HEALTHY VIRTUOSITY WITH THE TAUBMAN APPROACH

Therese Milanovic

This lecture addresses the many misconceptions concerning the Taubman Approach, including whom it can benefit, the retraining process, use of rotation, and association with injured pianists, followed by a problem-solving session.

This paper offers a brief introduction to the Taubman Approach to piano technique, in three parts. The first section gives a background to Dorothy Taubman's groundbreaking analytical approach to pianism, her major contributions to our understanding of healthy virtuosic pianism, and the significance of this information in the context of unacceptably high numbers of playing-related injuries in the Australian musical community, and globally. The second part outlines several basic principles of the technique that can be easily applied. Finally, incoordinate movements that Taubman identified as common sources of tension are discussed. These can cause a reduction in speed and comfort, along with increased tension, technical insecurities, pain and injury.

This paper has been extracted from the author's PhD doctoral dissertation, submitted in 2011. The research was formed through an extensive literature review, and the author's professional practice studying, practising, and now teaching the Taubman Approach as a certified Taubman Instructor.

What is the Taubman Approach?

Background

Despite the advances in biomechanical analysis in the last century, technical knowledge of playing one's instrument has been passed down largely unquestioned over the generations (Wristen, 2000, p. 55). Pedagogues often teach as they were taught, and as their teachers were taught, developing their own approach through trial and error (see Lister-Sink, 1994, pp. 29-30; Purser, 2005, pp. 295, 298; Allsop & Ackland, 2010, p. 64). These pedagogical attitudes are the result of a tendency to analyse piano technique based primarily on how playing *looks*, with little understanding of the underlying principles of anatomy and biomechanics (Mark, 2003, p. 2). As Taubman stated, "Ours is a hearsay tradition … Scientific study in our profession has been minimal, and even that little bit has all too frequently been overlooked"

(Taubman, 1984, p. 144). It was within this context that Taubman developed her innovative understanding of piano technique.

How did the Taubman Approach Develop?

The Taubman Approach was refined over five decades by Brooklyn-based pedagogue Dorothy Taubman (1918-). It is not a method, but rather:

> a comprehensive approach to piano technique that allows for an ordered and rational means of solving technical problems. Not only has this approach produced virtuoso pianists, it has also achieved an extraordinary success rate curing injured pianists, most of whom are performing again. (Golandsky, 1999a, p. 3)

Apart from developing "brilliance and ease" in playing, the Taubman Approach offers tools to understand and teach "full artistic expression", helping pianists to reach their "highest potential as performing artists" (Golandsky Institute, 20011).

Initially, Taubman's motivation was to uncover the secrets of virtuoso technique to assist gifted pianists in realising their potential. She queried the "frightening number" of pianists in pain, including amateurs, who practiced relatively little (Dyer, 1995, p. B21; Del Pico-Taylor & Tammam, 2005, p. 47). Taubman questioned how child prodigies can intuitively play virtuoso repertoire with tiny hands, and why these gifts are often lost in the "transition from intuitive to conscious playing" in adulthood, as Arrau notes (cited in Dubal, 1997, p. 3). She investigated her own "natural" playing and those around her, and examined traditional pedagogical dogmas through studying anatomy, physiology, physics, and the piano's construction (Berkowitz, 1998, pp. 8-9; Mark, 2003, p. 4). Taubman also studied Otto Ortmann's groundbreaking scientific analysis of piano technique (see 1984, p. 151).

Increasingly, Taubman "began to see a whole coordinate approach emerge" (cited in Dyer, 1995, p. B21). Taubman initially underestimated the importance of her discovery, believing "everybody knew about the technique but me" (cited in Berkowitz, 1998, p. 9). As Taubman's reputation travelled within the US, she became known by the 1960s as the "underground" teacher that pianists secretly sought for help (Dyer, 1995, p. B21). Accolades included pianists of the calibre of Leon Fleischer, who is quoted as saying, "Dorothy is

absolutely extraordinary in her intuition of when you have pain, where it is you are doing something wrong, and how you can get rid of it" (cited in Oltuski, 2009).

Principles

The principles of the Taubman Approach are not new. Taubman's innovation was in explicitly codifying the mostly invisible motions underlying a fluent, free technique, which many virtuosi intuitively adopt (Strauss, 2004). However, as the Russian pianist Feinberg stated, "sometimes intuition is not sufficient, and we have to resort to conscious analysis in order to discern the simple within the complex" (2007, p. 43). Thus, Taubman constructed a systematic pedagogical approach to developing coordinate movement through a process of "complexity that results in simplicity" (Golandsky, cited in Oltuski, 2009).

