CAN YOU IDENTIFY THE VIENNA PHILHARMONIC ORCHESTRA, COMPARED WITH THE BERLIN OR NEW YORK PHILARMONIC ?

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ABSTRACT

Hundreds of participants, professionals and non-musicians, within and outside of Vienna, listened to 21 pairs of sound examples and tried to identify the recording of the Vienna Philharmonic [1]. The final results shows that the total group indeed heard Viennese characteristics in 14 examples. In 9 cases these characteristics have been assigned correctly to the Viennese orchestra. Since longer examples were identified more accurately than shorter ones, the playing style was found to be the major criterion for judgment, rather than the timbre. The study concludes that listeners can indeed hear differences, but interpretation style can be misleading, and sound characteristics can generally only be identified by highly-experienced listeners.

INTRODUCTION

“Vienna is Different!” is an official slogan of the City of Music, and the musical peculiarities and traditions of the city are a particular source of pride. The direct descendants of instrument types which have disappeared from the rest of the world, are still built, taught and played in the tradition of the Viennese Sound. Outside the city limits, audition applicants playing these special oboes and horns need not even apply. But luckily, Vienna has several first-class orchestras that demand exactly this sound. The special characteristics of these instruments have been scientifically examined, and published in previous studies [2,3,4]. For the moment, we will concern ourselves with the noticeable differences while listening CD recordings. It has been unquestionably established that hornists and experts can tell the difference between the Viennese horn and the international double horn when played solo. But with a recording of the mixed sounds of the entire orchestra, the question remains whether these typical Viennese sound qualities come through to the listener. Is the sound of the Vienna Philharmonic really distinctive, compared to any other world-class orchestra? Is there truly a "Viennese dialect" for the orchestral sound?

ABOUT THE LISTENING TEST

Method. To determine whether Viennese qualities really are audible on orchestral recordings, a large scale study was made by surveying hundreds of professional and amateur musicians, students and music lovers. (Preliminary results were presented at ISMA2001 [1].) Besides 556 Austrians, there were participant musician groups from Athens, Paris, Warsaw and Prague, as well as employees of Deutsche Grammophon in Berlin and Hamburg included in this survey. The task was to listen to two recordings of the same orchestral excerpt and to identify the one which was played by the Vienna Philharmonic. If possible, the listener was invited also to comment on which clues led him to his or her decision. The second excerpt was played either by the Berlin or the New York Philharmonic. This project is a scientific study of the author, conducted at the University of Music and Performing Arts, Vienna. The study was not commissioned by the Vienna Philharmonic, and was not about judging the preferential tastes of the listeners.

Background to this study. An example of the project director's motivation for the study: at an interview before the entry examination audition at the University in Vienna, the professor, a member of the VPO, told the candidate, "You can forget even thinking about the audition with that "jazz trumpet" (a classical Bach Stradivarius). Here, we play this trumpet and this mouthpiece!" This statement naturally raises the question how much the instrument contributes to the resulting sound, and how much the musician. There were, however, even more important reasons to research the Viennese Sound. In world politics, globalization is on everyone's lips. It's therefore a legitimate question to ask how distinctive the symphonic orchestras and their products - concerts and CDs - really are from one another. Is there such a thing as the "Golden Sound" of the Vienna Philharmonic, and if so, what is it? Aside from ideological reflections, there are a few critical practical ones for musicians and instrument makers, as well: Is it worth it to learn such a specialized instrument, if the job market is so limited? Is it worth it for the instrument maker to make these instruments if the market is so small? Production is costly and requires special know-how, which also needs to be learned. At the University (formerly "Hochschule"), money and time are invested in two classes of instruments: one for Viennese, and the other for international instruments.

The participants of the listening test were divided into statistical groups that were used for criteria in the final analysis. 179 participants (20%) have occupations actively involved with music, which includes orchestral musicians, but also recording engineers and instrument makers. 119 listeners (13%) are music lovers who are not active musicians. The largest group of over 600 listeners either study music or consider themselves amateurs. 60% of the participants are Austrians, and most of the non-Austrians live in Vienna. To consider sound recognition in other countries, 200 listeners from Germany, the Czech Republic, France and Greece were included. The distribution of the participants was balanced, with 446 women (w) and 478 men (m). In the breakdown into instrument groups, males were more prevalent among brass players (10w/70m) and percussion instruments (14w/51m), while women among woodwinds (193w/111m) were more numerous. In other instrument groups such as strings (155w/145m), keyboard instruments (275w/251m), plucked instruments (66w/109m), and among those who neither sing nor play an instrument (31w/34m) were more or less balanced. A detailed breakdown by instrument, as well as the actual listening examples from the test, can be found at the project home page http://www.bias.at/wbny.

