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Musical 'learning styles' and 'learning strategies' in the instrumental lesson: the Ear Playing Project (EPP)

Abstract

Seventy-five audio recordings of learners attempting to copy a melody by ear were transcribed and analysed. Thematic analysis through NVivo was carried out and combined with judgements from four independent experts using a criteria grid. Overall, the learners' spontaneous responses to the ear-playing task, termed here 'learning styles', were classified into four main categories, termed *impulsive, shot-in-the-dark, practical* and *theoretical.* Learners who showed evidence of possible Absolute Pitch (AP) were categorised cross all the first three learning styles, suggesting that the ability to play back by ear from a recording may not be aided by AP. After the initial spontaneous response, the learners' most common learning approaches, termed here 'learning strategies', included listening without playing, playing isolated notes, asking questions, listening and playing along with the recording, and experimenting. The findings suggest that the practice of playing along to a recording can reveal a range of spontaneous learning styles amongst students, of which teachers may otherwise remain unaware; and a range of further learning strategies that may provide new insights for music teachers.

Introduction

James Mainwaring (1951b, p. 201) stressed that playing an instrument 'should be based as in speech on the mechanisation of the sound-action relation'. He explained that playing by ear is the most fundamental of all the performance skills and should be the first stage towards the development of applied musicianship. Priest has also argued (1985, 1989) that advanced aural ability can be achieved by ear-playing, and that this is a foundational musical process which has been historically undervalued in formal education.

Playing by ear has been defined by McPherson (1995a, p. 147) as 'the ability to reproduce on a musical instrument an existing passage or piece of music, which has been learnt aurally'. McPherson explains that 'unlike playing music from memory, playing by ear involves the recreation of an existing piece of

music at the same pitch level as the original learnt model, or transposed to another pitch level' (McPherson, 1995a, p. 147). His study of the relationship amongst sight-reading, playing by ear, playing from memory, improvising and performing rehearsed music (McPherson, 1995b; McPherson, Bailey, & Sinclair, 1997; McPherson & Gabrielsson, 2002) has shown that ear playing was the skill that exerted direct influence on improvising, sight reading and playing from memory and an indirect influence on performing rehearsed music. What is more, he found that enriching activities (i.e. how frequently participants played by ear or improvised, and their ensemble involvement) and early exposure were two factors with the most influence on playing by ear.

In vernacular musics of many kinds today, musicians become familiar with the musical genre and become 'better ear players in these genres by learning clichés, harmonic formulas and other stylistic traits of the genre' (Johansson, 2004, p. 94), mainly through copying music from a recording. Like an infinitely patient teacher the recording 'repeats the phrase as long as the learner wants without getting tired' and it can also accompany every musician's playing (Lilliestam, 1996, pp. 206-207). Campbell (1991, p. 103) has emphasised that only through listening 'most intently to themselves' can performers improve their own performance. Ear-playing can also enhance aural development (Hallam, 2012; Woody & Lehmann, 2010) and enjoyment through musical exploration (Harwood & Marsh, 2012; Priest, 1985).

Johansson (2004) investigated how six rock musicians with extensive experience of playing by ear in bands, responded to the challenge of playing along with three unfamiliar songs. The results revealed that the musicians were listening for harmonic formulas, sound and instrument idiosyncrasies. The strategies that they adopted were: using chords or melodic figures, searching for the bass part and building chords from bass notes, and using 'instant learning' – learning by making repeated mistakes as opposed to 'a more conscious and gradual building of knowledge' (op cit. 98). It was concluded that 'ear-playing is learnt by doing it' (p. 101) and that familiarity with the musical genre is key for a musician before he/ she tries to copy music by ear.

Woody and Lehmann's study (2010) explored the differences in ear-playing ability between formal 'classical' musicians and musicians with

vernacular music experience. The 24 participants were asked to learn two melodies by ear, one melody by singing and the other by playing it on their instrument, using a listen-then-perform paradigm. The authors tracked the number of times that each participant needed to listen to the music for accurate performance. The results of the study showed that the vernacular musicians required fewer trials than the formally trained musicians and singing by ear required fewer trials than playing by ear on instruments. On the whole, the vernacular musicians were more successful than the trained musicians in both tasks.

Currently there is a wealth of research that explores the teaching and learning of popular music, including investigations of learners' responses to ear-playing tasks during the early stages of learning a classical instrument (McPherson, 1997, 2005); strategies employed by ear players to hear and play chord progressions when playing unfamiliar rock songs (Johansson, 2004); musicians' ear-playing ability as a function of vernacular music experiences (Woody & Lehmann, 2010); and learners' responses to copying popular and classical music from a recording during one-to-one instrumental lessons (Green, 2012a, 2012b) and in classroom contexts (Green, 2008). These studies highlight that playing by ear may be more important to musical development than has commonly been assumed.