The fundamental principle of the Taubman Approach maintains that the "fingers, hand and arm always operate as a synchronised unit, with each part doing what it does best" (Golandsky, 1999a, p. 3). When this tenet is examined in detail, three further guidelines emerge:

1. Coordinate movement "permits the joints involved to act as near to their mid-range of action as possible". As Ortmann discovered, this produces "minimum fatigue" and "maximum accuracy of kinaesthetic judgement". Increasing tension results as the extreme of motion is approached (1929/1962, p. 118).
2. In coordinate movement, each part must act "at the best mechanical advantage" (Ortmann, 1929/1962, p. 114). For example, as the larger upper arm is incapable of the forearm's speed, the forearm initiates motion (Taubman, 1984, p. 151; Golandsky Institute, 2007c). If this principle is violated, "nature becomes deformed to fit the artificial arrangements" (Herbert Spencer, as cited in Gelb, 1994, p. 30).
3. Coordinate movement denotes minimum effort for the maximum result, creating precision and freedom (Ortmann, 1929/1962, p. 99).

Contributions

One of Taubman's major contributions was drawing attention to the existence of PRMDs and analysing their physical, playing-related causes in the late 1960s, long before awareness reached the mainstream in the 1980s (Schneider, 1983, p. 21). Taubman also found that

coordinate movement is therapeutic, either minimising or alleviating problems (see Mark, 2003, p. 147; Wolff, 1986, p. 30). Through developing more coordinated use, injured pianists not only overcame their problems, but also played at a higher level than prior to injury. Those who were never injured acquired new levels of facility (Mark, 2003, p. 150). Further, Taubman discovered that "…it is correct motion, not muscular development, that produces great technique" (cited in Pratt, 1989, p. 20). Taubman also stressed the physical pleasure of coordinate playing. She believed that "If playing the piano doesn't feel delicious and euphoric, you're doing something wrong" (cited in Schneider, 1983, p. 20).

An underlying premise in Taubman pedagogy is that all technical problems can be solved through effective diagnosis, rather than more practice (Schneider, 1983, p. 20). Thus, a key pedagogical tenet upholds that students' issues are due to a lack of knowledge, rather than lack of talent. As Taubman said, "We're talking about dedicated, earnest, gifted people. There should be no reason why they can't do what they want to do" (Taubman Institute, 1986).

Another of Taubman's revelations was that both tension and relaxation, its popular antidote, are incoordinate (1984, p. 150). Excessive relaxation is heavy, rendering speed difficult (see Ortmann, 1929/1962, pp. xxi, 125). Relaxation may also cause tension elsewhere, as more energy is required to initiate movement, and other parts have to work harder (Taubman Institute, 1995, see DVD 1). Taubman's understanding was that "Relaxation is the result, not the cause, of correct playing" (cited in Wilson, 1987, p. 58). Rather, Taubman advocated the lively, free midrange of movement between tension and relaxation, with which others agree (see de Alcantara, 1997, p. 137; Whiteside, 1955/1997, p. 54).

The Golandsky Institute

As Dorothy Taubman is currently in her nineties at the writing of this paper, the main exponent of the Taubman Approach today is Edna Golandsky, with whom I am fortunate to study. Golandsky's association with the Taubman Approach began when she was a Juilliard student, taking private lessons (on the side) with Taubman. Over time, Golandsky's role evolved from student to associate, then later extending Taubman's initial body of knowledge. In 1976, Taubman, administrator Enid Stettner and Golandsky formed the annual two-week Taubman Institute as co-directors. Golandsky delivered the basic technique lectures and also taught students at the Taubman Institute for more than twenty years: firstly at Amherst, then

Williams College, Williamstown (Strauss, 2004). Although a gifted performer, Golandsky chose to dedicate her life to teaching the Taubman Approach.

