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# Mind boggling! Considering the possibilities of brain gym in learning to play an instrument

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*This paper is one of the first presentations of research into brain gym's effectiveness in learning musical instruments. Brain gym (or Edu-K) is the popular, over-arching name for a system of exercises, approaches, and techniques intended to improve mental and physical performance. We explain the basic concepts and activities of brain gym and review the literature already published in other disciplines. We also track the short-term progress and experience of five instrumentalists when coached in brain gym. After one week, every participant rated brain gym as having a positive effect upon their playing. We also found that every participant had a more positive opinion of brain gym than they had prior to the experiment. While the findings are purely qualitative, they do suggest that brain gym has the potential to be an effective tool for music learning, and we encourage further research.*

## Introduction

This paper investigates the possibilities for brain gym's application in music learning. After a literature review and explanations of brain gym's central tenets, we recount a small research project conducted in the summer of 2004, involving five musicians experiencing three sessions of brain gym over the course of a week. The musicians each filled out a total of four questionnaires, describing and assessing their experience of brain gym and presenting their opinion of its effectiveness.

### *What is brain gym?*

Brain gym, or Edu-K (Hannaford, 1995) is the popular, over-arching name for a system of exercises, approaches and techniques intended to improve mental and physical functioning. The systems were developed from clinical research by Paul E. Dennison beginning in 1969. They are based on principles of kinesiology: the study of the body and body movement's reciprocal relationship with mental functioning (Dennison & Dennison, 1985, 1987, 1992, 1994, 1995). There are various forms and levels to brain gym, the most fundamental of which involves the repetition of specific physical movements. Different sets of exercises are aimed towards different areas of need. The most fundamental are 'cross crawl', 'brain buttons' and 'hook-ups'. Cross crawl, believed to encourage the integration of left and right brain functioning, involves the left hand touching the right knee, followed by the right hand touching the left knee, in a slowly repeating, static march. Brain buttons are

specific spots on the body, which when massaged with the fingers, are believed to increase circulation and therefore improve alertness, awareness and reaction times. 'Hook ups' are semi-meditative positions, which aid calm and focus and involve the crossing of ankles and arms, combined with specific breathing patterns. When a series of these three actions is combined with drinking water (which is much encouraged in brain gym), they are known as PACE. A typical PACE process will take 5–10 minutes. Further exercises such as 'the owl' and 'lazy eights' are intended to heighten visual and aural responsiveness. They can be performed in isolation or as add-ons to PACE.

These basic exercises can be employed with large numbers of people with a view to aiding relaxation, physical coordination or mental focus. Appendix 1 gives a list of the most frequently used, the effect of which has been researched for children (Koester, 2001; Kusnetsova & Kudryavtseva, 2001), university students (Irving, 1996) and adults (Khalsa & Sifft, 1990). All these studies present positive reports of brain gym's effect. Irving's nine-week study, for example, involving 27 nursing students and using three separate control groups during its different phases, found a 69.5% reduction in self-reported anxiety and an 18.7% increase in performance on skill tests for those using PACE. This increase was compared with continued self-reporting of high anxiety and heightening failure rate in the control groups not using PACE.

The second 'level' of brain gym practice is called 'Dennison Lateral Repatterning' (DLR). While PACE can be performed several times a day if desired, repatterning is a longer process with a longer-term effect, intended to enable a semi-permanent change in perspective and functioning. It could perhaps be described as a 're-programming' in comparison to the 'reboot' provided by PACE. DLR is more individually prescribed than PACE, but it tends to involve extensive sessions of cross crawl, in combination with diagonal eye movements, practised breathing patterns and visualisation exercises. Two papers compare the effects of the brain gym exercises with the effects of DLR and brain gym combined. Sifft and Khalsa (1991) provide a study measuring simple response times and choice response times among university students. Using a control group performing simple aerobic exercise, a second group practising PACE, and a third group practising PACE after DLR, improvements in response times for the third group were more than double those of the second group, whose improvements were in turn superior to the control sample. Similar results were found by Khalsa, Morris and Sifft (1988) in a similar research design involving 60 primary school children who were classified as learning-disabled.

