ПСИХОЛОГИЈА МУЗИКЕ / PSYCHOLOGY OF MUSIC

dr Renee Timmers
Department of Music, The University of Sheffield, United Kingdom
r.timmers@sheffield.ac.uk

PSYCHOLOGY FOR DEVELOPING MUSICIANS: SOME RECENT RESEARCH AND ITS IMPLICATIONS FOR MUSIC LEARNING

Abstract

Recent research at the *Music, Mind, Machine in Sheffield* research centre[1] is summarised and its implications for music learning and education explored. Two research questions drive the exploration: What is the role of multimodality in the acquisition of musical knowledge? And, what are effective ways to promote expressive music performance in children? The reported research has been conducted in the context of an MA and two PhD projects. It demonstrates the effectiveness of multimodal representations and active engagement for musical learning, and suggests ways in which these can be fostered in music educational practices.

Key words: multimodality, musical knowledge, expressive music performance.

Introduction

Playing music is inevitably a multimodal experience – sounds are made through actions, most instruments have a visible layout often related to pitch, and performers feel the instrument and experience the actions necessary to produce the sounds. While this makes performing music a challenging task and learning to perform a long-term process, theories of embodied cognition (Thelen & Smith, 1996; Thompson & Varela, 2001; Varela, Thompson, & Rosch, 1991) hold that a dynamic interaction between brains, bodies and environment are central for cognitive development, implying that learning may be facilitated through multisensory interaction (for similar arguments related to music learning, see Leman, 2008; Schiavio & Cummins, 2015). From this follows the question whether sensorimotor engagement with music supports musical learning, rather than that it complicates the learning process. We will look at two studies that have examined whether multimodal representations of music can facilitate musical learning. The first

[1] http://www.sheffield.ac.uk/music/research/researchcentres/music-mind-machine

examines the memorisation of unfamiliar melodies, and the second the learning of rhythm notation.

Notions of embodied learning may give the impression that learning is primarily implicit through action, rather than explicit through talk, with a limited role for mental concepts. However, this is not necessarily the case. Embodied cognition holds that concepts arise from and are supported by embodied interaction[2]. For example, our conceptualisation of pitch is influenced by embodied experience with a musical instrument (Timmers & Li, 2016). Nevertheless, this process interacts with the way we talk and think about the world. For example, linguistic references to thin and thick pitch influence our tendency to associate thin and thick objects with high and low pitch (Dolscheid et al., 2013). Interestingly, linguistic associations such as the future is in front and the past is behind can be overridden by the temporal focus of a culture, which can be oriented towards the past rather than the future (de la Fuente et al., 2014). The power of dialogue and conceptualisation to develop musical learning is examined in the third and final study that is summarised. This study examines the effectiveness of dialogic teaching to enhance expressive music performance in young instrumentalists.

Study 1: Learning of Tonally Ambiguous Melodies

Study 1 is part of the PhD thesis of Andrea Schiavio and has been published as Schiavio and Timmers (2016). It investigated whether multimodal representations of music facilitate the learning of tonally ambiguous melodies, and whether this is the case for musically untrained participants as well as for musically trained participants. Furthermore, we distinguished between musicians whose main instrument was the instrument that the music was performed on (piano), and musicians for whom this was not the case. As such three groups of participants were recruited: pianists, non-pianist musicians, and non-musicians. We recruited 40 participants per group leading to a total of 120 participants. A considerable number of participants was needed because participants were allocated to one of four learning conditions, yielding 30 participants per condition. The four learning conditions included hearing only, which we saw as the control condition, seeing the melodies performed, playing along with the melodies, and silently tapping along with the melodies. In a learning condition, four tonally ambiguous melodies were presented to participants. The presentations of the melodies in the hearing and seeing condition were unimodal – hearing or seeing only. The presentations in the other two conditions were multimodal. In the ‘playing’ condition, partici-

[2] An interesting example relates to uses of our dominant hand- if right is dominant, we associated the right with positive (good) ideas and left with negative (bad) ones, but if left is dominant, we employ an opposite association (Casasanto, 2009; Casasanto & Henetz, 2012).

pants played along with the melodies. To facilitate this, they saw which key they needed to press in an animation presented on a screen (the piano key to press was highlighted). In the 'silent tapping' condition, participants also played along with the animation. However, in this condition, the piano keyboard did not produce any sound. The seeing, tapping or playing was alternated with listening to the melodies, and participants were only exposed four times to each melody.