The Ear-playing Project (EPP)

This article builds on previous research (Green, 2012b), which reported a set of findings from a pilot study that adapted the ear-playing practices of popular musicians and brought them into the instrumental studio. In that article the concepts of 'learning style' and 'learning strategy' are considered. The former concept has had significant currency in the psychological literature generally, but relatively little in relation to music.[1] In essence, 'learning style' refers to '…an individual's spontaneous or preferred approach to learning; an approach which

[1] For literature reviews of theories, models and assessment protocols in the psychology field in general see, for example, Zhang and Sternberg (2006), or Coffield et al. (2004). Riding and Raynor (1998) provide a useful overview of work up to that date. Schmeck (1988) and Sternberg and Zhang (2001) offer anthologies with chapters by many of the core authors. For work specifically relating to music, see Zhukov (2007, 2012).

is independent from other factors such as intelligence, personality, gender, culture, and to a large extent, motivation or learning situation; and which remains constant, or relatively constant, in a fundamental way throughout the individual's life' (Green, 2012b, p. 44). By contrast, 'learning strategy' tends to refer to a set of potential responses that develop as a result of the learner gaining greater experience of attempting a task. Thus, learning strategy involves concepts such as '"approach", "process", or "orientation" to learning, and other similar notions … rather than being seen as 'hard-wired' in the way that "style" is, these latter constructs refer to learnt behaviours that are acquired through experience, and are able to change and develop as time goes by' (Green, 2012b, p. 44).

The previous article discussed primarily the identification of four apparently distinct learning styles, and secondarily a range of learning strategies, which had emerged unsought and unexpected, amongst the 15 students in the pilot study. This article provides findings from the Ear Playing Project (EPP) in relation to the emergence of learning styles and learning strategies amongst a larger sample of, this time, 75 students, focussing on learners' initial responses to an ear-playing task in the first lesson only. Our aims are to further the debates in the following six areas.

Firstly, the concept of learning style has, as mentioned above, attracted a large amount of interest from psychologists in many sub-fields over several decades (see note 1), who have found the notion that different individuals may spontaneously display different responses to the same task, interesting and worthy of further examination. Yet little work has been done to investigate this phenomenon in relation to music, and even less in relation to ear-playing.

Secondly, from a pedagogic point of view, it may be important for teachers to appreciate and understand the different ways that their students might approach a task, as being, not the 'failure', 'success' or 'idiosyncrasy' of the individual, but less pejoratively, an approach which may be shared across different learners and which sits within a wider context. This could allow teachers to plan more effectively for ways to help and encourage different learners.

Thirdly, if there is any currency in the idea that different individuals have different spontaneous responses, or learning styles, to a given task, then that must mean each teacher themselves will be bound to have their own learning style. It could be that if they lack awareness of this, and lack appreciation of the different approaches that may commonly be used amongst students, teachers will 'impose' their own learning style indiscriminately and unwittingly upon all of their students. Yet their personal learning style may conflict in some way with that of some of their students, which could be to the detriment of the learning and teaching. A deeper understanding of potential musical learning styles could therefore be of benefit in helping teachers to predict and understand the behaviours and responses of their students; and in responding appropriately to the differing needs of their students.

Fourthly, whilst the current project looks at learning styles in relation specifically to ear-playing, which is not a commonly used practice in instrumental teaching, it may be that learning styles transcend any one task, and further research could therefore provide insights into a range of teaching and learning practices and individual propensities.

Fifthly, regarding the concept of learning strategy: whilst the analysis of learning style was a focus in the previously mentioned report on the pilot study, here we offer a fuller and more systematically analysed explication of learning strategies than was undertaken in the pilot. These learning strategies shed light on how the learners went on to develop their approaches in relation to an aural task that was completely new to them, an area which has received little attention in the literature.

Finally, the teaching-and-learning approach used – a novice musician playing, in most cases for the first time ever, by ear from a recording – is one that has received little attention in the psychology of music or music education. The one-to-one instrumental lesson is a context that dominates music teaching and learning in western classical music (Creech & Gaunt, 2012), but which rarely adopts this practice. Therefore, by paying attention to how learners' initial responses to an ear-playing task developed from style to strategy, and what strategies they reached out for, we hope to add some new and potentially useful

insights which could be of interest and benefit to teachers as well as music-psychologists and musicians.

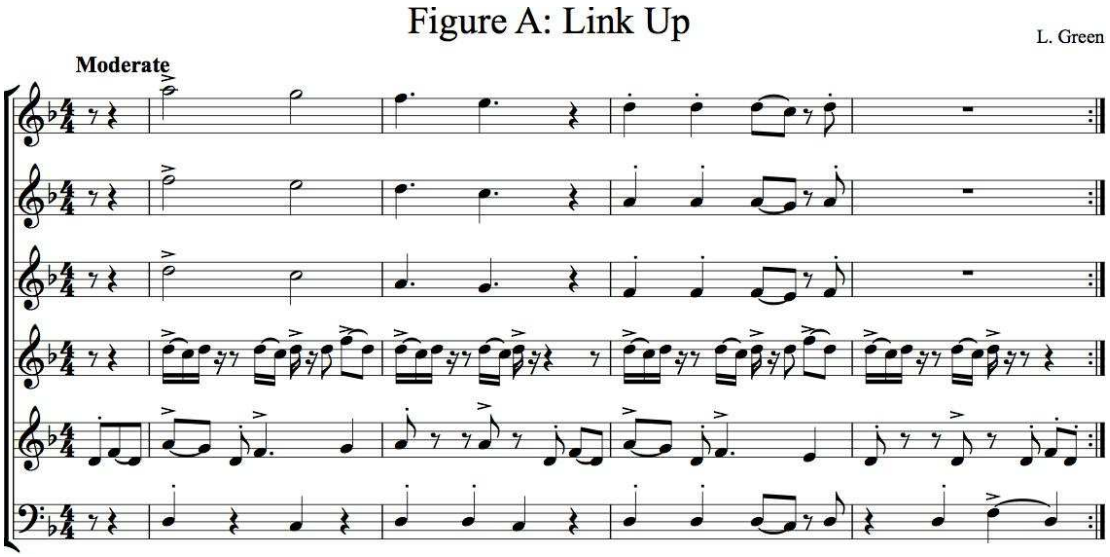
The present article has a narrow focus on the initial responses of 75 students to a particular task, in order to illuminate a) the concept of learning style in relation to musical ear-playing; and b) how the students' initial learning styles were distinct from and/or developed into a range of learning strategies across just one short lesson. In various teaching-and-learning settings ear-playing occurs regularly through imitation, where the teacher, master, or guru, acting as a live instrumental model, provides visual stimuli through modelling melodic or rhythmic phrases, performance techniques or stylistic nuances (Campbell, 1991). However, the present study explores ear-playing from a recording within one-to-one instrumental tuition. In this context, we use the term 'ear-playing' to refer to the processes of playing music 'without the aid of notation, without the visual stimulus of watching a live instrumental model, without verbal hints such as solfege' (Musco, 2010, p. 49) and, in particular, to playing back from a recording.