In 2002, differing opinions regarding the future of the Taubman Institute between the three co-directors became irreconcilable. There was no summer symposium that year. In 2003, two new organisations were founded from what was the Taubman Institute. The Dorothy Taubman Seminar was established (Taubman Seminar, 2009), as was the Golandsky Institute, formed by Edna Golandsky, John Bloomfield, Robert Durso and Mary Moran (Golandsky Institute, 2011). Foci of the Golandsky Institute include bringing "high-level training in the Taubman Approach to the musical community" and offering musicians "a foundation that allows for full artistic expression and the development of virtuosic technical ability" (Golandsky Institute, 2011). As the next section illustrates, there is a demonstrated need for this information within the Australian musical community, and beyond.

The Australian Context

It has been uncovered that 67% of Australian child musicians report playing-related problems, and 25% of Australian students commence their tertiary music programs already harbouring playing-related musculo-skeletal disorders (PRMDs) (Ackermann & Wijsman, 2011). A study of Australian tertiary keyboard students reported that 68% had experienced PRMDs in the preceding week (Bragge, Bialocerkowski, & McMeeken, 2008, p. 21).

These more recent figures have not markedly improved since Fry's landmark studies in the mid-1980s. His investigations revealed a "minimum prevalence" of 9.3%, and a more likely 13-21% of Australian tertiary students having PRMDs. Fry concedes that even these numbers are probably understated, due to students' reluctance to admit to PRMDs and conducting the study in university holidays (1987, p. 35). The recent frequency of PRMDs is reflected in one Brisbane tertiary student's claim: "I don't really know anyone who hasn't experienced RSI to some degree" (cited in Carey, 2004, p. 125). Yang, another student in the same institution, identified a "near-epidemic" of injuries among piano students (2001, p. 12).

Statistics among orchestral musicians are similarly concerning. Emerging results from a nationwide study of Australian professional orchestras suggest that 84% of respondents have experienced PRMDs that were sufficiently severe to have interfered with their playing in the past 18 months. 49.3% of respondents admitted to current pain for at least the week prior to

the survey (Ackermann, personal communication, 15 June 2011). These results are comparable to Fry's survey twenty-five years earlier of Australian national symphony orchestras, with an incident rate of PRMDs ranging from 50-80% (1986b, p. 53). It appears that unrealised talent, abandoned careers, pain, suffering and frustration are all too prevalent amongst musicians (de Alcantara, 1997, p. 1).

What Defines a PRMD?

There is wide discrepancy over statistics on playing-related musculoskeletal disorders, or PRMDs. A literature review led by Australian physiotherapist Peter Bragge revealed 26-93% of pianists identify playing-related problems (Bragge, Bialocerkowski, & McMeeken, 2004, p. 19). As Guptill notes, statistics do not take into account musicians who were not surveyed, due to being forced to abandon their music study or career due to injury (2011, p. 84). Statistics are wide partly because a global standard definition of PRMDs has not been implemented, hindering comparison across studies (Bragge, Bialocerkowski, & McMeeken, 2006a, p. 35). Bragge et al. recommend Zaza, Charles and Muszynski's definition of PRMDs as "pain, weakness, lack of control, numbness, tingling or other symptoms that interfere with your ability to play your instrument at the level you are accustomed to" (cited in 2006a, pp. 28-29).

This definition encompasses Brandfonbrener and Kjelland's three categories of PRMDs, including pain, nerve entrapments (of which carpal tunnel syndrome (CTS)[1] is most common), and painless yet devastating injuries such as dystonia (2002, pp. 85-86). It also incorporates the musician's perspective of their discomfort, and acknowledges those musicians who "won't admit there's a problem until playing is affected", and attitudes such as "If I could play, then I don't really care" (cited in Zaza, Charles, & Muszynski, 1998, pp. 2016-2017). When Zaza, Charles, & Muszynski's definition is used, prevalence of PRMDs falls to approximately 26% (Bragge, et al., 2004, p. 19).

Another issue affecting accurate reporting is that many musicians are reluctant to admit to a reduction in performance skills (Fry, 2000). Most are unaware of tension until it becomes a

[1] Carpal Tunnel Syndrome (CTS) describes the inflammation of the flexor tendons in the carpal tunnel, commonly misdiagnosed as tenosynovitis (Fry, 1986g, pp. 37-38). Symptoms may include numbness, pins and needles, and loss of coordination (Dawson, 2008, p. 5).

significant issue (Sutton, 2005, p. 39), with a tendency to focus on artistry to the exclusion of their bodies (Guptill, 2011, p. 89). Alexander observed our "capacity for becoming used to conditions of almost any kind, whether good or bad", and how these "inferior experiences" can seem "both right and natural" (1931/2001, p. 82). Thus, while the proposed PRMDs definition is useful in moving towards a standardised classification of injury, the wide statistic range of 26-93% nonetheless reveals that the majority of pianists play with varying degrees of discomfort, although many may not consider themselves as injured.