TWENTY-ONE TASKS OF THE LISTENING TEST

[Task 1-2] Mozart: Symph. Nr. 41 (3. Menuetto) [1788]
Task 1: tutti in 3/4 - [bar 52 - 59]. (dynamic =f) - flute, oboe, bassoon, horn, trump., timp., 1. viol., 2. viol., cello, bass, viola
Task 2: - downward phrase, 3/4 - [bar 44 - 51]. (dynamic =p) - flute, oboe, bassoon
[Task 3-5] Beethoven: Symph. Nr. 3 "Eroica" (4. Finale) [1804]
Task 3: - strings pizzicato, woodwind staccato - [bar 12 - 27]. (dynamic =p) - flute, clar., bassoon, 1. viol., 2. viol., viola, cello, bass Task 4: flute solo (16th) above orchestra - [bar 182 - 198]. (dynamic =p) - flute, oboe, 1. viol., 2. viol., viola, cello, bass Task 5: tutti passage, theme played by horn and basses - [bar 380 - 388]. (dynamic =ff) - flute, oboe, clar., bassoon, horn, trump., timp., 1. viol., 2. viol., viola, cello, bass
[Task 6] Beethoven: Symph. Nr. 7 (2. Allegretto) [1812]
Task 6: - slow theme played by strings; poco a poco crescendo - [bar 51 - 66]. (dynamic =p-mf) - 1. viol., 2. viol., viola, cello, bass
[Task 7-8] Schubert : Symph. Nr. 8 "Unvollendete" (1. Allegro) [1822]
Task 7: celli theme, syncopic contrapunct - [bar 44 - 47]. (dynamic =pp) - clar., viola, cello, bass Task 8: strings theme - [bar 312 - 316]. (dynamic =p) - flute, oboe, bassoon, horn, 1. viol., 2. viol., viola, cello, bass
[Task 9] Brahms: Symph. No. 4 e-moll op. 98 (4. Allegro) [1885]
Task 9: begin, accord theme played by all wind players - [bar 1 - 8]. (dynamic =f) - flute, oboe, clar., bassoon, horn, trump., tromb., timp.
[Task 10-13] Bruckner: Symph. Nr. 7 E-Dur (3.Scherzo) [1883]
Task 10: trumpet - theme, strings rhythmic accomp. - [bar 5 - 8]. (dynamic =p) - trump., 1. viol., 2. viol., viola, cello, bass
Task 11: tutti, trumpet ff punctated motifs - [bar 77 - 89]. (dynamic =ff) - flute, oboe, clar., bassoon, horn, trump., tromb., tuba, timp., 1. viol., 2. viol., viola, cello, bass Task 12: begin, timpani solo - [bar 273 - 276]. (dynamic =pp) - timp. Task 13: end of trio, flute melodic motifs - [bar 397 - 405]. (dynamic =p) - flute, oboe, clar., timp., 1. viol., 2. viol., viola, cello, bass
[Task 14] Berlioz: Symph. fantastique (1. Rêveries) [1831]
Task 14: oboe and bassoon motivs - [bar 456 - 460]. (dynamic =p) - oboe, clar., bassoon, horn, bass
[Task 15,16,17] Mahler: Symph. Nr. 1 "Der Titan" (2. Kräftig bewegt) [1889]
Task 15: beginn, 3/4 "Ländler", rough motifs - [bar 1 - 22]. (dynamic =f) - flute, oboe, bassoon, horn, triangel, 1. viol., 2. viol., viola, cello, bass Task 16: stringendo, climax, "Ländler"-theme, tutti - [bar 132 - 169]. (dynamic =ff-fff) - flute, oboe, clar., bassoon, horn, trump., tromb., tuba, timp., triangel, 1. viol., 2. viol., viola, cello, bass Task 17: - horn solo, rit. dim. - [bar 171 - 175]. (dynamic =mf-pp) - horn
[Task 18-21] Mahler: Symph. Nr. 5 (1. Trauermarsch) [1904]
Task 18: - trumpet solo - [bar 0 - 5]. (dynamic =p-mf) - trump.
Task 19: strings "Weinend" (sad), legato - [bar 42 - 50]. (dynamic =pp-ppp) - clar., bassoon, 1. viol., 2. viol., viola, cello, bass Task 20: tutti, triplets, tuba solo - [bar 254 - 265]. (dynamic =ff-pp) - clar., bassoon, horn, trump., tromb., tuba, timp., drum, l.drum Task 21: horn theme, 1.violin contrapart, strings triplet motifs - [bar 337 - 344]. (dynamic =f-ff) - horn, 1. viol., 2. viol., viola, cello, bass.