The aims of the Ear Playing Project (EPP) very briefly, were to introduce ear-playing from a recording to the students and ascertain to what extent, and in what ways if any, they and teachers benefitted according mainly to their own judgements. They included: (1) increasing pupils' aural skills, especially their ability to play back what they hear and to work out music by ear, (2) increasing pupils' improvisatory and creative abilities, (3) fostering pupils' general listening skills and musical appreciation, enabling them to listen attentively and purposively to a range of classical and other music, and (4) increasing pupils' autonomy and understanding as musicians and as learners. These aims were approached by engagement in copying music by ear from a recording during the learners' instrumental lesson for approximately ten minutes per lesson, over a period of six to eight weeks.

In the first lesson, the students were asked to listen to a recorded track in a pop-funk style (see Figure A), then to listen to the bass line played on its own, and whilst listening, to seek the pitches by ear. Each track involved a riff, which repeated itself over and over for two minutes. The students were not, at this stage, told the note-names, key or other characteristic of the music, nor given any

visual demonstration by the teacher, nor any other clues. It was explained to learners that they were free to approach the task in whatever way they wished, and that it 'did not matter' if they played 'wrong' notes or notes that were 'different from those on the recording'. We put the term 'wrong' here in inverted commas, just as we will put the term 'correct' in inverted commas: the reason for this is precisely because the students were free to interpret the music if they so wished since the focus of the study was on their response to the task rather than the correctness of the musical reproduction (also see Mainwaring, 1951a, p. 120). Most of the students nonetheless seemed to have the conscious aim of playing the 'correct' notes, but with some exceptions, which will be discussed in more detail below. The learners' first, uninterrupted responses to this task lasted no more than a matter of minutes or even seconds, and were only the initial step in what was a project lasting 7 to 10 lessons involving various stages, teaching strategies and other aspects that, as explained above, are reported elsewhere.

Figure A: Link Up



Altogether we worked with over 54 teachers and 340 students, mostly in one-to-one settings. We collected data through 228 lesson observations involving 110 of the students and 21 of the teachers; 43 student interviews and 17 teacher interviews; 193 student questionnaires and 54 teacher questionnaires; e-mails, meetings and blog comments. Most of the students experienced 5 to 10 lessons.

However, here our focus is on observations involving the first lessons of just 75 of the students, taught between them by 15 of the teachers. The teachers had all attended a one-day induction at the Institute of Education, University of London, and had expressed an interest in being involved. The students were selected by the teachers, according to two main criteria: that they were not preparing for a music exam, and were not absolute beginners. The learners were receiving instrumental tuition on a weekly basis. For the purposes of investigating the evidence for learning *styles*, we focussed on the first minute or two only of the students' responses, cutting off at whatever point other factors started to come into play such as reflection, repetition of a behaviour, or teacher-intervention; and then looking in detail at the learning *strategies* that were observable during the remainder of the first lesson.

EPP methodology and methods

The study followed a phenomenological approach (Denscombe, 2003) that focused on how ear-playing was experienced by the participants. Phenomenology was considered a suitable approach because 'it concentrates its efforts on the kinds of human experiences that are pure, basic and raw in the sense that they have not yet being subject to processes of analysis and theorising' (Denscombe, 2003, p. 98). Thus this was a suitable approach for a consideration of learning style as a spontaneous response to a task. Qualitative data were collected through transcriptions and analysis of audio recordings of the first session from the 75 students.

The first moments where the learners responded spontaneously to the task were isolated with the aid of the audio editor programme *Audacity*. Each first attempt was edited in a separate track and coded. The shortest lasted 18 seconds (after that the teacher intervened to indicate how the student should approach the task therefore the student's spontaneity was over) and the longest 3 minutes 32 seconds. Three phases of analysis were used. During the first phase all 75 audio recordings were transcribed, being divided amongst three researchers. The spoken responses from teachers and learners, including comments, questions and dialogues were transcribed verbatim and the musical notes that each learner played were also annotated. A thematic analysis of the

transcripts was carried out with the support of NVivo 9. The data were analysed through an iterative process outlined by Cooper and McIntyre (1993), involving:

1. Reading a random sample of scripts;
2. Identifying points of similarity and difference in relation to the research questions;
3. Generating theories against a new set of transcripts;
4. Testing theories against a new set of transcripts;
5. Testing new theories against transcripts that have already been dealt with;
6. Carrying all existing theories forward to new transcripts;
7. Repeating the above process until all data have been examined and all theories tested against all data (Cooper & McIntyre, 1993).