Relationship of Use to Health

In my professional experience, many musicians are unaware of the relationship of how they use their bodies, pianistic results, and their health. As use deteriorates, symptoms of PRMDs emerge, increasing muscle strain and decreasing efficiency (Kochevitsky, 1967, p. 197). Taubman believed fatigue and technical limitations are early indicators, followed by discomfort and/or pain (cited in Del Pico-Taylor & Tammam, 2005, p. 47). Other symptoms include tension, weakness, numbness, pins and needles, impaired coordination or circulation, and involuntary movements (Horvath, 2004, p. 54). Unfortunately, symptoms such as fatigue or weakness upon playing, which may develop into pain or injury, are not often recognised as warnings signs (see Warrington, 2003, p. 290). In contrast, Taubman believed that with coordinate use, "…the only thing that gets tired is the left side of the head!" (cited in Wilson, 1987, p. 59).

If the incoordinate movements continue, symptoms can develop to pain when playing a specific passage, increasing to constant pain even at rest, and in the worst cases, loss of use of the affected limb (see Fry, 1986a, pp. 47-48; 1987, p. 40). Pain is a strong warning that "we are hurting ourselves by doing something wrong" (Taubman, cited in Pratt, 1989, p. 20). As in my case, the problem can extend to adjacent areas, or even transfer to the non-affected side (see Fry, 1986c, p. 278).

Ideally, warning signs should prompt the seeking of alternative solutions, rather than practising more. As Alexander believed, "The way I use myself affects my function, and to improve my functioning *I must change my use"* (italics in original, cited in de Alcantara, 1997, p. 18). Similarly, Taubman emphasised "returning to the scene of the crime" (1986), that is, identifying and addressing the specific movement causing misuse (see Golandsky

Institute, 2007c). Thus, for many injured pianists, retraining with a skilled practitioner is the only permanent way of overcoming injury.

Fortunately, as one improves use of one's body, performance also improves, with greater power, brilliance, ease, and speed (Conable & Conable, 2000, p. 66). "Symptoms of misuse", such as technical limitations, pain and injury, disappear (Alexander, 1931/ 2001, pp. 66-67). Further, coordinate use assists learning: new concepts are absorbed faster, and responses become more precise (Gelb, 1994, p. 28). Thus, there is a continuum of use, from high-level, healthy skill, to loss of function.

Healthy Virtuosity

In this paper, healthy virtuosity is defined as "the desirable marriage of healthy pianistic practice and virtuosity", exemplified in pianists such as Arthur Rubinstein, who performed well into later life. The concept is unpacked to incorporate comfort, but also power, brilliance, ease, freedom, control and speed, as healthy pianism as a goal in itself is unsatisfactory if the musical outcomes are disappointing. Conversely, impressive musical results should not be at the expense of one's health. Healthy virtuosity is an explicit tenet of the Taubman Approach, which promises an "in-depth analysis of a technique for virtuosity and prevention of injuries among musicians" (Taubman Institute, 1995).

Some might be surprised to learn of the wonderful virtuosi who struggled with PRMDs: Schnabel, Fleischer, Graffman, Rachmaninoff, Clara and Robert Schumann, Paderewski, Scriabin, Gould, Landowska, Friedman, and Goode to name a few (Dunning, 1981; Golandsky, 1999b; Mark, 2003, p. 5; 2011; Altenmüller & Kopiez, 2010). As a result, the pedagogue Matthay warns of attempting to imitate great artists, whose technique can be a combination of healthy movements and "unusual" mannerisms (1932, pp. 14, 112). As an example, pianist Boris Berman notes that Glenn Gould played brilliantly "not because of his abnormally low sitting position but in spite of it" (2000, p. 30). Gould's diary chronicles his injury, which some believe was dystonia, that developed into a "disturbing breakdown of control" until it was "no longer possible to play even a Bach chorale securely" (Ostwald, 1997, pp. 189, 298). Clearly, dazzling playing does not guarantee healthy pianism, of which some introductory concepts are outlined next.

