Physical movement and imagery in professional and undergraduate student solo marimba practice

Mary Broughton and Catherine Stevens

MARCS Auditory Laboratories, University of Western Sydney, Australia

Cognitive strategies and imagery are important features of expert musical practice. Movement imagery is important for developing note-accurate marimba performance. We report findings of a study where four professional marimba players and four undergraduate student marimba players completed questionnaires regarding their practice strategies and use of imagery in performance preparation. Since pedagogical marimba practice involves developing movement imagery, each participant also completed the Movement Imagery Questionnaire (MIQ-R) to measure subjective kinesthetic and visual imagery ability. As expected, professional musicians' qualitative reports of practice were driven by cognitive strategies. The student musicians reported more regular practice habits focusing primarily on physical practice. Professional musicians reported use of imagery in practice more often than student musicians. As predicted professional musicians' kinesthetic imagery was significantly greater than student musicians'. Contrary to prediction no significant difference was observed between professional and student musicians' visual imagery. Results offer some support for a pedagogical approach to marimba playing specifically aimed at developing note-accurate performance through kinesthetic awareness and imagery.

Keywords: practice; music imagery; movement imagery; marimba performance; musical expertise

Cognitive strategies in musical practice involve mental rehearsal of skills, music analysis, and metacognition to direct efficient practice (Barry and Hallam 2002). Whereas novices tend to focus on technical physicality, such as playing the correct pitches in the right rhythm (Hallam 2001), expert musicians demonstrate well-integrated cognitive and motoric strategies in pre-

paring for performance (Chaffin and Logan 2006). An important early facet of an expert's approach to preparing a musical work for performance is to form an *artistic image* of the piece (Chaffin *et al.* 2003). This includes imagined musical character and emotions to be realized as sound through movement. Recent empirical evidence suggests *notional audiation*—imagining or "hearing" sounds purely from reading musical notation alone—to be a process involving kinesthetic vocal and motor processes in expert musicians (Brodsky *et al.* 2008). Hence, musical imagery and movement appear to be inextricably linked in expert music practice. While cognitive strategies and musical imagery would be expected features in professional marimba players' practice, movement imagery is also vital in the Western classical art form.

Movement imagery is "the mental rehearsal of visual and kinesthetic properties of movements to enhance learning and performance of motor skills" (Gregg *et al.* 2007, p. 1). According to Guillot *et al.* (2004), visual imagery is "self-visualization of movement whereas kinesthetic imagery requires one to "feel" the movement, i.e. to perceive muscle contractions mentally" (p. 190). Arvinen-Barrow *et al.* (2007) found elite athletes' cognitive-specific (sports skills) imagery ability was significantly higher than novices'. Solo marimba performance involves overt and spatial movement where the performer is not in tactile, or often direct visual, contact with their instrument; movement imagery is anecdotally reported to be important in developing expertise. An entire pedagogical approach to marimba playing, *Ideo Kinetics* (Stout 2001), aims to develop accurate movement patterns through kinesthetic awareness and imagery. Therefore, professional marimba players might be expected to possess greater movement imagery than student marimba players.

The aims of this study are twofold. Firstly, we offer preliminary documentation of professional and student solo marimba players' practice strategies, both physical and imagined. Qualitative data are expected to demonstrate that where professional marimba players focus on cognitive strategies and imagery, undergraduate student marimba players' practice focuses on physical or technical aspects. Secondly, since marimba playing is a complex motor skill that develops over time, we investigate kinesthetic and visual imagery ability of participants. It is predicted that professional marimba players self-report greater kinesthetic and visual imagery than undergraduate student marimba players.

METHOD

Participants

Participants included staff and students of the Zeltsman Marimba Festival 2004: two female and two male internationally-renowned solo marimbists (mean age=47 years, SD=6.18; mean years playing marimba=38.0, SD=7.66); two female and two male undergraduate-student marimba players (mean age=20 years, SD=1.71; mean years playing marimba=8.5, SD=1.73).

Materials and procedure

A questionnaire (Q1) gathered demographic and musical background information; open-ended questions requested explanation of practice strategies and use of kinesthetic, visual, auditory, and emotional/musical character imagery. The Movement Imagery Questionnaire-Revised (MIQ-R) (Hall and Martin 1997) assessed participants' subjective movement imagery ability on two scales: (1) kinesthetic, and (2) visual. An eight-item questionnaire, the MIQ-R requires participants to perform one of four movement tasks and then rate the ease with which they can kinesthetically or visually imagine performing the task. The scales range from 1 (very hard to see/feel) to 7 (very easy to see/feel). Scores for items on each scale are summed separately, giving participants a kinesthetic and a visual imagery score. A score below 16 (out of a possible 28) on either scale indicates low imagery ability on that scale, 16-20 moderate imagery ability, and above 20 high imagery ability. Hall and Martin (1997) reported satisfactory internal consistency for the kinesthetic (α=0.88) and visual (α=0.89) subscales of the MIQ-R. Participants were provided with an information sheet and, following written consent being gained, were given Q1 to complete and return. At a convenient time, participants completed the MIQ-R individually in a quiet room.