"Wow, That Was Pretty Hard!" …was the response of almost all participants. The short duration of the sound examples, or a solo excerpt whose instrument was not so familiar, were typical pitfalls. Most decisions were "gut reactions", that is, from subconsciously perceived clues. With the given reasons for certain decisions, many conclusions were quite interesting. Many participants opted to submit their questionnaire anonymously. The considerations while choosing were diverse among the listeners, and in the end, many aspects can be attributed to "acoustic trademarks". The Viennese Sound is a complex phenomenon, and a multitude of factors contribute significantly to it. Though these factors largely are not possible to express in numbers, the following formula might be “a nice try” in clarifying how the various factors interrelate. Though this “Wiener Klangstil” is surely incalculable, it's worth considering that the listening test resulted in 19,500 single experiments (930 listeners, twenty-one examples) in order to solve the following equation:

$$WKS = V\,T\,Ps = \left\{ \sum_{j=1}^{80} \left[\left(\sum_{i=1}^{n_j} M_{i,j} \times I_{i,j} \right) \right] \times LT \right\}^{C} \times [r\ t] \times \left\{ \int_{Q=-\infty}^{+\infty} RT \times \sum_{n \to \infty} XP \right\}$$

WKS = Wiener Klangstil
V = Vienna
T = Timbre
Ps = Playing style
M = Musician
I = Instrument
LT = local tradition
C = Conductor
r = Room
t = Time
RT = Recording Technique
Q = Recording Quality
XP = Listeners individual Experience

“Wiener Klangstil” (Ger.) is a combination of the Viennese playing style and the Viennese instrumental timbre. Both result through the interaction between the musician (M) with his or her instrument (I). || A symphonic orchestra is the sum (∑) of 80 musicians. || The interpretation of a work is determined by the local tradition (LT). || Altogether can be potentialized or masked by a conductor (C) through his or her individual interpretation. || Of course, there are differences in the room (r) and time (t). || With recordings, the sound depends on the recording techniques (RT), whose quality (Q) can span from an infinite minus to an infinite plus. || As last and most important factor, the individual listener's experiences (XP) determine which characteristics are perceived.

Sometimes, no characteristics were heard, and the listener just guessed. Examples particularly difficult were where typical characteristics appeared alongside atypical ones. For example, "The sound of the instrument is typical, but not the interpretation." In these cases, the interpretation and rhythmical phrasing carried more weight in deciding.
Just as some qualities are attributed to the Vienna Philharmonic, others are seldom attributed to it ("The Viennese never hack into their violins like that"). Furthermore, some listeners claimed to hear characteristics of the Berlin or New York Philharmonic. Each listener used his or her own listening experience as a point of reference. Zubin Metha, long-time conductor of the New York Philharmonic, paid close attention to his special experiences with musicians that he knows well, or to the special recording techniques of different orchestras. (FIG 1). He, as well as many others, speculated about the hall, the conductor, or musical personalities in the examples. [Question to Zubin Mehta: "When you are standing in front of a first-class orchestra with your eyes closed, how can you tell if they are the Vienna Phil?" Answer Mehta: "It's very simple - if I give the first beat, and nothing happens!" This is a characteristic which is difficult to hear on a CD, but that a live audience at a performance can recognize.]

FIG.1 Interviews with Zubin Metha and Seji Ozawa gave additional information from the conductor’s point of view. Maestro Metha also took part in the listening test.