The third level of brain gym is the 'balance', a technique that is used less often and has been little researched. The balance involves setting a goal to help someone overcome a specific problem or challenge. The goal is clarified, phrased and verbalized in a specific style with the collaboration of the instructor: most often as a positive statement of the person's ability, using the present, rather than future, tense. The person then absorbs the goal through a series of physical movements, repatterning and brain gym exercises. Developing the goal and selecting the exercises for repatterning is a process specific to each individual. Until now, Wolfsont (2002) provides the only research of the balance and goal-setting. In a small project, not unlike the present study, four individuals were repatterned and given a balance with personal goals. The diversity of problems tackled in Wolfsont's study demonstrates the specificity of this process. One individual wanted to find more successful ways of building intimacy with her partner. Another wanted to

get better at finding things he mislaid. All four participants' abilities to verbalise and rationalise their problem and how to solve it were measured using the Commons *et al.* (1995) scoring scheme identifying stages and steps of hierarchical complexity. Significant improvements were found in all participants. Furthermore, all four were asked for self-assessed feedback three weeks later and reported improved ability in dealing with their problem.

The participants in our research project were exposed to all three brain gym systems. Dennison's methods are based upon the belief that human beings function in either a 'homolateral' or 'cross-lateral' way: that is the different sections of the brain (right/left, top/bottom) will either work independently with a bias towards one section (homolateral), or they will work in a coordinated, integrated and balanced way (cross-lateral). When we are cross-lateral, we are able to achieve more: our different brain functions are integrated, helping us to coordinate an appropriate and effective response to our environment and the demands made upon us. Many people function homolaterally, using only some of the brain's capacity in any one situation. Much of brain gym's underlying aim is to encourage the crossing of lateral planes of functioning (Eyestone, 1988; Wolfsont, 2002).

Brain gym is applied within several areas of life. Its most common use is as an educational tool to maximise children's concentration and mental agility. This can be applied on a class-wide level for any ability group, but is often employed to help children who particularly struggle, for example, with attention deficit disorder, dyslexia, mental or physical disability (Hannaford, 1990; Khalsa & Sifft, 1990; Donczik, 1994; Koelman, 1997). The techniques have permeated into the sporting and business world, and are used here to maximise physical coordination, mental focus, entrepreneurial vision and drive (Dennison *et al.*, 1995; Donovan & Teplitz, 2001; Winkelmann 1998; Teplitz, 2001). Research has also considered brain gym's ability to relieve anxiety (Irving, 1996) and repetitive strain injury in office work (Spalding, 1991).

### *Brain gym research*

Although they are little known or accepted in Britain, brain gym techniques have a firm foothold in several parts of the world. In the USA, where they were pioneered, they have been researched extensively and selected by the National Learning Foundation[1] as a 'Successful Learning Innovation' each year since 1990. There is also research from Germany (Donczik, 1994; Drabben-Theimann *et al.*, 2002; Beigel *et al.*, 2002), Russia (Masgutova, 1995, 1996, 2001; Kuznetsova & Kudryavtseva, 2001), Australia (Hannaford, 1990, 1995, 1997), Bangladesh (Winkelman, 2001a) and Indonesia (Winkelmann, 2001b). All of these have supplied a positive account of brain gym's effects and some are described in more detail in this paper.

While this body of research is fairly extensive, much of it is conducted by practitioner-researchers and published by the *Brain Gym Journal*, of the Educational Kinesiology Foundation in Ventura, California. The studies in the journal appear rigorous and we have summarised their scope and results along with papers published independently (Khalsa *et al.*, 1988; Hannaford, 1990; Sifft & Khalsa, 1991; Doncsik, 1994; Kuznetsova & Kudryavtseva, 2001; Beigel *et al.*, 2002; Wolfsont 2002). However, it must be



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acknowledged that research so far has generally been excluded from the mainstream scholarly realm, and is frequently self-referencing. The sparseness of brain gym research within primary research journals does hint at the ambivalent position brain gym holds within mainstream research and practice. The idea that it is 'rather too wacky' for serious scholarly attention certainly prevails in some circles, and may have made scholarly investigation more difficult. The fact that the techniques have been put to commercial use, particularly in the business world, is likely also to undermine the method's perceived integrity. However, we contend that findings within existing research are significant enough to warrant further investigations. We are also convinced of the importance in considering the introduction of innovative learning methods in music conservatoires. While the conservatoires' venerable reputations for tradition and excellence are to be celebrated, our institutions can only retain their vibrancy and relevance by remaining open to the innovative methods that their instrumental staff may bring to bear on their teaching.

