musical training. However, the most explicit differences between strings and woodwind instrument players could be seen in the area of their *affective profiles.* At the second-order factor level, string players manifested clear signs of problematic adjustment, i.e. *Emotional instability (C-, Nepq+, N4+, N5+) and Anxiety (C-, O+, Q3-, Q4+),* similar to piano players, whereas characteristics of poor adjustment in woodwind players were much less expressed, with the exception of certain characteristics of *Anxiety (O+, Q4+).*

Conclusion

The recorded statistically significant differences among the four types of instrumentalists in our sample are externalized with explicit above-average intensity, which should suggest *above-average potential for generalization to wider population.* However, considering the coincidence in the dispersion of subjects through both the independent variable choice of musical instrument and relevant variable gender, *the potential for generalization of derived results is decreased to a certain point.* In this sense, the presented conclusions, based on multivariant differential analysis, may not portend the level of certainty which would be appropriate to the exceptionally high effect size, which they possess as measurements.

However, the researcher considers observations as potentially very useful as indicators of tendencies in this area, especially because of the synergy with previous researchers' findings. The organization of education and training at the institutions of musical education, as well as the improvement of professional guidance and professional life of academically educated profesional musicians are areas in which the findings of this research paper could find their systematic application. Considering the profound position of the music culture as one of the dominant forms of social consciousness in all modern societies, the production of own high-quality artistic and pedagogical staff in the area of music may have a truly significant place of a relevant segment in the strategy of culture and art as dominant patterns of presentation outside.

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Osobnost, inteligencija i glazbeni instrument

Sažetak

Empirijsko istraživanje razlika u osobnim karakteristikama i općim intelektualnim dosezima glazbenika provedeno je na uzorku makedonskih glazbenika. Uzorak se sastojao od četiri skupine instrumentalnih glazbenika iz četiri instrumentalna područja: glasovir (55); gudački instrumenti: violina, viola, violončelo, kontrabas (103); drveni puhački instrumenti: flauta, oboa, klarinet, fagot (72); limeni puhački instrumenti: truba, trombon, francuski rog, saksofon (58). Uzorak je sastavljen od tri dobne skupine: učenika srednje glazbene škole, studenata muzičke akademije (sveučilišni studij) i odraslih profesionalnih glazbenika s visokoškolskim glazbenim obrazovanjem. Istražene su individualne razlike koristeći se s ukupno četiri instrumenta, uključujući tri popisa osobnosti: R. Cattell 16PF, H. Eysenck EPQ, i Costa & McCrae NEO PI-R, te figuralni IQ (TRL), kao mjerilo opće intelektualne sposobnosti.

Multivarijantna analiza varijance (MANOVA) korištenjem programa SPSS 16.0 pokazala je rezultate koji su općenito u skladu s već poznatim činjenicama iz područja osobnosti glazbenika ponajviše iz angloameričkih znanstvenih okruženja. S obzirom na faktore drugoga reda svirače glasovira karakterizira: originalnost (u odnosu na svirače limenih puhačkih instrumenata), anksioznost (u odnosu na svirače limenih i drvenih puhačkih instrumenata), samodisciplina, emocionalna nestabilnost i viša inteligencija. Svirače gudačkih instrumenata karakterizira: originalnost (u odnosu na svirače limenih puhačkih instrumenata), anksioznost i emocionalna nesigurnost kao i introvertiranost. Svirači drvenih puhačkih instrumenata pokazuju atribute slične svračima gudačkih instrumenata: originalnost (u odnosu na svirače limenih puhačkih instrumenata), inrovertiranost i anksioznost. Naposljetku, svirači limenih puhačkih instrumenata pokazuju osobito karakterističan profil u odnosu na druge svirače, odnosno pokazuju: ekstrovertiranost, konvencionalnost, emocionalnu stabilnost, sposobnost prilagodbe i manju inteligenciju.

Ključne riječi: *inteligencija; glazbenici; glazbeni instrumenti; osobnost*