The four tonally ambiguous melodies were excerpts of between 10 and 15 seconds taken from Charles Ives' '114 Songs for voice and piano' (1922). Each was four measures long and started with an upbeat. Additionally, three variations were composed on each melody, which consisted of slightly rhythmically and melodically modified versions of the originals. Participants were first asked to learn the four original melodies in a particular way, as explained above. Thereafter they had a 10-minute break, which was followed by the testing phase, during which their memory for the melodies was tested: They heard all 16 melodies (4 originals and 12 lures) and were asked to indicate whether the melody was one that they had learned or not.

The results showed to our surprise that the recognition accuracy was not higher for musicians than non-musicians, and also pianists did not do better than non-pianists or non-musicians. Importantly, for our question, the results showed that accuracy was higher for participants who had learned the melodies in a multimodal fashion – either by playing it or tapping it silently. These are also the two conditions that require the involvement of the 'motor system' of the participants – active motor engagement, which may in particular be relevant for musical learning (Gerson, Schiavio, Timmers, & Hunnius, 2015; Schiavio & Cummins, 2015).

The implications of this study are that active engagement with unfamiliar musical material may facilitate learning of it, as may multimodal representations of music, including audio, visual, and motor components. Such learning resembles learning using a musical instrument, but it is not necessary to have extensive experience with the musical instrument before active musical engagement using an instrument can be beneficial. It is however necessary to include an appropriate tool to facilitate performance of a melody on an instrument in untrained participants, which can have various formats, such as the video animation used in this study.

Study 2: Learning to Read Rhythmic Notation

Although for most musicians, reading rhythmic notation is a fully automated process, for beginner level musicians, reading rhythms can be a considerable challenge. Lisa Carlin has developed a method that uses colour, size, and supporting symbols to facilitate the learning of rhythmic notation. As part of her MA dissertation (Carlin, 2015), she examined whether using the multimodal rhythmic representation indeed facilitates rhythm reading in children, including case studies of three children with learning difficulties and two without learning difficulties. Four of the five participating children had had some prior musical training and had a basic understanding of music notation. One child without learning difficulties had had no prior musical training.

The multimodal representations that Carlin developed used a different colour for each note value. Initially, each note value also had a different size, in accordance with its duration. Rests were similar to notes, except they were blank in the middle with Sh! written in the centre. Heartbeats in red were used to symbolise the pulse, a concept sometimes seen in Kodály teaching. Carlin worked for three sessions with the children and tested their ability to sight read rhythms from notation at the start and end of the three sessions. An example of a sight-reading test in conventional notation is shown in Figure 1. As most children had had music lessons before, relearning music notation in a different way, should not necessarily have improved their sight-reading ability. Carlin showed however that all children benefitted, including children with learning difficulties. Table 1 shows the number of notes of a certain value present in a test, and the percentage correct production of these note values before and after the training. The improvement in accuracy is considerable, especially for the minim and semibreve.

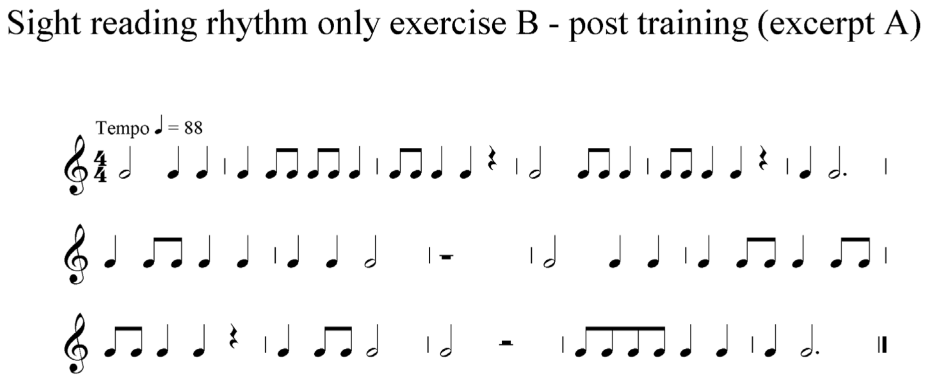

Figure 1. Sight reading test for rhythmic notation.