### *Applying brain gym in music*

As mentioned earlier, Dennison's principles are based upon the belief that human beings function in either a 'homolateral' or 'cross-lateral' way. In basic terms, non-integrated or homolateral function can be seen when somebody is panicking; emotional functioning is overloading, rational response mechanisms are 'switched off'. In the event of a car crash, they may scream and cry uncontrollably, rather than phone 999 or move themselves out of danger. Alternatively, people hardened by war or personal crisis can at times appear 'numbed' or in shock. This would reflect the opposite bias in functioning, and is equally homolateral: normal emotional responses are shut down and reactions can lack emotional intelligence or human empathy. In the same car crash, this person is more likely to sit quietly on the curb, worrying about the permanence of the bloodstain on their shirt.

The tendency towards homolateral functioning in 'at risk' populations has been researched by educational psychologist, Robert Eyestone. The 'at risk' category included groups of teenage mothers, detainees in juvenile detention centres, sufferers from Attention Deficit Disorder, students in learning disabilities classes, and members of drug rehabilitation and alcohol support groups. In three studies, he applied Edu-K testing to over 1300 individuals, identifying them as either homolateral or cross-lateral visual and motor processors. He found that 95% of those labelled 'at risk' were operating in a homolateral state. This compared to findings of 8–13% homolateral functioning in random groupings of populations that were not 'at risk'.

These are extreme examples, but in day-to-day life, stress and anxiety can provoke homolateral functioning, even in people who are normally cross-lateral. This idea is reflected faithfully, though with different vocabularies, by the venerable Yerkes–Dodson law (Yerkes & Dodson, 1908), and more recently by the 'catastrophe model' of the relationship between anxiety and performance (Fazey & Hardy, 1998). The latter model is more complex, but both acknowledge the essential balance between cognitive control and physiological (or emotional) involvement.

When we apply this understanding to music, its relevance is clear. As musicians, our stress levels have been found to be significantly higher than most segments of

the population (Kemp, 1981; Watson & Valentine, 1987). This anxiety is substantially heightened during performance, making cross-lateral functioning particularly difficult. As a result, our tendency in performance is to swing towards homolateral functioning. We cease to hear the sounds we are creating as objectively or self-analytically as we habitually do. This happens in the most common situation of rushing. We feel we are playing the piece at the same speed we normally do, when actually we are getting 'carried away' and not hearing ourselves. Alternatively, we may offer a highly controlled performance, which fails to resonate and communicate with our audience on a musical and emotional level. These problems can be seen at the most basic and advanced levels of music-making. We all remember our primary school concerts, when a child previously able to play sufficiently well, freezes, panics and becomes virtually non-functioning when faced with an audience. Functioning effectively under stress provides an important challenge for musicians: relevant to a child preparing for their first graded performance examinations and to the music conservatoire graduate embarking on her Wigmore Hall debut.

The demands made upon musicians, even outside the stressful performance situation, are extensive and multivalent. Several realms of functioning must be balanced at the same time when playing or practising. So-called right- and left-brain integration are demanded through the simultaneous mastery of technique and expression of musical meaning. In this way, music can be viewed as a marriage between reason and emotion. Musicians need to be able to communicate the emotional essence of the music in an uninhibited way. At the same time, we must be listening to and critiquing our own playing, remembering the pitfalls which we have practised, focusing on technical issues, and perhaps playing by memory. Few activities require such a high level of physical virtuosity, emotional intensity and intellectual analysis, all at the same time.

Our senses must also be employed to good effect. Most obviously, our hearing must be finely tuned and responsive to nuances of pitch, rhythm and timbre. Touch is essential when we measure the tension of a bow, the intensity of a vibrato, or the shifting pressure of our breath. We also employ our physical memory to build on past playing experiences (Ginsborg, 2004; Holmes, 2005). Sight is important for reading music (particularly sight reading). It is employed in leaping to the correct note on a piano, in interpreting the colour-coded strings of a harp, in watching a conductor, or in making eye contact with fellow ensemble players. Contrary to common romanticised myths of the transcendental musical genius, oblivious to the outside world, and enraptured with unthinking, unmediated passion, musicians actually calculate, build, carve and express their musical visions with emotional integrity, sensory responsiveness and rigorous self-control.