During the second phase of analysis, a grid of criteria was developed after listening to a random sample of 50% of the 75 audio excerpts. The grid described musical responses and teaching behaviours demonstrated by the learners and teachers, and was filled in by four judges. The research design was selected in order to reduce methodological problems with reliability and validity associated with phenomenology and the subjectivity of individual observations, interviews and questionnaires; 'what people say they do, what they say they prefer and what they say they think cannot automatically be assumed to reflect the truth' (Denscombe, 2003, p. 190). There was 97% agreement (73/75 excerpts) on the learning styles grid amongst the four judges, which suggests high reliability.

Finally, an SPSS file was developed with data from each learner given by their teacher (gender, age, instrument, last grade taken, grade working towards, learning style and number of riffs played during the first lesson). The female participants (n=55, 73.3%) outnumbered the male participants. The ages ranged from seven to 58 (no=61, SD=9.4), with the majority being between 11 and 14 (36/61, 59%). Most participants played the piano (n=57, 76%), 8 (10.7%) played the flute, 5 (6.7%) the violin, 3 (4%) the saxophone, 1 (1.3%) the guitar and 1 (1.3%) the recorder. Information from a small number of learners (n=46) suggested that 32 (69.6%) were either at Preparatory Grade 1 or Grade 1 and 2

standard when they started the ear-playing strategies and were working (n=59) towards Preparatory Grade 1 (2, 3.4%), Grades 1 (12, 20.3%), 2 (14, 23.7%), 3 (17, 28.8%), 4 (5, 8.5%), 5 (3, 5.1%), 6 (4, 6.8%), 7 (1, 1.7%) and 8 (1, 1.7%). The teachers comprised thirteen women and two men who between them taught the piano, flute, violin, recorder, saxophone and guitar. The sample is not big enough to make claims about differences in relation to gender, instrument, or other variables; however there are some suggestions that further research in these areas could prove illuminating (see below).

Table 1: Number and percentage of learning style participants broken down by instrument

	Instrument (no and %)						
Learning Style	**Piano**	**Violin**	**Flute**	**Recorder**	**Sax**	**Guitar**	**Total**
Impulsive	14	1	3	0	1	0	19
% within instrument	24.6%	20.0%	37.5%	0.0%	33.3%	0.0%	25.3%
Shot in the dark	22	4	1	0	1	1	29
% within instrument	38.6%	80.0%	12.5%	0.0%	33.3%	100.0%	38.7%
Practical	19	0	2	1	0	0	22
% within instrument	33.3%	0.0%	25.0%	100.0%	0.0%	0.0%	29.3%
Theoretical	2	0	2	0	1	0	5
% within instrument	3.5%	0.0%	25.0%	0.0%	33.3%	0.0%	6.7%
Total	57	5	8	1	3	1	75
% within instrument	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100%

Findings

Learning styles

The same four learning styles that were identified in the pilot study were again apparent, and there were no findings which pointed to a logical requirement to add any other style to the existing four. In summary, the majority of the learners fell into the shot-in-the-dark category (n=29, 38.7%), followed by 22 (29.3%) in the 'practical' learning style category, 19 (25.3) in the impulsive learning style category and 5 (6.7%) in the theoretical learning style category. Table 1 shows

the overall picture of how the learning styles were distributed by instrument. Table 2 offers an example from each learning style identified from the lessons transcriptions and the grid criteria.

The impulsive style

Nineteen learners were identified as having an impulsive learning style (see Table 2). These learners exhibited some of the following behaviours: they often played straight away after the recording had started, they focused on rhythm rather than melodic movement, they played isolated notes without appearing to recognise if a 'correct' note was found, they had no apparent melodic intention (i.e. played only isolated notes) or had melodic intention (i.e. attempted a melodic outline of at least two pitches) but without apparently recognising whether they were 'correct' or not. By the end of the excerpt some learners were unable to play any of the 'correct' notes or rhythms; some played a connected bass line of at least two notes, but without 'correct' notes and/ or rhythms and some fixed on their 'own version' of the bass line.

Those who fixed on their own version showed signs of improvisation. By this term we refer to a 'spontaneous instrumental performance' that leads to the generation of 'new ideas in music without any censorship or editing' (Hargreaves, 1999, p. 29). This may have occurred partly because, as explained earlier, despite the fact that the task given to learners was to *attempt* to copy the bass line by ear, students were also told it did not matter if they did not play exactly the same notes as those on the recording. This approach therefore frees up the improvisatory sense (see Mainwaring, 1951a; Green, 2014).

The practical style

Twenty-two learners were identified as having a practical learning style (see Table 2). One important trait that distinguished them from impulsive learners is that they tended to listen to several repetitions of the bass line before they attempted to copy it, and they took what can be described as a more practical approach to the task by trying to break it down into components. Some spontaneously tried to find the first note by playing up or down a scale or by playing what initially sounded like isolated notes, some of which were later

connected to form a phrase. By the end of the excerpt, they had either managed to play three out of the four bars or all four bars correctly, but not necessarily in the 'correct' rhythm.