Table 1. Number of notes of a certain value and percentage correct in sight reading tests before and after training.

	Pre-test		Post-test		
Type of note	No. in test	% correct	No. in test	% correct	% Difference
Semibreve	10	0	15	73	73
Minim	74	15	57	91	76
Crotchet	112	69	106	97	28
Minim (rest)	10	0	9	33	33

Carlin is in particular interested in helping children with dyscalculia and dyslexia, although this study showed that children in general can benefit from a multimodal presentation of rhythmic values. Rhythm is often presented in an abstract and unimodal fashion: black symbols represent different values and these values are interpreted as divisions and multiples of each other. Giving the rhythmic values a proportional size, physically appending note values, and showing relationships between rest and note values, provide a physical presence that support the musical concepts.

It should be noted that this was an exploratory study including a few participants without a control group of participants who received an equal amount of individual training using conventional notation rather than the multimodal notation. The study was exploratory and the results promising but tentative. Carlin is currently developing her method and investigation as part of her PhD work at University College London.

Study 3: Teaching young musicians expressive performance

The third study to be reported here investigated ways in which expressive performance of music can be enhanced in children (8-15) learning to play a musical instrument. For her MA dissertation, Henrique Meissner (doctoral student at The University of Sheffield, and recorder teacher in Cambridge) conducted an exploratory action research project, in which she asked several music teachers to document their methods for developing expressive performance in their music pupils. Methods ranged from gesturing, singing, modelling and listening to own recordings, to teacher's enquiry and explanation of expressive devices. The last two were in particular associated with an improvement in expressive performers (Meissner, 2017). As part of her PhD work, Meissner continued this area of research and designed an experimental study to test whether a dialogic teaching approach is indeed effective in enhancing expressive music performance in children. Dialogic teaching is characterised by asking questions and dialogue rather than teacher presentation (see Alexander, 2008). In the experimental lesson, Meissner included enquiry about the musical character and discussion of expressive devices.

The effectiveness of a half-hour teaching session to improve accuracy of, and expressiveness in performance was tested, comparing two teaching methods: The control teaching method focussed on reading and playing the notated music, including a few ways of enhancing the ability to perform what was notated. This included clapping rhythms, playing scales and arpeggios in the key of the piece, and improvisation of tunes with similar rhythmic and melodic patterns. The experimental teaching method employed similar teaching methods as the control teaching, but for a brief time only, which was followed by teaching that focussed on enquiry about the musical character of the test pieces, and ways in which a character can be communicated (i.e. discussion of expressive devices). In both teaching approaches, the lesson focussed on the performance of two short music extracts – one with a happy and one with a sad character. The skill level of participants ranged from beginner to advanced. To accommodate these levels in performance, two sets of pieces were used: a set with two simple pieces and a set with two more advanced pieces.

At the start and end of the half-hour lesson, participants performed the two pieces. They had had the opportunity to practice the music before-hand, so the music was not entirely new at the start of the lesson. Independent adjudicators rated the quality of performances from video recordings on multiple dimensions including accuracy, emotional expression and overall expressiveness. Data analyses focussed on the effects of type of teaching and musical piece on the amount of progress made from pre- to post-teaching. Consequently, the effects of group (control or experiment) and musical piece (happy or sad) were tested on the differences in the evaluations of the pre- and post-performances. Results showed that both groups improved in accuracy, emotional expressiveness and overall expressiveness. Improvement in emotional expressiveness and overall expressiveness was, however, larger for the experimental group than the control group, which was primarily due to a difference in improvement for the sad piece: Improvement in expression was similar for both groups for the happy piece, but stronger for the experimental group for the sad piece. An opposite trend was observed for accuracy in the happy piece, which improved more in the control group. However, this trend was not statistically significant.

Table 2. Mean difference scores between evaluations of the pre-teaching and post-teaching performances of participants in the control group and the experimental group for the happy and sad test extracts.