Brain gym's basic exercises seem a potentially helpful tool in meeting these demands, as they are specifically intended to heighten visual and aural responsiveness, while promoting cross-lateral functioning. Its vocabularies may seem alien, but brain gym actually speaks to many of the current questions in music education and performance research: can visualisation techniques help with musicians' practice and performance? How do you help musicians deal with performance anxiety? What perceptual balance is most advantageous for attaining musical excellence? How can we help musicians maximise the effect of their practice? How can we broaden the scope of music education to include alternative learning tools?



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## Research

### Method

Our research was conducted in the first half of August 2004 and involved five participants. Three were students at a conservatoire in London. One was a staff member, who remains an active instrumentalist. The other was a piano student from outside the conservatoire. Four were female. However, for the sake of anonymity, we shall refer to all as female in the text. One had experienced one session of brain gym prior to the research. Two had heard of the techniques second-hand. Two had no prior knowledge. Participants ranged in age from 20–32 and in standard from beginner to highly advanced. We kept our research sample small, because our objective was to track the experience of each individual in applying brain gym techniques to their specific learning objectives.

The brain gym instructor was Fiona Hibbert (also co-author), who qualified with a BMus Hons and ARCM from the Royal College of Music as a harpist, organist and teacher in 1971. While pursuing her successful career as a professional musician and teacher, Fiona looked towards alternative therapies as a way to help herself and her students maximise their potential as performers both on and off the concert platform. She has been instructing music students in brain gym for the last 10 years, and more recently has been applying the same technique to children with learning difficulties, as well as professional athletes and sportspeople. She stresses that while the brain gym techniques she uses are inspired by the research of Paul Dennison, and shared by many brain gym instructors, each instructor has a unique approach to the application of these over-arching principles. While the experiences of the participants, then, will be in line with standard practices of brain gym, they will also be touched by the personalised climate of Fiona's approach.

Prior to the first session, we asked each participant to think of a specific area of their playing or performance they wanted to improve. We explained that the research would be tracking their individual objectives, their feelings about the process, and whether they felt brain gym to be useful/useless in achieving their goal. On the first day, participants took part in one group session, lasting half an hour in which they were:

- Introduced to the principal concepts of brain gym
- Muscle-tested to see whether they were homolateral or crosslateral[2]
- Muscle-tested to find out whether their eyes and ears were 'switched on'

They were then given an individual second session with the instructor, which lasted somewhere between 40 minutes and an hour. Because of the more personal nature of this session (involving re-patterning and goal-setting), the session was not observed by the primary author. During this session they:

- Were introduced to PACE
- Discussed their specific 'issue' with the aim of establishing a goal they could work towards over the week
- Were repatterned
- Were muscle-tested to establish which exercises were required, with how many repetitions and for how many weeks



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- Were given instructions for exercises and approaches to implement throughout the following week.

Each participant was given a questionnaire to fill out at the beginning of the day and after her private session. The third and final session, conducted a week later and lasting between 30 minutes and an hour, was individual and intended to work through the experiences of the week, and suggest paths for future work, if desired. This session was observed by the primary author. Again, participants filled out a questionnaire before and after the session.

The four questionnaires, included in Appendices 2–5, were designed to place emphasis on participants' subjective experience through the process of learning and implementing brain gym, and their subjective opinion of brain gym's effectiveness, based upon those experiences. The questions concentrated on:

- Expectations. Participants were asked to rate their expectations of brain gym's effectiveness before and after the sessions on the first day. By framing the questionnaire in this way, we hoped to deal explicitly with one of the variables that may influence the effectiveness of brain gym.
- Their experience within sessions. Participants were given 13 emotions, randomly placed on a page. They were asked to circle each one they felt applied to their emotional state during their first individual session.
- The changes they experienced after carrying out the exercises. Participants were asked both to rate the level of progress they felt they had achieved through the week, and describe in prose any changes they had experienced.
- Their opinion of brain gym's effectiveness. After the final session, participants were asked to rate their personal opinion of the effectiveness of brain gym.

## Results

### *Expectations*

Unsurprisingly, since the participants were volunteers, nobody expected brain gym to have a negative effect. Two said they had no expectations while the remaining three had positive expectations. Four of the five participants emerged from their first day's brain gym with more positive expectations than they had before they went in. The fifth participant's expectations had not changed. This was the person who had prior experience of brain gym, and already had positive expectations. Both participants with no prior expectations, then, emerged more optimistic.