% correct answers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
all /n= 923	52,8%	56,9%	45,3%	59,0%	44,7%	52,1%	48,0%	56,6%	36,2%	43,5%	56,8%	50,3%	53,9%	60,6%	30,3%	50,9%	49,9%	62,7%	61,6%	47,9%	56,4%
male /n= 473	53,1%	54,8%	46,9%	56,0%	46,0%	49,7%	50,1%	53,8%	40,6%	45,5%	60,3%	50,4%	54,4%	59,7%	32,2%	52,0%	53,3%	63,6%	61,0%	51,1%	55,2%
female /n= 444	51,8%	59,4%	43,6%	62,3%	43,0%	54,7%	46,0%	59,5%	31,8%	41,4%	53,2%	50,1%	53,2%	62,0%	28,4%	49,0%	46,5%	61,7%	62,4%	44,6%	57,6%
brass /n= 77	54,5%	59,7%	46,8%	63,6%	58,4%	45,5%	41,6%	50,6%	51,9%	51,3%	59,7%	50,6%	57,9%	57,1%	32,5%	54,5%	57,9%	64,9%	58,7%	51,3%	58,7%
wood /n= 257	53,3%	58,0%	47,8%	66,1%	43,0%	57,2%	51,2%	57,4%	31,4%	43,0%	57,6%	43,5%	52,3%	58,5%	28,8%	48,8%	56,8%	65,0%	65,2%	51,6%	53,9%
string /n= 274	54,0%	59,0%	42,0%	59,5%	46,0%	57,3%	46,7%	55,3%	36,9%	48,4%	54,6%	50,4%	53,1%	60,6%	28,5%	49,6%	47,4%	59,7%	65,1%	44,9%	55,7%
percussion /n= 48	50,0%	57,1%	51,0%	59,2%	38,8%	39,6%	53,1%	61,2%	40,8%	55,1%	71,4%	49,0%	46,9%	49,0%	30,6%	49,0%	57,1%	67,3%	46,9%	53,1%	57,1%
professionals /n= 179	55,9%	55,9%	49,2%	55,9%	48,6%	51,4%	50,8%	53,1%	40,8%	49,1%	61,5%	42,9%	56,4%	46,9%	39,1%	45,8%	56,2%	60,9%	68,2%	50,3%	54,8%
stud./Amat. /n= 617	52,7%	57,4%	44,4%	60,7%	43,7%	51,6%	47,2%	58,2%	35,2%	43,2%	56,6%	52,6%	53,1%	63,1%	28,0%	53,9%	49,9%	65,1%	59,3%	49,1%	55,6%
passive.listener /n= 119	49,6%	56,8%	45,3%	57,1%	43,7%	57,6%	47,0%	52,5%	35,0%	35,7%	51,3%	49,1%	53,0%	67,5%	30,2%	40,4%	37,4%	52,6%	63,5%	38,8%	63,5%
Austrians /n= 553	49,7%	58,3%	44,0%	60,4%	41,7%	53,3%	48,6%	57,3%	35,9%	37,7%	58,5%	51,4%	52,7%	61,9%	31,0%	48,3%	47,4%	60,3%	63,8%	48,1%	57,8%
Non-Austr. /n= 359	58,2%	54,7%	47,3%	57,6%	49,3%	50,8%	46,7%	55,0%	36,9%	53,1%	53,7%	48,2%	55,0%	58,3%	29,6%	54,8%	53,5%	66,3%	58,2%	47,9%	53,7%
age 0-19 /n= 268	53,0%	55,2%	46,6%	61,7%	46,5%	48,9%	44,8%	60,0%	32,6%	40,0%	59,3%	48,3%	52,8%	63,3%	23,7%	55,0%	48,3%	65,9%	58,4%	49,8%	49,8%
age 20-39 /n= 460	54,3%	56,4%	44,9%	58,4%	43,5%	52,0%	48,4%	55,0%	39,8%	45,4%	57,1%	48,8%	55,4%	57,5%	31,5%	49,9%	48,8%	62,2%	63,1%	48,6%	59,3%
age 40-99 /n= 181	48,1%	59,2%	43,9%	57,5%	44,8%	59,1%	52,0%	53,9%	33,0%	43,8%	52,5%	55,8%	49,4%	63,7%	36,7%	44,9%	53,9%	58,9%	62,0%	42,8%	57,5%