RESULTS

As expected, professional musicians' practice focused on cognitive strategies: "studying the music away from the instrument" (G), "practice see(ing) the notes" (JG). An initial goal for a new work was to develop musical interpretation: "I try to figure out what I could say through a piece from the first moment of studying it" (N), "Try to engage your imagination from the beginning" (M). Time constraint and demands of the repertoire affected practice: "Practicing schedule is often dependent upon my...work schedule...; often when I must do it (because of an upcoming performance, etc.)...I try to learn a piece in as little time as possible" (G), "To save time of playing the

whole piece through, I keep a log of the most challenging sections and focus on those as separate exercises" (N).

The student musicians reported regular practice habits (mean hours per day=3.25, SD=0.96; mean days per week=6.00, SD=0.96). As expected, their practice focused on physical and technical elements: "Warm-ups, technique, repertoire, mess around" (D), "Learn the notes, work with a metronome, practice fast changes" (J). Strategies for learning a new piece involved breaking it into manageable chunks: "Separate the piece into chunks, and learn each chunk until I finish the piece" (S), "Divide the number of measures by the number of days (e.g. until performance)...; work the sections each day until the piece is done" (D). Attention was also directed toward locating and working on the most difficult sections: "I read through the entire piece at first to get a feel for it...find the difficult spots and try to work on them first" (S), "Practice 'black' sections slowly" (JS). Musical interpretation was briefly mentioned: "After I have learned all the notes and listened to a recording(s) of the piece, I put character to it" (S).

Professional musicians self-reported imagery as part of their usual practice: Kinesthetic (100%), e.g. "You have to remember the movements...to play smoothly and accurately" (JG), "Slow, accurate practice...helps to develop kinesthetic memory of the notes" (G); Visual (100%), e.g. "You can't hit what you don't see" (JG), "Develop a visual image of the printed page" (G); Auditory (100%), e.g. "You can't shape musically what you can't hear" (JG); Emotional/character (100%), e.g. "Project...my relationship with the piece" (JG).

The student musicians self-reported imagery less often: Kinesthetic (50%), e.g. "To train muscles for different phrasing or difficult passages...different intervals using kinesthetic imagery" (J); Visual (75%), e.g. "The instrument, the audience, the performance setting...visual imagery of the keyboard" (J); Auditory (50%), e.g. "sometimes I try to sound like a singer or violin...; recently, I started to just sit somewhere and play my tune in my head" (J), "Decide on the auditory response I want the instrument to have" (JS); Emotional/character (75%), e.g. "It helps to make a story or a scene out of the music...; depending on what emotions I have while I practice, I use them and turn them into emotions that will hopefully bring out the musicality of the piece" (S), "Imagery of particular experiences I've had which inform my approach" (J).

Mann-Whitney U tests were conducted on the kinesthetic and visual imagery scales separately, with musical expertise as the grouping variable. As predicted, the professional marimba players' kinesthetic imagery (Md=26.6, n=4) was significantly greater than the undergraduate student (Md=20.5,
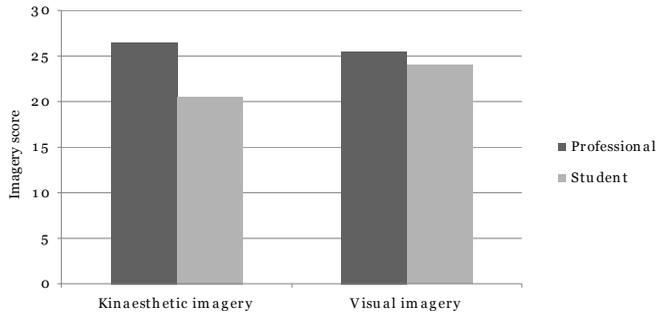
Figure 1. Median imagery scores for the professional and student marimba players on the kinesthetic and visual imagery subscales of the MIQ-R.

n=4) marimba players' (U=0.00, z=-2.34, p<0.05). Contrary to prediction, there was no significant difference between professional (Md=25.5, n=4) and student (Md=24.0, n=4) musicians' visual imagery (U =5.0, z=-0.89, p=0.37). Figure 1 shows the median scores for the professional and student musicians on both the kinesthetic and visual imagery subscales of the MIQ-R.

DISCUSSION

As expected, professional marimba players' practice strategies focused on cognitive issues and imagery (Brodsky *et al.* 2008, Barry and Hallam 2002, Chaffin *et al.* 2003, Chaffin and Logan 2006). While these habits were some-what evident in these advanced student musicians' practice, their focus was primarily on the physical aspect (Barry and Hallam 2002, Hallam 2001). As predicted, professional marimba players reported significantly greater kin-esthetic imagery than the undergraduate student marimba players (Arvinen-Barrow *et al.* 2007). These results conservatively support the *Ideo Kinetic*, kinesthetic-imagery-based, pedagogical approach to marimba playing (Stout 2001). No significant difference was observed between professional and stu-dent marimba players' visual imagery, contradicting the prediction. This may be because the spatial nature of movement required to play the marimba and hit specific targets explicitly incorporates the visual sense early in training. A more expansive study is necessary to validate these results. Future work will gather additional data to verify and broaden the scope of these findings, and identify links between performance practice and audience perceptual re-sponses to recorded performances.

Address for correspondence

Mary Broughton, MARCS Auditory Laboratories, University of Western Sydney, Locked Bag 1797, South Penrith DC, New South Wales 1797, Australia; *Email:* m.broughton@ uws.edu.au

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