### *First individual session*

Each participant could choose as many adjectives as they wanted from a list of 13 to describe their feelings during their first brain gym session. The adjectives were: sceptical, optimistic, empowered, overwhelmed, comfortable, nervous, uncomfortable, encouraged, confident, confused, questioning, worried and excited.

Nobody chose sceptical, overwhelmed or confident. Of the remaining adjectives the most frequently occurring were: empowered (3); uncomfortable (3); optimistic (3);



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encouraged (3); worried (2); confused (2); and excited (2). As the frequency of contradictory emotions above would indicate, every participant expressed some form of ambivalence. For example, one reported feeling optimistic, empowered, encouraged and worried. Another described their feelings as empowered, nervous, and encouraged. Another chose optimistic, uncomfortable, and excited.

There was no account that was purely positive or purely negative, but the balance was towards positive. Splitting the adjectives into six positive (optimistic, empowered, confident, excited, comfortable, encouraged); six negative (worried, overwhelmed, sceptical, confused, uncomfortable, nervous) and one neutral (questioning,) results show 12 occurrences of positive feelings, eight occurrences of negative feelings and one occurrence of a neutral feeling. Two of the occurrences of negative feelings were adjusted to express 'only a little', so it would be fair to summarise that while all participants had some form of doubtful or negative feelings during their session, the dominant feeling was a positive one. The negative feelings were reported just as strongly among those who entered the session with positive expectations, suggesting that expectation was not a substantial influence upon the way the participants felt during sessions. Clearly all participants found the brain gym experience in some way unsettling. Despite this, they were all able to feel positively about the session and all but one (whose expectations were already positive) emerged from the session feeling more optimistic about brain gym's effectiveness.

We suggest participants' discomfort comes in part from the confrontation of something completely unknown. As explained above, brain gym involves physical movements that are unfamiliar. It also involves what can best be described as a 'perspective shift'. From the moment students are tested and found to be homolateral, or to have eyes and ears 'switched off', they are asked to consider the possibility that they have not been fulfilling their full potential. A third unsettling element can be described as a 'shift in the site of control' from mind to body. The muscle-testing encountered in the first session is based upon the principle that the body can give out information (in this case to the instructor) without the participant consciously deciding to release that information. The instructor, then, has a significant amount of 'access' (and therefore control), which may leave the participant feeling particularly exposed. The relationship between the exposure of the participant and the instructor's control over, and therefore responsibility for, the participant's experience is a complex one and will be discussed in more detail below.

### *Second session: opinions of brain gym's effectiveness and the changes experienced after carrying out the exercises*

Each participant was aiming to solve a different kind of problem with brain gym. As a result, each story is highly individualised, making anything but the broadest generalisations about the participants' experiences of changes during the week nearly meaningless. However, it is important to note that every participant reported at least one positive effect from brain gym. There were no negative effects reported. Before discussing the mean rating for brain gym's effectiveness, it will be beneficial to track the participants' experiences in a little more detail. To give a sense of the personal threads that run through the research, we have presented the first two examples in 'narrative' form. The findings for all five musicians are included in the table that follows. We have assigned participants new names.



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*Participant A – 'JULIE'*

Julie, a recorder player, came to her first session wanting to work on: 'concentration – generally stopping my mind wandering and staying in control of my playing while practising'. During her first session, Julie's goal was established to be: 'I can concentrate and focus on my practice. Notes flow from my fingers with ease and enjoyment.' Julie was repatterned and given a combination of brain gym exercises to perform daily.

The following week, Julie made the following observations about the changes she had experienced: 'I found I didn't need as much practice time as I expected because I achieved more than I thought I would in the time . . . This week for the first time in months, I actually enjoyed practising . . . I've even done an hour of scales every day, and that would be unheard of! . . . It's just made such a difference this week.' She rated brain gym's effectiveness at $6\frac{1}{2}$ out of 7 on a 1–7 scale, with 1 being the most negative effect and 7 being the most positive effect. She stated that her opinion of brain gym was 'much more positive' than before her first session.

*Participant B – 'CLARE'*

Clare, a pianist, came to the first session wanting to lessen her 'performance anxiety'. Her goal was: 'I can perform with confidence and ease. I have energy, focus and a feeling of enjoyment.' During and after her second session, Clare stated that: 'When I have finished the exercises I feel more focused and alert. I had more energy and awareness after the exercises'. Clare arranged a semi-formal performance to test the results, and felt that she was 'much calmer' than she would have been under those circumstances normally. She rated brain gym's effectiveness as 6 out of 7. She said that her opinion of brain gym was 'much more positive' than before the first session.