Table 2: One example from each learning style as it emerged from the transcriptions and the grid criteria

Learning style	**Transcriptions**	**Grid** *(some of the most relevant criteria for each excerpt are mentioned here)*
Impulsive	The teacher puts on the recording (0.24) and the learner immediately starts playing various notes (0.26) starting from G. Then she starts building the rhythm by playing the whole riff rhythmically on G.	• Plays isolated notes without appearing to recognise if a 'correct' one is found. • Attends to rhythm at expense of pitch. • *By the end of the excerpt*: Fixes on 'own version' of the base line, not on 'correct' notes but with some 'correct' rhythm, lasting over two bars, plays it repeatedly without seeming to check whether it is 'correct'.
Practical	The learner listens to one repetition of the riff and before the repetition finishes she plays the two bars of the riff correctly (notes and rhythms). After that she doesn't seem to be listening to the CD – she is trying to find the melodic leap at the end. She experiments with a few notes and then she stops.	• Waits for over four bars (one riff) before playing. • Plays isolated notes and recognises when a 'correct' one is found (D, C, or F); then uses that as an anchor. • *By the end of the excerpt*: Is able to play only D-C, DD-C, DDDC-D, without F, more or less correctly.
Shot-in-the-dark	Music starts immediately. Some conversation over music. Music stops at 1.59. T: I just need you to play the bass track. I will just play it once more (music starts at 2.05). L: What should I do? T: You need to try playing that on the piano. L tries an E on the piano. Music plays for some time. L plays a G.	• Waits for over 12 bars (three riffs) before playing. • Plays isolated notes without appearing to recognise if a 'correct' one is found. • Has no apparent melodic intention, i.e. plays only isolated notes. • *By the end of the excerpt:* Is unable to play any of the 'correct' notes or rhythms.
Theoretical	L: Is it the same note that is	• Asks questions about the music (e.g. 'How

	playing again and again? T: Yea. The little thing that it is repeated. You are absolutely right… The learner is playing a G. L: Is that the right note?	many notes are there'; 'Is it repeated three times?') • The teacher gives verbal advice e.g. 'Try a higher note'. • *By the end of the excerpt the pupil:* is unable to play any of the 'correct' notes or rhythms.

The shot-in-the-dark style

There were 29 learners who demonstrated a haphazard approach to the task. This approach is termed here shot-in-the-dark. These learners listened to several repetitions of the riff without playing anything; three learners did not play anything at all throughout the excerpt. When the learners played something, it tended to be isolated notes and they did not appear to recognise when a 'correct' pitch was found (see Table 2). By the end of the track they were unable to play any of the 'correct' notes or rhythms, nor did they offer up any improvisatory response in the way that the impulsive students had done. Many of them appeared to have a fear of the task, and were very hesitant, apparently not wishing to play something 'wrong', despite what they had been told about this. The teachers offered a lot of encouragement in order to make the learners play something as well as to continue despite playing notes that were not related to the recording; however it was only during the next phase, learning strategy that students availed themselves of this.

The theoretical style

The five learners who were considered to display a theoretical response to the ear-playing task asked music-related questions such as 'Is it high or low? How many notes are there? Is it repeated three times?', before attempting to play any note. Three of these made no attempt to play, whilst two waited for over twelve bars before they played isolated notes. By the end of the excerpt they were, like the shot-in-the-dark students, unable to play any of the 'correct' notes or rhythms (see Table 2).

Learners displaying potential Absolute Pitch

A finding that had not emerged clearly during the pilot study was that 10 learners were indentified as displaying behaviour that could suggest they had Absolute Pitch (AP). AP describes an individual's ability to recognise, name, and/or reproduce a musical tone accurately (Zatorre, 2003) and 'spontaneously' (Bachem, 1955). The criterion by which the judgement of a learner possibly having AP was made, was whether the student played the 'correct' start-note straightaway, that is, without any trial-and-error. This behaviour is not a sufficient condition from which to surmise that the student had AP; but it is a necessary condition for *demonstrating* AP. Below is an example of the data transcription and analysis from two out of the 10 students attributed with potential AP, in order to illustrate how the attribution was arrived at.

Table 3: Two examples from learners with Absolute Pitch (AP)

Learner ID	**Transcriptions**	**Grid** *(some of the most relevant criteria from each excerpt are mentioned here)*
58	She is playing the riff on the piano. *T: I told you she was good. Can you get the rest of it then?*	• Plays the D as first note, without any trial-and-error, and uses it as an anchor to find other pitches. • Has melodic intention, i.e. attempts a melodic outline of at least two pitches, realises they are on the right lines and uses then as an anchor. • By the end of the excerpt: is able to play only D-C, DD-C, DDDC-D, without F, more or less correctly.
32	The learner listens for two repetitions without playing. Then she plays a scale D,C,B,A (2.09) and then she plays an ascending scale up to F and then moves down again.	• Plays the D as a first note, without trial-and-error, BUT does not use it as an anchor. • Plays isolated notes without appearing to recognise if a 'correct' one is found. • By the end of the excerpt: Fixes on 'own version' of riff, not on 'correct' notes but with some 'correct' rhythm, lasting over two bars, plays it repeatedly without seeming to check whether it is 'correct'.