flute /n= 76	55,3%	56,0%	47,3%	73,3%	50,0%	53,9%	43,2%	47,4%	30,3%	32,0%	61,3%	41,9%	61,8%	56,6%	28,9%	47,4%	54,7%	68,0%	63,2%	60,8%	58,7%
clarinet /n= 38	47,4%	57,9%	37,8%	57,9%	42,1%	60,5%	57,9%	55,3%	31,6%	50,0%	63,2%	33,3%	50,0%	47,4%	29,7%	47,4%	68,4%	60,5%	75,7%	52,6%	50,0%
oboe /n= 21	57,1%	71,4%	45,0%	61,9%	52,4%	52,4%	57,1%	61,9%	52,4%	52,4%	65,0%	28,6%	42,9%	57,1%	28,6%	55,0%	42,9%	66,7%	57,1%	57,1%	47,6%
horn /n= 24	54,2%	50,0%	54,2%	66,7%	75,0%	41,7%	29,2%	58,3%	66,7%	54,2%	54,2%	29,2%	78,3%	50,0%	41,7%	58,3%	62,5%	79,2%	56,5%	60,9%	70,8%
trumpet /n= 28	53,6%	60,7%	39,3%	60,7%	42,9%	67,9%	53,6%	42,9%	46,4%	50,0%	57,1%	57,1%	46,4%	67,9%	32,1%	64,3%	53,6%	64,3%	60,7%	50,0%	53,6%
trombone /n= 19	52,6%	57,9%	52,6%	63,2%	57,9%	26,3%	52,6%	52,6%	52,6%	38,9%	52,6%	63,2%	42,1%	52,6%	26,3%	36,8%	50,0%	52,6%	44,4%	42,1%	47,1%
timpani /n= 16	37,5%	50,0%	37,5%	56,3%	50,0%	50,0%	50,0%	62,5%	56,3%	43,8%	62,5%	31,3%	31,3%	37,5%	18,8%	56,3%	62,5%	68,8%	62,5%	56,3%	56,3%
violin /n= 163	53,4%	59,3%	40,9%	62,0%	46,0%	57,1%	43,8%	52,5%	35,0%	48,1%	56,8%	49,7%	58,9%	65,0%	28,2%	52,1%	46,6%	55,6%	64,6%	45,7%	54,3%
viola /n= 45	48,9%	55,6%	51,1%	55,6%	37,8%	73,3%	50,0%	51,1%	37,8%	48,9%	44,4%	57,8%	44,4%	60,0%	28,9%	35,6%	46,5%	64,4%	64,4%	40,0%	53,3%
cello /n= 59	57,6%	61,0%	41,4%	61,0%	47,5%	55,9%	44,8%	59,3%	42,4%	40,7%	52,5%	54,2%	51,7%	55,9%	28,8%	47,5%	45,8%	66,1%	62,7%	51,7%	67,8%
bass /n= 26	50,0%	46,2%	46,2%	50,0%	57,7%	46,2%	57,7%	42,3%	46,2%	61,5%	50,0%	38,5%	30,8%	50,0%	34,6%	50,0%	61,5%	61,5%	61,5%	42,3%	46,2%
piano /n= 433	52,7%	57,8%	47,6%	60,6%	39,9%	48,8%	45,3%	55,6%	32,6%	43,2%	55,0%	50,0%	53,2%	62,2%	27,2%	50,6%	48,7%	62,0%	62,7%	49,4%	57,4%
conducter /n= 21	61,9%	66,7%	47,6%	57,1%	47,6%	42,9%	35,0%	61,9%	28,6%	61,9%	38,1%	47,6%	52,4%	52,4%	38,1%	57,1%	61,9%	47,6%	61,9%	47,6%	66,7%
NO instrument /n= 64	54,7%	55,6%	39,7%	56,3%	41,5%	53,1%	40,6%	53,8%	33,8%	27,7%	52,3%	55,6%	53,1%	67,2%	25,0%	39,7%	35,4%	56,3%	61,9%	34,9%	60,9%
Europe ext /n=104	52,9%	50,0%	37,1%	50,0%	51,4%	45,7%	36,5%	57,1%	29,1%	47,6%	57,1%	47,6%	66,7%	58,1%	28,6%	57,1%	50,5%	69,5%	57,1%	55,8%	57,1%