		Accuracy	Emotional expression	Overall expressiveness
Control	Happy	1.589	1.054	0.750
	Sad	1.089	0.554	0.411
Experimental	Happy	0.583	1.200	0.717
	Sad	1.10	1.817	1.383

These results provide important evidence that particular teaching methods can make a positive impact on students' expressive performance ability. Moreover, it suggests that an active involvement of pupils in the learning process is important – inviting pupils to reflect on the music they are playing and the ways they can use their instrument to express a musical interpretation. Qualitative analyses of questionnaires and interviews with the participating pupils indicated that young musicians tend to concentrate on note reading and technical skills in their practice. Participants from the experimental group reported that the researcher-teacher's questions had facilitated their reflection on the musical character and how to convey this in their playing by adjusting expressive cues (Meissner, in preparation).

General discussion

All three studies employed a systematic methodology to empirically investigate how musical learning takes place and what psychological factors contribute to this learning. These studies offer insights relevant for music education, despite the gap between experimental studies that aim to control as much as possible for external influences and real-life situations where development is always the result of a complexity of factors. The first study indicated that the learning of musical sequences may benefit from the inclusion of playing the sequences on a musical instrument in combination with concrete visual instruction that facilitates such performance. Participants do not need prior experience with the instrument to be able to benefit from this kind of training. It is not clear whether this effect concerns some instruments in particular (like the piano) or performance on an instrument in general.

In the second study, learning was supported by representing musical properties (rhythm in this case) in a multimodal fashion. Duration was represented using differences in size, and duration categories were identified using colour. This study highlights some of the difficulties that music learners may encounter when learning to read music notation as well as when developing an understanding of the concepts that are represented in music notation. The development of an intuition for these concepts may be supported by alternative representations that more readily align musical with visual parameters, drawing on commonly shared cross-modal correspondences such as between length and duration (Casasanto, Fotakopoulou, & Boroditsky, 2010). Understanding of learning difficulties, in particular dyslexia, is growing, offering insight into ways to overcome experienced obstacles. Nevertheless, considerably more research focus is needed for the learning of music, and music notation, potentially borrowing from research focused on reading, verbal or mathematical skills.

The third study may on first sight seem to contrast the findings and implications of the first two studies, as it advocates for the use of discussion and dialogue for learning to perform music expressively. While this may rely on participants' verbalisation abilities, it shares with the first study an incentive for the learner to engage actively in the learning process, and with the second study an elaboration of the conceptualisations of musical knowledge. In the dialogic process, intuitive and abstract notions may be made concrete using other modalities: Methods for expressive performance are labelled (i.e. dynamics, tempo, articulation), musical characters are defined (i.e. happy or sad), and phrasing may be gestured as well as annotated in the score. Research into performance expression may help to visualise and to some extent demystify contributions of performers, providing tools for music pupils to develop independence in musical understanding and fostering creativity (Timmers, Desain & Sadakata, 2012; Timmers & Sadakata, 2014).

These studies are part of an ongoing effort to increase our understanding of musical learning and development, contributing to music cognition as a fundamental research area, whilst investigating and evaluating the implications for music education and applied music psychology. They indicate how listeners and performers make use of different modalities, including vision, movement, and emotion to conceptualise and make sense of structures and characteristics of music. Future research may further investigate the relationship between these different modalities and conceptualisations (e.g. cross-modality and emotion), as well as differences in preferences and employment of particular conceptualisations across individuals.

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др Рене Тимерс

Психологија музичког развоја: новија истраживања и њихове импликације за учење музике

Сажетак

Недавно је спроведено истраживање које се односи на учење музике и музичку педагогију у оквиру истраживачког центра Музика, Мозак, Машина (Music, Mind, Machine) у Шефилду. Два кључна питања занимала су истраживаче: 1) Која је улога мултимодалности у стицању музичког образовања, и 2) који су делотворни начини за остваривање експресивног извођења код деце? Истраживање је представљено у једном мастер раду и две докторске дисертације. Оно показује делотворност мултимодалности у процесу учења музике, те предлаже начине на које оно може поспешити музичко-педагошку праксу.

Кључне речи: мултимодалност, музичко знање, експресивно извођење