## Brain gym as an individual and emotional experience

As can be seen from the earlier literature review, much of the research on brain gym has been conducted on a mass scale and has involved only the physical exercises designed to promote cross-lateral functioning. As such, exercises can be issued in a very similar way to aerobics. It is unlikely that they will provoke the feelings of unsettledness and anxiety that were expressed by our participants. There is no research on the individual's private journey through repatterning and setting goals. We suggest that this is a much more emotional process, which caters to, and impacts upon, each individual in unique and potentially unsettling ways. This can be a very positive thing: since music speaks to the human experience, learning to feel and communicate it should always be a process of self-realisation and self-transformation. The discomfort that comes along with these moments of change can simply add to the rich experiences we communicate in our music making.

We embarked on our project with some understanding of the personal journeys that brain gym could encourage: our research was intentionally designed to allow significant freedom and flexibility. Despite this, several aspects did not go according to expectation. On the first day, after muscle-testing Mary, the instructor decided not to proceed with the session. She explained that while Mary was willing to go forward on a conscious level, her 'body was saying no'. She explained that she believed repatterning under those conditions



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Table 1 *With a mean rating for brain gym's effectiveness of 5.8 out of 7, and a standard deviation of 0.57, the overall impact of brain gym appears to have been positive. Nobody gave a rating below 5 out of 7*

| Name, instrument | GOAL | Second Session Comments | Brain gym's effectiveness (out of 7) |
|---|---|---|---|
| Julie recorder | 'I can concentrate and focus on my practice. Notes flow from my fingers with ease and enjoyment' | 'I found I didn't need as much practice time as I expected because I achieved more than I thought I would in the time . . . This week for the first time in months, I actually enjoyed practising . . . I've even done an hour of scales every day, and that would be unheard of! . . . It's just made such a difference this week.' | 6.5 |
| Clare piano | 'I can perform with confidence and ease. I have energy and awareness after the exercises' | I was 'much calmer' in performance than I would normally be. | 6 |
| Rebecca piano | 'When I play the piano my hands move independently. I feel the keys and read the notes simultaneously, with ease and enjoyment.' | 'I'm tending to be less stressed when playing and aiming for certain parts of the music. There is much more flow.' | 5.5 |
| Mary wind player | Not established | She carried out the instructions 'somewhat' and said her opinion of brain gym was a 'little more positive' than before. | 5 |
| Ruth opera singer | 'I can move around the stage and sense the singers around me, while singing with confidence and grace' | I have 'much improved confidence'. | 6 |

could be detrimental: the 'unsettling' or 'anxious' aspect felt by everyone during their first session could become too extreme. Re-patterning, as a deeply powerful realignment of people's thinking could, in some circumstances, disable coping mechanisms and unleash suppressed trauma. Mary was given hook-up exercises to encourage her calmness and focus. She was invited to return next week if desired, and on doing so, her muscle-tests suggested that she could now be repatterned. Unlike all the others however, a goal was not



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forthcoming. Prior to the brain gym, Mary had rated the severity of her musical problem as 5 out of 7 (with 7 the most severe). A week after her second session, having been given PACE exercises (which she performed 'somewhat'), she rated it 3 out of 7, and brain gym's effectiveness as 5 out of 7. She cited 'confused' as her only emotion during the first two sessions, and 'uncomfortable', 'optimistic' and 'excited' as her emotions during her third session.

Rebecca's experience did not go to 'plan' either. During the second session, Rebecca became upset and left in the middle. While there are some reasons for this not relevant to the research, we also suggest that it offers an indication of the raw emotional state that can be provoked during the re-patterning process. Rebecca gave her feedback about brain gym at a later date. This included: 'I feel I don't know how or why it works but I feel it does, and that is the most important thing. Thank you.'

## Follow-up

We contacted all participants a few months after the conclusion of the project to ask them whether they had continued to use the brain gym techniques they had been taught. Out of the five participants, four had continued using the techniques, although none on a daily basis. Ruth explained that it was a challenge for someone who was disorganised to have the discipline to do the exercises, but that she remained certain of their positive results. Mary said she used the techniques occasionally to calm her nerves before performances. While she could not be sure why, and questioned whether in part it could be a placebo effect, she did feel they improved her performance, helping to calm her. Clare was the most enthusiastic. She sent the following comment by email: 'I still use brain gym – particularly before concerts. It helps a lot with my circulation. When I'm nervous my hands are really cold, but doing some brain gym gets the blood flowing and makes my breathing calm also. It definitely helps – makes me more focused and calm. I've told loads of people about it and recommended it to them.' The only participant who did not continue with the exercises was Rebecca, who has temporarily suspended her piano playing while adjusting to motherhood.