Table 1: The "Bullseye" Quota, for all 21 Examples. Correct answers in percent for all and groups of listeners. Values above 50 % are green, below 50 % are red. The corresponding significance can be seen in table 2.

significance	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
all /n= 923	9,32	**0,01**	0,44	**0,01**	0,13	19,92	23,53	**0,01**	**0,01**	**0,01**	**0,01**	86,86	1,77	**0,01**	**0,01**	59,82	94,74	**0,01**	**0,01**	21,08	**0,01**
male /n= 473	18,24	3,85	18,05	0,88	8,09	89,01	96,32	9,82	**0,01**	5,27	**0,01**	85,36	5,37	**0,01**	**0,01**	38,33	15,40	**0,01**	**0,01**	64,60	2,40
female /n= 444	44,77	**0,01**	0,76	**0,01**	0,33	4,67	9,63	**0,01**	**0,01**	**0,03**	18,29	96,18	18,29	**0,01**	**0,01**	66,82	13,99	**0,01**	**0,01**	2,24	0,15
brass /n= 77	42,50	8,74	56,88	1,67	13,85	42,50	13,85	90,93	73,24	81,85	8,74	90,93	16,87	21,00	0,21	42,50	16,87	0,88	13,33	81,85	13,33
wood /n= 257	28,89	1,05	48,92	**0,01**	2,50	2,10	70,77	1,80	**0,01**	2,44	1,46	3,80	45,50	0,62	**0,01**	70,87	2,90	**0,01**	**0,01**	61,71	21,31
string /n= 274	18,38	0,30	0,87	0,17	18,38	1,57	27,51	7,92	**0,01**	58,60	13,03	90,35	30,35	**0,01**	**0,01**	90,38	39,60	0,13	**0,01**	8,96	6,06
percussion /n= 48	99,99	31,73	88,64	19,85	11,61	14,89	66,82	11,61	19,85	47,51	0,27	88,64	66,82	88,64	0,66	88,64	31,73	1,52	66,82	66,82	31,73
professionals /n= 179	11,65	11,65	82,16	11,65	70,86	70,86	82,26	41,10	1,36	82,06	0,22	5,88	8,56	41,10	0,36	26,22	9,92	0,36	**0,00**	94,01	20,13
stud./Amat. /n= 617	18,40	**0,02**	0,60	**0,01**	0,17	42,11	17,07	**0,01**	**0,01**	0,07	0,10	19,80	12,70	**0,01**	**0,01**	4,93	96,79	**0,00**	**0,00**	65,89	0,56
passive.listener /n= 119	92,70	14,08	30,92	11,91	16,91	9,75	51,75	58,07	0,12	0,21	78,15	85,01	51,39	**0,02**	**0,01**	3,94	0,68	57,75	0,38	1,58	0,38
Austrians /n= 553	89,85	**0,01**	0,47	**0,01**	**0,01**	12,55	52,21	0,06	**0,01**	**0,01**	**0,01**	51,98	20,00	**0,00**	**0,01**	41,74	21,58	**0,01**	**0,01**	37,01	**0,02**
Non-Austr. /n= 359	0,18	7,31	31,46	0,38	79,24	75,18	20,59	5,78	**0,01**	24,63	15,53	49,38	5,85	0,16	**0,01**	6,55	18,70	**0,01**	0,18	42,98	15,53
age 0-19 /n= 268	32,84	8,72	26,97	**0,01**	24,67	71,50	8,84	0,10	**0,01**	0,10	0,23	58,32	36,04	**0,00**	**0,01**	9,97	58,18	**0,01**	0,61	95,14	95,14
age 20-39 /n= 460	6,22	0,60	3,09	**0,03**	0,52	40,03	48,38	3,20	**0,01**	4,97	0,24	60,76	1,97	0,13	**0,01**	96,29	60,84	**0,01**	**0,01**	54,40	**0,01**
age 40-99 /n= 181	60,29	1,36	10,11	4,48	15,79	1,42	59,88	29,67	**0,01**	9,73	50,35	12,73	88,15	**0,02**	**0,03**	17,73	29,40	1,71	0,13	5,26	4,36
flute /n= 76	35,88	29,87	64,19	**0,01**	99,99	49,13	24,50	64,64	0,06	0,18	4,96	16,30	3,89	25,13	**0,02**	64,64	41,89	0,18	2,18	6,29	13,33
clarinet /n= 38	74,56	33,04	13,90	33,04	33,04	19,44	33,04	51,64	2,31	99,99	10,48	4,55	99,99	74,56	1,37	74,56	2,31	19,44	0,18	74,56	99,99
oboe /n= 21	51,27	4,95	65,47	27,52	82,73	82,73	51,27	27,52	82,73	82,73	17,97	4,95	51,27	51,27	4,95	65,47	51,27	12,66	51,27	51,27	82,73
horn /n= 24	68,31	99,99	68,31	10,25	1,43	41,42	4,12	41,42	10,25	68,31	68,31	4,12	0,67	99,99	41,42	41,42	22,07	0,43	53,16	29,71	4,12
trumpet /n= 28	70,55	25,68	25,68	25,68	44,97	5,88	70,55	44,97	70,55	99,99	44,97	44,97	70,55	5,88	5,88	13,06	70,55	13,06	25,68	99,99	70,55
trombone /n= 19	81,85	49,13	81,85	25,13	49,13	3,89	81,85	81,85	81,85	34,58	81,85	25,13	49,13	81,85	3,89	25,13	99,99	81,85	63,74	49,13	80,84
timpani /n= 16	31,73	99,99	31,73	61,71	99,99	99,99	99,99	31,73	61,71	61,71	31,73	13,36	13,36	31,73	1,24	61,71	31,73	13,36	31,73	61,71	61,71
violin /n= 163	38,89	1,84	2,15	0,23	30,86	7,16	11,61	52,97	**0,01**	63,74	8,39	93,72	2,31	**0,01**	**0,01**	58,35	38,60	15,73	**0,02**	27,14	27,14
viola /n= 45	88,15	45,61	88,15	45,61	10,11	0,17	99,99	88,15	10,11	88,15	45,61	29,67	45,61	17,97	0,46	5,26	64,73	5,26	5,26	17,97	65,47
cello /n= 59	24,13	9,06	18,92	9,06	69,61	36,21	43,08	15,21	24,13	15,21	69,61	51,51	79,28	36,21	0,11	69,61	51,51	1,34	5,08	79,28	0,63
bass /n= 26	99,99	69,49	69,49	99,99	43,28	69,49	43,28	43,28	69,49	23,93	99,99	23,93	4,99	99,99	11,67	99,99	23,93	23,93	23,93	43,28	69,49
piano /n= 433	26,90	0,11	31,06	**0,01**	**0,01**	63,12	4,93	1,88	**0,00**	0,46	3,88	99,99	17,89	**0,01**	**0,01**	81,05	59,71	**0,01**	**0,01**	81,05	0,21
conducter /n= 21	80,55	13,96	10,69	8,48	70,98	45,33	6,28	53,51	2,67	90,13	90,13	80,55	21,84	99,99	0,68	62,25	21,84	53,51	0,92	80,55	46,02
NO instrument /n= 64	45,33	37,78	10,15	31,73	17,24	61,71	13,36	53,51	0,92	**0,03**	70,98	37,78	61,71	0,60	**0,01**	10,15	1,84	31,73	5,88	1,67	8,01
Europe ext /n=104	55,63	99,99	0,84	99,99	76,97	37,98	0,60	14,32	**0,01**	62,56	14,32	62,56	0,06	9,71	**0,01**	14,32	92,23	**0,01**	14,32	23,93	14,32