Basic Taubman Principles

In this section, seating, alignment, and hand position as taught in the Taubman Approach are discussed. While there are many other major tenets of the Taubman Approach, including rotation, in and out, the lateral "walking hand and arm" motion, shaping, and tone production (see Taubman Institute 1995, 2003), for the purposes of this paper the focus was narrowed to principles of healthy movement which can be easily incorporated into a pianist's playing and teaching, to begin developing a freer, more coordinate technique.

Seating

Seating is usually the first aspect to check in the basic set-up at the piano (Golandsky Institute, 2007b). To allow the fingers, hand and arm to act as a unit, the forearm needs to be basically horizontal to the floor, with the elbow approximately level with the surface of the white keys. This premise is underlined in numerous analytical approaches to piano pedagogy (see Brown, 2000, p. 560; Gát, 1974, p. 54; Golandsky Institute, 2009; Mark, 2003, pp. 53-54; Matthay, 1932, p. 106; Sándor, 1981, p. 33; Watson, 2009, p. 33).

Nevertheless, one has to be somewhat flexible in determining seating height. Minor adjustments may be necessary within a small range of what looks correct (Golandsky Institute, 2007b). The shoulders are quiet (Gát, 1974, p. 119; Sándor, 1981, p. 46); similarly, the elbow maintains "sympathetic neutrality" as Berman describes (2000, p. 42). Figure 1 illustrates a young girl balanced over the keyboard, sitting appropriately on the front half of the seat.

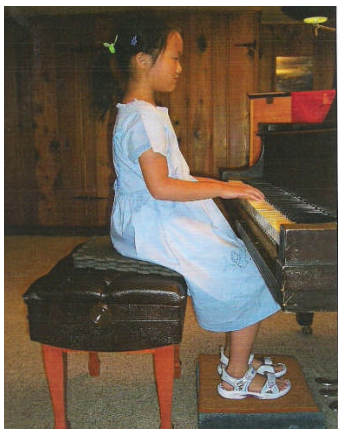

Figure 1. Sitting at the Piano (Moran, 2008, p. 7).

The photograph above depicts the three points of balanced seating: contact with the piano bench, fingertips resting lightly on the keys, and feet on the floor. As the student is young, her feet are supported with blocks (also see Gát, p. 38). Balanced seating brings the torso forward to support the hands, assisted by the feet being near the pedals. It feels "forward" compared to "back-oriented" seating (see Mark, 2003, p. 49). The position of the torso will adjust continually and incrementally as she plays: slightly back when playing in front of the body, and forward as she approaches the extremes of register. This is consistent with Berman (2000, p. 45).

As proposed by many pedagogues, bench height is dependent on the ratio of the upper arm to the torso (see Gát, 1974, p. 54; Golandsky, 1999a; Golandsky Institute, 2007b; Mark, 2003, p. 53; Matthay, 1932, pp. 47, 106). If one sits too low, the arm weight falls into the elbow, depriving the hand and fingers of support, which then grip the keys. To compensate, the wrist is often held high, breaking the alignment of the finger, hand and arm. The shoulder and elbow may also be raised, which can cause pain in the upper arms, neck, shoulder and back (Golandsky, 1999a).

In contrast, sitting too high may invoke a feeling of hovering, rather than being connected to the key. Symptoms include reduced control over tone and speed, and pain in the upper arm and/or back muscles due to holding up the upper arm (Taubman, 1984). Further, the wrist often drops, breaking the unity of the finger, hand and arm. The shoulders may also pull down in an attempt to be closer to the keys (Golandsky, 1999a). Rather than a prescription, the seating height and distance has to be tailored to the student, allowing the forearm and upper arm to adjust freely (Golandsky, 1999a). Golandsky's recommendation in this regard is supported by Gát (1974) and Sándor (1981).

In my professional practice, optimal seating is often initially perceived as high, but my experiences concur with Mark that there is almost always "immediate improvement" when one begins playing at the height of best mechanical advantage (2003, p. 54). In my experience, even young children quickly gain a sense of optimal bench height when they are

encouraged to develop awareness of their bodies. In my studio, if the adjustable bench is not high enough, students learn how many jigsaw mats[2] they need to add to feel comfortable.