We decided to look further into the students displaying potential AP by monitoring in detail how they responded to the task. Their first attempts were, therefore, isolated and analysed in depth. Of these 10 learners, who spontaneously responded to the task by finding the first note straight away without trial-and-error, two then went on immediately to display an impulsive learning style, four a practical and four a shot-in-the-dark learning style. The two AP learners who were placed in the impulsive learning style category started to play at least one note during the first two bars of the excerpt, and they played with seeming confidence. By the end of the excerpt these learners fixed on their 'own', improvisatory version of the riff, not on 'correct' notes, but with some 'correct' rhythms. Unlike the other 'impulsive' learners, however, they gave equal attention to pitch and rhythm, and by the end of the excerpt they were able to play the first five notes D,C,D,D,C more or less correctly. Four AP learners demonstrated a 'practical' learning style: they waited for over twelve bars (three riffs) before playing, they gave equal attention to pitch and rhythm and by the end they played D, C (and some F) but not necessarily in the 'correct' order or rhythm. Finally, four AP learners demonstrated a shot-in-the-dark approach. After finding the first note, they played isolated notes without appearing to have recognised whether a 'correct' one was found.

A further study which systematically tested AP in relation to ear-playing from a recording would be required to make robust claims about the proportion or likelihood of these 10 learners possessing AP, or to predict the correlation of AP with learning style. However the possibility of AP occurring in these 10 cases cannot be ruled out, nor can the fact that there was no apparent correlation between AP, as attributed here, and any one particular learning style.

Learning strategies

Considering now what happened during the remainder of the first lesson, after the initial spontaneous responses designated as learning styles, the learners' approaches began to develop in various ways. The data here come from the recordings of the remainder of the first lesson only. We were unable to collect recordings from subsequent lessons in this part of the project owing to stringencies of resources and time, but as mentioned earlier, discussion of a

range of findings is available in other publications from the project. The shortest lesson reported on here was 59 seconds, although this was an exception, and the longest was 24 minutes 14 seconds. The total time of all 75 lessons was 737 minutes 22 seconds.

A thematic analysis of the audio transcriptions of the remainder of the first lesson was undertaken. The analysis revealed that the learners adopted a variety of learning strategies in order to continue copying the first riff; and for those that got beyond it, the subsequent musical riff or riffs by ear (see Table 4). These were the results of various happenings, including in some cases a response to the teacher's help, asking questions, self-reflection and practice. Some of the strategies are similar to what for other students were regarded as learning styles – for example, playing up or down a scale was something that a few learners did spontaneously and we therefore regarded it as evidence of learning style; but for others, this was a strategy which they developed, or which was suggested to them, after trial-and-error.

The most common strategy adopted was listening without playing (143 references), followed by trying to find the notes through playing isolated notes (116 references) and by asking the teacher questions (108 references). Listening without playing was either used as a strategy to help the learner memorise the melody internally before trying to reproduce it, or it indicated that the learner did not know what to do to approach the task. Many students played isolated notes whilst listening to the recording (80 references); some used them as an anchor to develop the riffs, and some did not appear to recognise it when they found a 'correct' note. Some learners adopted the strategy of listening and playing along with the recording (67 references). Others developed the piece in a progressive manner by dividing it into parts that were practiced in isolation and then linked together (67 references). Some others appeared to try to get a holistic sense of the piece through experimenting with different notes and rhythms (46 references). The analysis of the audio transcriptions indicated that most learners focused on getting the rhythm first and then the melody (46 references). One possible explanation for this is that the rhythmic character of the bass line accompanied in the CD by a drumbeat might have made the learners focus on the rhythm rather than the melody.

Many learners tried to find the notes through scalar movement (44 references) whilst others followed the 'dwell and catch up' approach (Green, 2012b) where they dwell on a few notes and practise them a couple of times whilst the music on the CD track is moving forwards through time, and then they catch up with the CD music by leaving out the next few bars (23 references). Worth noting here is that some students' performance showed signs of spontaneous and creative exploration of musical ideas (Hargreaves, 1999) from the very first lesson. Lastly, a small minority preferred to practise without the recording (20 references) or sang/hummed the notes of the riffs (19 references).

Table 4: Ear-playing strategies from the lesson transcriptions

Listening without playing	143
Finding the notes through playing isolated notes	116
Asking music-related questions (i.e. *How high is it? Is it a low D or a low C?)*	54
Asking practical questions (*Can I do it without the music first?)*	51
Listening and playing along with the recording	67
Progressively developing the piece	67
Experimenting with the riff– getting a sense of the piece	46
Focus on rhythm first and then on melody	46
Finding the notes by scalar movement	44
Dwell and catch up	23
Signs of improvisation (i.e. *S. plays several notes around D,F,A. She follows the rhythm but improvises on the notes. She tries higher)*	23
Playing without the recording	20
Sings or hums the riffs	19

Riffs completed during the first session

Table 5 shows the number of riffs completed during the first session by the 75 participants grouped according to learning styles. Four learners managed to copy all 6 riffs during the first lesson. One of these initially had a 'shot-in-the-dark' response to the first riff but within just one lesson, went on to develop strategies, with the help of the teacher, to copy them all. The other three initially displayed a practical learning style. The majority (42), however, only managed

the bass line and unsurprisingly displayed either an impulsive or a shot-in-the-dark learning style.