Table 2: Chi^2 values for the results of table 1. Values below 5 % indicate that answers are probably not random. Significance depends greatly on the number of members within a group (n=). With a smaller group, there is a high quota of hits or misses necessary to rule out random chance. Very significant data are underlined.

A FEW TYPICAL AND ATYPICAL EXAMPLES

Example Number 18 was recognized the best by all participants. The triplet pick-up to the trumpet signal from Mahler's 5th Symphony was identified significantly as played by a Viennese. It was especially clear that listeners from outside of Vienna (Athens, Paris...) heard the difference. Listeners who play no instrument identified the example least often. Listeners found the rhythmic interpretation and the dynamic characteristics, like accents and decay, typically Viennese. A darker, softer sound was also a major hint.

Example 19 was well-recognized by musicians and non-musicians alike. The Viennese legato passage from Mahler's 5th was correctly identified by 69% of professional musicians and also by 63% of listeners who play no instrument. Both excerpts in Example 19 were directed by Leonard Bernstein. The Viennese outtake was, however, played more warmly and with "schmalz" (vibrato, phrasing).

Example 9 (Brahms' 4th Symphony, beginning of the 4th Mvt.) was identified poorly on the whole. Only hornists heard the typical Viennese horn sound. Oboists had an average rate of success, along with timpanists and sound engineers. Incorrect identification was attributed to interpretive factors and to the total sound ("that sound couldn't be in Vienna"). The recording of Berlin with Claudio Abbado was closer to listeners' expectations of Viennese interpretation than Carlos Kleiber's with the VPO. Experts on the Viennese instruments heard the differences much better than "normal" listeners, who were far more interpretation-oriented, and in this case, deceived.

Example 14, a short excerpt from Berlioz' Symphonie Fantastique, was correctly identified by non-musicians more often than professionals. "Hit" quotas among instrument groups were inconsistent. Percussionists had fewer hits than string or wind players. The additional comments show that listeners prefer the Viennese recording. Woodwind experts also identified the Viennese orchestra better by the sound of the instruments than those who decided based on phasing and rhythm.

Example 15 is very interesting, indeed. Though most listeners were confident that they chose correctly, this example was identified correctly less often than any other! Only 30% of listeners were able to assign Paul Kletzki's interpretation of Mahler to the Vienna Philharmonic. The other recording, from Bernstein with the New York Phil, sounded for most listeners much more "wienerisch". But this is easily explained, due to Bernstein's influence on the tradition of Mahler interpretation in Vienna in the 60's and 70's. Listeners were influenced mostly by stylistic elements like rhythm interpretation and phrasing with this example. In the typical alpine 3/4 rhythm (Ländler), Kletzki demanded a very straight rhythm. Bernstein's freer rhythm sounds for most listeners like it has more feeling, rounder, and softer, and therefore more typically Viennese. Only a few listeners noticed the more rich forte overtones of the Viennese horns enough to correctly identify the example. This is yet another example showing not the sound of the instruments, but the characteristics of the interpretation (dependent on the time and conductor) as the primary factor in choosing the correct orchestra.