Alignment

Once seating is established, the next concept frequently introduced is alignment of the finger, hand and arm. These should be in the same relationship as when the arm hangs by one's side (see Figure 2). This natural alignment facilitates optimal movement in the midrange, one of Ortmann's important findings as outlined in Chapter 1 (1929/1962). The benefits of alignment have been recognised in disciplines such as martial arts and yoga for many years (Healthy Typing, 2009).

Ortmann described alignment as the hand being straight with the arm (1929/1962, p. 32). However, the index finger should be approximately fifteen degrees away from the radius when aligned, although there may be a range of variation (Dybvig, 2007, p. 10, citing Chamagne and Tubiana). A Taubman student concurred, "One's own alignment is the most perfect" (cited in Milanovic, 2005, p. 83).

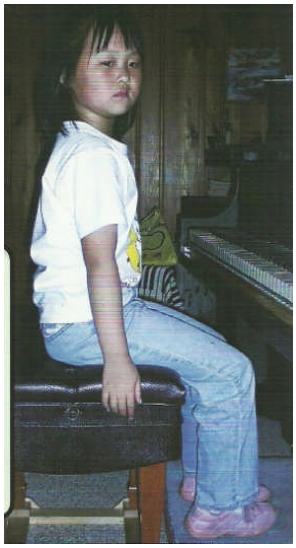

Figure 2. Alignment and Natural Hand Position (Moran, 2008, p. 20).

[2] Jigsaw mats (or foam gym mats) are a durable, inexpensive and lightweight means of adding height to a piano bench. Unlike cushions or pillows, they are firm and retain their shape.

Hand Position

Taubman advocates a natural, or neutral hand position (see Figure 2), concurred by numerous articles on analytical piano technique and performing arts health (see Ortmann, 1929/1962, p. 311; Culf, 1998, p. 43; S. Brown, 2000, p. 559; Wristen, 2000, p. 58; Fraser, 2003, p. 208; Mark, 2003, p. 107; Warrington, 2003, p. 298). However, interpretations of a "natural" hand position are rife, ranging from holding a ball (see Berman, 2000, pp. 13, 29), a grapefruit (Brown, 2000, p. 570), or as I have encountered in my professional experience, a golf ball, an orange, or even a fluffy chicken!

In my teaching experience, adults are often amazed that, unlike the five-finger position they were taught in childhood, their natural hand position does not occupy five white keys. They are even more surprised to discover that a child's small hand may only cover four keys or even fewer (see Figure 3). Once alignment and hand position is established, focus turns to playing.

Figure 3. Natural Hand Position Versus Five-finger Position (Moran, 2008, p. 21).
Copyright 2008, used with permission.

Taubman believes our fingers move best by dropping from the main bridge or MCP joint (also see Mark, 2003, p. 93), facilitated by the short flexors (Golandsky, 1999a; Taubman Institute, 1995, see DVD 1). The fingers retain their natural curves; that is, the thumb with two knuckles present, the other fingers with three (see Culf, 1998, p. 58; Golandsky, 1999a; Grindea, 1978/1991, p. 115; Sándor, 1981, p. 21; Wristen, 2000, p. 58). If any of the knuckles or fulcrums are collapsed, excess work is required elsewhere (Ortmann, 1929/1962, p. 127).

While a strong arch is recommended by some pedagogues, this distorts the hand, limits finger movement, and can cause tension and/or pain (Dybvig, 2007, p. 28; Golandsky, 1999a; Lister-Sink, 1996). The hand position is not fixed, as de Alcantara notes (1997, p. 14; also see Neuhaus, 1973, p. 101), but changes according to the context. One's hand position and alignment will vary, from the close hand position of scale passages to a more one for open large intervals.

Sources of Tension

After briefly outlining basic Taubman principles, Taubman's views on common sources of tension in piano playing are investigated, supported by references to other literature on piano technique and performing arts medicine. At best, excessive tension results in impaired performance through limiting freedom of movement, the ability to listen to the music we are producing, and our perception of how we are moving (see Fraser, 2003, p. 386). At worst, tension can lead to debilitating injury. Although not an exclusive list, common causes of tension in playing are introduced: curling, isolating the fingers, twisting, keybedding, stretching, and a low wrist.

Curling

A common source of tension and limitation is curling (see Figure 4), which activates a long flexor muscle extending from the fingertip to the elbow, pulling over the wrist, and restricting hand and finger motion (del Pico Taylor, 2004). Yet moving the finger and arm unit in towards and away from the fallboard can assist in avoiding curling.