## Conclusions

For this paper, we tracked the progress of five instrumentalists engaged in a one-week brain gym programme. We wanted to assess their experiences and their opinions on brain gym's effectiveness in helping them achieve their goals. Every participant felt that brain gym had a positive effect upon their playing. The mean rating of brain gym's effectiveness was 5.8 out of 7 (7 being the most positive). All participants found their brain gym sessions in some way unsettling, yet every participant finished the week with a more positive opinion of brain gym than they had prior to the experiment (barring the participant whose opinion remained 'very positive'). The literature review has established that no published research has been produced in music education prior to this article, and very little research on brain gym has been published in independent scholarly journals. There is also very little research into the personal experience of brain gym participants. We therefore encourage further investigation into the positive potential for brain gym within music learning.



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## Notes

1 The National Learning Foundation (NLF) grew from a White House task force formed to investigate innovative learning techniques within industry, which were not yet being applied in educational settings. The task force recommended the formation of the NLF, a non-profit organisation, to identify and disseminate proven learning innovations within the school context.

2 Muscle testing is very common within brain gym. It is achieved by measuring the participant's muscle flexibility and strength, when performing different tasks or visualising scenarios. Any muscle can be used, but most commonly the participant is asked to outstretch their arm horizontally. The instructor will then ask them to look at a specific shape (for cross-lateral/ homolateral/ eyes testing), listen to a sound (for ears testing), perform an exercise (during repatterning), or imagine themselves in a situation (for goal-setting). While doing so, the instructor will push downwards on the participant's outstretched hand. The participant's muscular strength or weakness in resisting to this force informs the instructor as to the participant's predispositions.

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## Appendix 1: Most Common Brain Gym Exercises

### *Cross crawl*

Lift your left leg and touch your left knee with your right hand. Follow this with the same motion on the opposite side: lifting your right knee and touching it with your left hand. Repeat this rotation slowly for some time (number of repetitions depends on participants' needs).

### *Lazy 8's*

Extend the right arm, make a fist and raise the thumb. Bring the arm around to the midline of the body and draw the 'lazy 8' with the thumb. Follow with the eyes keeping the head still – three times with each hand and three times with the hands together, thumbs crossed.

### *Elephant*

'Glue' your head to the shoulder, extend your arm and look down the arm past the fingers. Draw the 'lazy 8' with the arm keeping the hips and knees relaxed. Three times with each arm.

### *The owl*

Grasp the shoulder and squeeze the muscles firmly. Turn your head to look over the shoulder, breathe in deeply and bring the head around to look over the other shoulder while you exhale. Drop the chin to the chest during the movement.

### *The grounder*

Start with legs more than a shoulder-width apart, hands on hips. Turn the right foot to a 90° angle, inhale and as you exhale bend the right knee keeping the hips facing forwards. Inhale as you raise your body a few inches, exhale and repeat the above three times. Change sides.

### *Brain buttons*

Place one hand over the navel while the other hand stimulates points between the ribs. Gently rub the indentations between the first and second ribs directly under the collar bone

and simultaneously rub the navel. Hold these points and then change the hands and repeat the process.

*Hook-ups*

Cross one ankle over the other, the hands are then crossed, clasped and inverted. Breath in and out calmly and slowly.

## Appendix 2: Questionnaire 1
## Thank you for taking part in our research into Brain Gym!

Name:
Instrument:
Age:
Sex:

Please circle the appropriate answer for questions 1, 2 and 4, and write your comments for question 3 in the space below.

1) How much experience do you have of brain gym?

A) I had never heard of it before this project
B) I've heard about it second-hand
C) I've experienced some myself

2) Going into your first session, how would you rate your expectation of the effect brain gym will have on you?

A) I expect it to have a negative effect
B) I expect it to have no effect
C) I expect it to have a positive effect
D) I have no expectations

3) Please describe the problem you would most like to address using brain gym. This can be a technical, musical, performance or confidence issue.