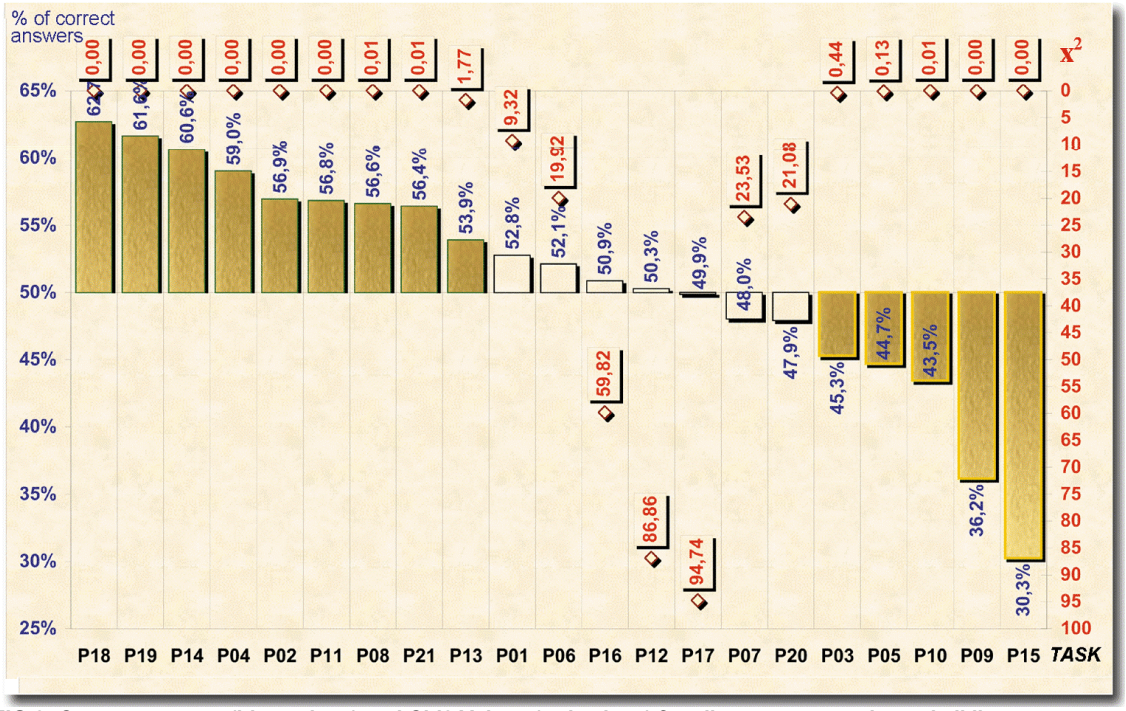

FIG 2: Correct answers (blue values) and Chi2 Values (red values) for all twenty-one tasks and all listeners

SUMMARY

There are indeed special sound characteristics of the Viennese Orchestra, which are audible on CD recordings. The results of this study show that fourteen sound examples used in the test were definitely judged among all participants based on sound characteristics, rather than being guessed (FIG 2). In nine cases (Excerpts 18, 19, 14, 4, 2, 11, 8, 21, 13) the listeners correctly identified the Vienna Philharmonic, while in five cases (15, 9, 10, 5, 3) the listeners were misled by interpretive elements and attributed them to another orchestra. Among groups of specialists (players of a particular instrument, etc.), a correct attribution as high as 15 out of 21 was observed.
The study has shown that perception and identification of the "Viennese" characteristics depends on what kind out excerpt is played and how much experience the listener has. It's impossible to say scientifically whether someone can "speak" the Viennese language of music. The statistics are only able to determine the probability of whether listeners guessed based on random chance. The additional comments, however, allow new attempts at explanations.
The number of excerpts shows that no global generalization is possible. But the two most often quoted statements from participants, on one hand, "It's easy to hear the Viennese Sound, unmistakable, unique...", and on the other, "I can't possibly hear the difference", could be definitively disproved. Every group identified some examples incorrectly; all groups, including non-musicians, identified others significantly.
All in all, the longer excerpts were more readily identified that those lasting only four to ten seconds. Because short examples are better suited to sound comparisons, and longer ones for hearing the interpretation, it can be concluded that most listeners listened to the interpretation, rather than the sound. The most remarkable examples in this case were the excerpts of Mahler and those in 3/4 time. Not that these samples were identified correctly the most of all, but rather that they supplied the most clues, which were then interpreted correctly or not.
Viennese instruments have specific sound characteristics, which can be either purposely used, or partially concealed. This special sound as heard on a recording was audible mostly for musicians who are very familiar with these particular instruments.
On the other hand, there are highly variable stylistic clues, which depend on the individual conductor or musician's interpretation. Therefore, many typical Viennese elements may not be used in every recording, and are also imitable by other groups.

CONCLUSIONS

There are indeed audible characteristics of the Viennese Sound. Their recognition is dependent on the individual excerpt and on the listening experience of the audience. Those knowledgeable of the Viennese instruments can recognize the "golden sound". Non-specialists orient themselves on the musical style, which is influenced greatly by individual interpretations. Other orchestras can create a "Viennese" interpretation, and not every recording by the Vienna Philharmonic is typically Viennese, which resulted in obvious confusion during the test. Because the longer samples were more readily identified, one can also conclude that the interpretive elements of the sample were more important that the sound quality of the instruments.

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[4] A great deal of additional information on the Viennese Instruments is available on the Internet. It can be accessed through the IWK server (http://www.bias.at).

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