Figure 4. Curling Fingers (Moran, 2008, p. 17).

Unfortunately, there are exercises in popular piano method books encouraging students to curl by lining up their fingertips on a pencil (see Palmer, Manus, & Lethco, 1993, p. 4). Mark believes "no one should be surprised if injury is the result" of such practices (2003, p. 107).

Finger Isolation

A finger is isolated when it moves without the support of the hand and forearm, such as in Figure 5 (also see Healthy Typing, 2009; Wristen, 2000, p. 62). Independence exercises with a still hand were considered essential to develop finger strength in the 18th and 19th centuries (Kullak, 1972, p. 123). These exercises are an exemplar of how historically pedagogy has often been based on how something looks, rather than on scientific analysis (Fraser, 2003, p. 3; Golandsky, 1999a; Mark, 2003, p. 2). As the fingers obviously move, the rationale is to develop strong, individual fingers through high finger action. However, the tiny muscles in the fingers only permit sideways movement, which is inefficient for speed; fingers are moved mostly by muscles in the forearm (Mark, 2003, p. 105). Consequently, excessive finger lifting can create a tight forearm, and a tense wrist (Warrington, 2003, p. 296). Common exercises include Hanon, Philippe, and Pischna, which in addition to isolating are often executed with additional sources of tension such as stretching, curling, keybedding, and a low wrist (Golandsky Institute, 2010).

Figure 5. Finger Isolation (Moran, 2008, p. 17).
Copyright 2008, used with permission.

Despite historical support of independence exercises, numerous resources suggest the danger in this practice (Brown, 2000, pp. 565-566; Lister-Sink, 1996; Mark, 2003, p. 7; Matthay, 1932, p. 54; Whiteside, 1955/1997, p. 49). As Sándor describes, the "victim, or student, is

supposed to press down four notes, raise the finger that plays, and repeat the down-and-up motion until he feels considerable tension and stiffness in the forearm" (1981, p. 159). Ortmann concurs that independence exercises require movement "at the very greatest mechanical disadvantage" (1929/1962, p. 219).

Part of the rationale behind independence exercises is to improve the fourth finger's ability to lift. In every individual, this action is limited by the fact that the 4th finger is bound to the 3rd and 5th fingers by extensor tendons. However, there is no need to bemoan nature's "impediment to the human will" (Kullak, 1972, p. 116). Nor is it necessary to sever tendons to achieve a more independent 4th finger, as many have done (see Kochevitsky, 1967, p. 5). As Taubman advocated, the 4th or any other finger can easily drop from the main knuckle with great speed, support and control (1984, p. 146).

In Taubman's professional experience, independence exercises are a significant cause of injuries (1984, p. 147). One particularly debilitating injury linked to independence exercises is dystonia (de Lisle, Speedy & Thompson, 2009; Taubman, cited in Lidster, 1999, p. 52). Taubman observed that pianists who escaped injury, despite practising independence exercises, either ceased practice after registering discomfort, or intuitively released the held notes (Wilson, 1987a, p. 39). Parlitz, Peschel, and Altenmüller also observe that professionals hold the non-playing notes with very light pressure, which amateurs do not (cited in Watson, 2009, p. 90). Unfortunately, independence exercises are still common, even as fun games with cute illustrations in popular children's method books (see Palmer, et al., 1993, p. 24).

Twisting

Twisting involves moving the hand away from the forearm, either towards the thumb (ulna deviation, see Figure 6), or the fifth finger (radial deviation, see Figure 7). Approaching the extremes of motion creates tension and loss of efficacy, and is warned against in numerous Taubman and performing arts medicine resources (Taubman, 1984, p. 148; Taubman Institute, 1995, (see DVD 1); Culf, 1998, p. 57; Brown, 2000, p. 562; Wristen, 2000, p. 62; Mark, 2003, pp. 83-86; Warrington, 2003, p. 298; Watson, 2009, p. 88). In fact, Mark believes that chronic *twisting* is "one of the most common causes of injury among pianists" (2003, p. 87). Common injuries that Taubman links to *twisting* include ganglions and tendinitis (Taubman Institute, 1995, see DVD 1, also Lister-Sink, 1999, p. 52). Additionally,

twisting also impacts on expressive tone production, as it prevents the forearm from falling freely (Golandsky Institute, 2007a).

Figure 6. Twisting the Hand to the Left (Moran, 2008, p. 19).
Copyright 2008, used with permission.