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4) Please rate how severe a problem you consider this to be on a scale of 1–7, with 7 being the most severe and 1 being not at all severe.

| Not-at-all Severe | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Very Severe |
|---|---|---|---|---|---|---|---|---|

**Appendix 3: Questionnaire 2**
**Thank you for taking part in our brain gym research!**

Name:

1. How did you feel DURING your first two sessions? (circle as many as apply) Please use the space below to explain anything you would like to about your answer.

sceptical
optimistic
empowered
overwhelmed
nervous
uncomfortable
comfortable
encouraged
confused
questioning
confident
worried
excited



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2. How have your expectations of brain gym's effect changed since before your first two sessions? Please explain why in the space below.

   A) My expectations are more negative
   B) My expectations haven't changed
   C) My expectations are more positive

**Appendix 4: Questionnaire 3**
**Thank you for taking part in our brain gym research!**

Name:

1. Were the instructions for the week clear and practical?

   A) Not at all
   B) Not really
   C) Somewhat
   D) Yes, mostly
   E) Yes, very much so

2. Did you carry out the instructions?

   A) Not at all
   B) Not really
   C) Somewhat
   D) Yes, mostly
   E) Yes, very much so

3. Do you feel you have made progress with the issue you were addressing?

   A) Not at all
   B) Not really
   C) Somewhat
   D) Yes, mostly
   E) Yes, very much so

4. Please specify any changes you have experienced that you feel may be relevant:



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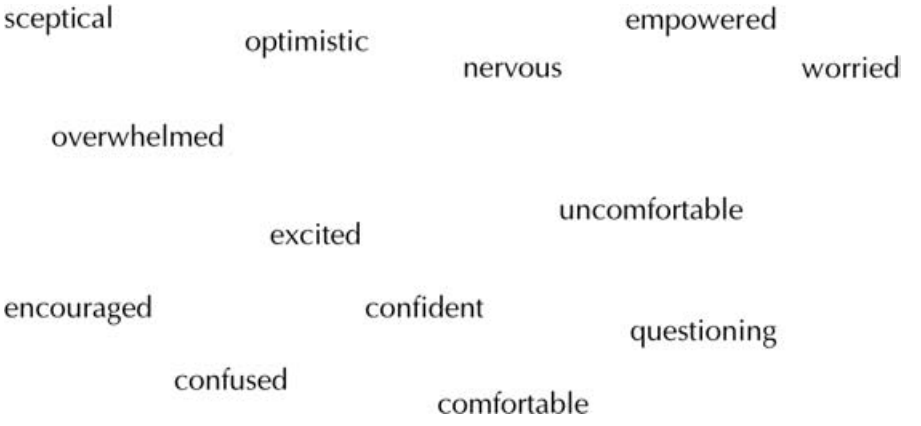
5. Please rate how severe you now consider your problem to be, on the same scale of 1–7 you used for the first questionnaire, with 7 being the most severe and 1 being not at all severe.

| Not-at-all Severe | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Very Severe |
|---|---|---|---|---|---|---|---|---|

**Appendix 5: Questionnaire 4**
**Thank you for taking part in our brain gym research!**

Name:

3. How did you feel DURING your third session? (circle as many as apply) Please use the space below to explain anything you would like to about your answer.




4. How has your opinion of brain gym changed since before your first session?

A) My opinion is much more negative
B) My opinion is a little more negative
C) My opinion hasn't changed
D) My opinion is a little more positive
E) My opinion is much more positive



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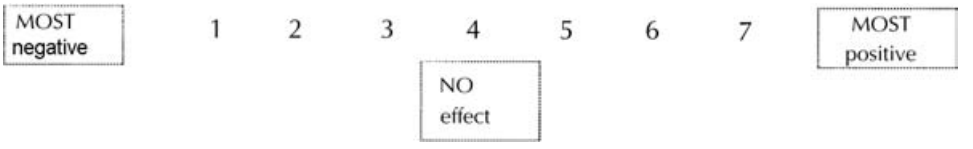
5. How would you personally rate the effectiveness of brain gym?
   Please use the 1–7 scale below, with 1 being the most negative effect and 7 being the most positive effect, 4 being indifferent.




PLEASE USE THE SPACE OVERLEAF TO GIVE REASONS FOR YOUR RATING, OR ANY OTHER COMMENTS YOU WOULD LIKE TO MAKE ABOUT BRAIN GYM OR YOUR EXPERIENCE.



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