A one-way between-groups analysis of variance was conducted to explore the difference between students when they were grouped according to learning styles. Specifically these groups were compared for differences in the number of riffs completed during the first lesson. Because the groups were found to violate assumptions of homogeneity the Welch statistic was used (Pallant, 2007). Statistically significant differences were revealed between the four groups; F (3,71)=25.5, p=.002. The effect size calculated using eta squared was 0.2. Post-hoc comparison using the Tukey HSD test indicated that the mean number of riffs completed amongst the pupils categorised as impulsive (M=1.3, SD=.94) was significantly different from the shot-in-the-dark (M=1.6, SD=1.17), the practical (M=3.04, SD=1.75) and the theoretical (M=1.2, SD=.44) pupils. In other words, the pupils categorised as having an impulsive or a shot-in-the-dark learning style were not completing the task successfully (amongst those were the students with the longest first lessons). This is cautiously suggesting that there are differences between groups and further research is needed to test that.

Table 5: Number of riffs completed during the first lesson broken down by learning style

	Number of riff completed during the first lesson						
Learning Style	**1**	**2**	**3**	**4**	**5**	**6**	**Total**
Impulsive	16	2	0	0	1	0	19
% within no of riffs	38.1%	10.0%	0.0%	0.0%	20.0%	0.0%	25.3%
Shot in the dark	19	7	0	2	0	1	29
% within no of riffs	45.2%	35.0%	0.0%	100.0%	0.0%	25.0%	38.7%
Practical	3	10	2	0	4	3	22
% within no of riffs	7.1%	50.0%	100.0%	0.0%	80.0%	75.0%	29.3%
Theoretical	4	1	0	0	0	0	5
% within no of riffs	9.5%	5.0%	0.0%	0.0%	0.0%	0.0%	6.7%
Total	42	20	2	2	5	4	75
% within no of riffs	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Learners' verbal responses during the first session

The learners' verbal responses during the first lesson were also transcribed and analysed. The majority appeared overwhelmingly apprehensive about copying music by ear and amongst these, comments included phrases like 'It's hard', 'I don't know what to do' or 'I don't like it' (59 responses); a minority at this point said they found the tasks fun (2 responses); one learner liked the fact the melodies were repeating; one described it as 'different' from the other activities that he did during the instrumental lesson; and one learner considered herself an ear player after successfully managing to complete one riff. Despite such apparent apprehension, the overwhelming response in anonymous questionnaires and interviews at the end of the project, was very positive (See Baker and Green, 2013, Baker, 2013, and Green, 2014). This may suggest that students on the whole tend to regard ear-playing as something unapproachable; and yet, being given an opportunity and encouragement to try it, they are likely to discover that it is both approachable and in most cases, enjoyable. Thus, by showing them the initial steps of playing by ear from a recording, we may be giving them not only a musical skill, but a way of learning which they can take with them through life if they so wish.

Conclusion

This study investigated the initial responses of 75 instrumentalists to copying music by ear from a recording as part of their one-to-one instrumental lesson, and confirmed earlier pilot findings by Green (2012a). As in the pilot study, the majority of the learners seemed to fall into what we have termed the shot-in-the-dark learning style category (no=7/15 in the pilot and n=29/75 in the EPP study, including 4 AP learners). This is followed by the practical (no= 5/15 in the pilot and no=22/75 in the EPP study, including 4 AP learners). The theoretical style had 2/15 in the pilot study and 5/75 in the EPP study; but the impulsive had as many as 19/75 in the EPP study (including 2 AP learners) and only one out of 15 in the pilot. The findings from the analysis of the audio and verbal responses of the ten AP learners seem to suggest that showing signs of absolute pitch, which part of the literature on AP considers to be a desirable ability and an asset to musicians (Eaton & Siegel, 1976; Takeuchi & Hulse, 1993), did not necessarily

help those learners with this particular task. This resonates with other studies on AP, which have found that AP possessors tend to have a low performance in relative pitch tasks (Miyazaki, 1993, 1995). Learners also went on to develop a range of strategies during this first lesson.

We acknowledge there are many limitations to the study. In particular, owing to time limitations, we were unable to observe the 75 learners in the same amount of detail through subsequent lessons, which might have allowed some interesting follow-ups to how the different learning strategies developed, their correlation with the initial learning styles, and their correlation with AP. Unequal distribution of both sex of participant and instruments played made it impossible to draw any conclusions about the correlation of learning styles in relation to these variables. In addition, missing data on the learners' grade levels meant that no comparison between level of expertise, as measured by a formal graded exam, and learning style could be made. Furthermore, the study only involved 90 students, putting together the pilot and the EPP studies, which is a small sample, so the authors are cautious about claiming that the findings are generalisable to a larger population.

However, we hope that the findings bear witness to the possible existence of learning styles in musical skill development, particularly in relation to ear-playing. As argued earlier, the learning style construct could have implications for how teachers understand their students, and how they tailor their responses according to the differing needs of individuals. For example, when, at the end of the project, the teachers were asked about the benefits of the EPP they emphasised that the project helped them give their students more autonomy during the lessons, and to assess their students' needs more insightfully. They considered that the benefits for the students included an increase in students' confidence in playing diverse repertoire and in using alternative pedagogies; enjoyment from bringing their favourite music and performing it during the lesson; listening with expectation and more awareness of dynamics and phrasing; and encouragement to improvise (Baker 2013, Baker and Green 2013, Green 2014, Varvarigou, 2014).

Further, this potential understanding need not be restricted to ear-playing, but it is possible that if the students in this study display the learning

styles as indicated, then those styles might also affect the way these students respond to notation reading, instruction, modelling, music-theory, and many other important aspects of instrumental lessons. Further research may be warranted on that. The learning *strategies* which these students reached for, with and without the help and advice of the teacher, may also betray some areas of as yet little-understood musical development, knowledge of which could be of interest and which could affect teaching strategies. For example, although the benefits of using singing for modelling and to supporting audiation in instrumental lessons have been highlighted by Benson and Fung (2005), Robinson (1996) and Dalby (1999), to mention a few, singing or humming the melody before or along with playing was neither a learning style that occurred nor a popular strategy adopted by the students. This indicates that possibly more singing needs to take place during instrumental lessons in order for the approach to be appreciated and adopted by the students.

Finally, two of the most common responses from over 200 teachers who have undertaken the ear-playing tasks themselves during induction days have been that a) the teachers have been surprised and enlightened in being able to identify their *own* learning style from engaging in this task; and b) many of them said that the learning style construct had shed new light on the behaviours and attributes of many of their students, and enabled them to have a deeper appreciation of their students' needs (see also Varvarigou, 2014). Our hope is that we can contribute to teacher-education through this discussion, and that the findings may be of interest to teachers, as well as psychologists of music, and musicians themselves.

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Appendix: Grid of learning style criteria

1. Onset time (Tick one)	**a.**	Starts to play at least one note during first two bars of excerpt
	b.	Starts to play at least one note during first four bars of excerpt
	c.	Waits for over four bars (one base line) before playing
	d.	Waits for over eight bars (two base lines) before playing
	e.	Waits for over twelve bars (three base lines) before playing
	f.	Does not make any attempt at playing at all
2.Evidence of Absolute Pitch (Tick one)	**a.**	Plays the D as first note, *without any trial-and-error whatsoever*, and uses it as an anchor to find other pitches
	b.	Plays the D as first note, *without trail-and-error,* BUT does not then use it as an anchor
	c.	Plays the F as first note, *without trail-and-error,* then uses it as an anchor
	d.	Plays the F as first note, *without trail-and-error,* BUT does not then use it as an anchor
	e.	Plays the C as first note, *without trail-and-error,* then uses it as an anchor
	f.	Plays the C as first note, *without trail-and-error,* BUT does not then use it as an anchor
	g.	No evidence of going straight to D or F at outset.
3.Seeking by stabbing (Tick one)	**a.**	Plays isolated notes and recognises when a 'correct' one is found (D, C or F); then uses that as an anchor
	b.	Plays isolated notes without appearing to recognise if a 'correct' one is found
	c.	Does not play any isolated notes in older to seek the pitch
4.Seeking by scalar movement (Tick one)	**a.**	Plays up or down a scale of at least 3 notes to find 'correct' note, and *recognises it* if/ when found
	b.	Plays up and down a scale of at least 3 notes to find 'correct' note, but *does not recognise it* when found
	c.	Does not play any scalar movement by which to seek the note
5.Melodic intention (Tick one)	***a.***	Has melodic intention, i.e. attempts a melodic outline of at least two pitches, *realises they are on the right lines and uses them as an anchor*
	b.	Has melodic intention, i.e. attempts a melodic outline of at least two

		pitches, *realises they are not right and tries something else*
	c.	Has melodic intention, i.e. attempts a melodic outline of at least two pitches, *but without recognising whether they are 'correct' or not*
	d.	Has no apparent melodic intention, i.e. plays only isolated notes
	e.	Goes straight to one note, *not including D,* starts to play it rhythmically; and sticks on it as the anchor
6.Pitch and rhythm (Tick one)	**a.**	Attends to pitch at expense of rhythm
	b.	Attends to rhythm at expense of pitch
	c.	Gives equal attention (or lack of attention) to pitch and rhythm
7.Verbal responses (Tick one)	**a.**	Asks questions *about the music*, e.g. 'how many notes are there'; 'is it repeated three times?'
	b.	Asks for clarification of task
	c.	Talks negatively about own state of mind, feelings, e.g. 'this is hard', 'stop watching me', 'I don't know' 'do I have to do it?'
	d.	Talks positively about own state of mind, feelings concerning task, e.g. 'this is fun' [!!]
8.Teacher behaviour (Tick one)	**a.**	The teacher sings pitches
	b.	The teachers gives verbal advice e.g. 'try a higher note'
	c.	The teacher gives encouragement e.g. 'great!' but without advice
	d.	The teacher doesn't say anything
	e.	Does not say anything
9.By the end of the excerpt, the pupil: (Tick one)	**a.**	Is unable to play any of the 'correct' notes or rhythms
	b.	Plays a connected base line of at least two notes, but without 'correct' notes and/or rhythms
	c.	Fixes on 'own version' of base line, not on 'correct' notes but with some 'correct' rhythm, lasting over 2 bars; plays it repeatedly, without seeming to check whether it is ''correct'
	d.	Is able to play *only* D-C, DD-C, *more or less* correctly
	e.	Is able to play *only* D-C, DD-C, DDDC-D, *without F*, *more or less* correctly
	f.	Is playing D, C and F but not necessarily in the 'correct' rhythm
	g.	Is able to play an almost-'correct' rendition of the base line