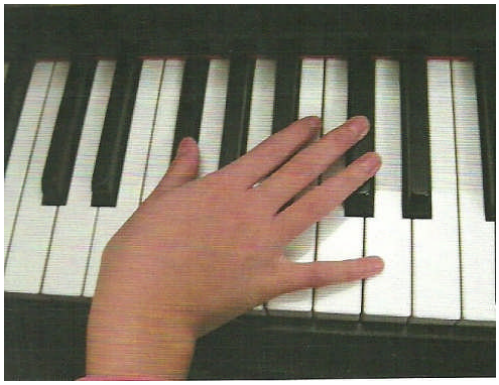

Figure 7. Twisting the Hand to the Right (Moran, 2008, p. 19).
Copyright 2008, used with permission.

Key situations in which one needs to be mindful of twisting are:

a. When the 1st or 5th fingers play black notes.
b. In white note passages, described previously in discussing in and out.
c. Octaves taken with 1-4.
d. Aligning the playing finger with the forearm.

Twisting and Octaves

To avoid twisting, Taubman and others warn against playing octaves with 1-4, let alone 1-3, (1986; also see Deahl & Wristen, 2003, p. 22; Mark, 2003, p. 86). Taubman estimates that "half the number of pianists that are injured and crippled are because of this (fingering). It's one of the most common causes of injury" (1986). Indeed, 52% of pianists in a survey by Shields and Dockrell attributed their problems to octave playing (2000, p. 4). One famous example is Gary Graffman, who distorted his hand by playing octaves with 1-3 for "great

power", which he believed contributed to incurring dystonia (1986, p. 4). Graffman never performed again.

Golandsky has clarified that if the pianist has a large hand, the danger is not the 1-4 octave, although 1-5 is preferable, but the twisting created when playing legato 1-5 to 1-4 (Lesson, May 4, 2010). In my experience, many pianists are unwilling to relinquish 1-4 octaves until they are presented with a replacement to create the impression of legato octaves, achieved through a combination of skills taught in Taubman lessons including tone production, pedal, shaping, and timing.

Keybedding

Matthay was the first to describe the phenomenon of aiming past the point of sound (escapement) to press on the keybed, which he named keybedding (see Figure 8) (1932, p. 95). The excessive force associated with keybedding can result in harsh sound and tension (Gát, 1974, p. 28; Last, 1980, p. 24; Sándor, 1981, p. 8; Harding et al., as cited in Wristen, 2000, p. 56; Mark, 2003, pp. 128-130). Further, it can cause pain on the underside of the forearm, and has been linked with tendonitis and other injuries (Lister-Sink, 1996; Healthy Typing, 2009; Whiteside, 1955/1997, p. 49).

Figure 8. Keybedding (Moran, 2008, p. 19).

Keybedding is addictive, stimulating the tactile nerves, and promoting a false impression of involvement in the music and musical intensity through physical tension (see Conable &

Conable, 2000, pp. 74-75). Despite the "carnal gratification" (Sándor, 1981, pp. 181-182) that keybedding offers, squeezing the keybed cannot alter the tone already produced. Furthermore, Ortmann's studies proved that playing a key with excessive force actually limits overall speed, as the key rebounds before resting on the keybed (1929/1962, p. 196; also Taubman, 1984, p. 147). Another disadvantage is that if the key is struck forcefully, the tone decays more quickly than if played with a more moderate descent (Gerig, 1974, p. 13).

The antithesis of keybedding is aiming to the point of sound (escapement), followed by balancing on the keybed. One Taubman student described this as "simultaneously wondrous and plain" (cited in Milanovic, 2005a, p. 79). Balance can feel like an anti-climax, even confronting, if one is used to the stimulation of keybedding (Mark, 2003, p. 130).

Stretching

Stretching the fingers apart limits movement, speed, and potentially causes injury, acknowledged across literature in performing arts medicine as well as in some piano pedagogy texts (see Fry, 1986a, p. 47; Culf, 1998, p. 63; Mark, 2003, p. 7; Healthy Typing, 2009; Whiteside, 1955/1997). Even the origin of the word stretch, *tensionem* in Latin, is clearly associated with tension (Nieman, 1978/1991, p. 42). Stretching is depicted in Figure 9.

Nevertheless, some have attacked Taubman teachers for warning against stretching, claiming that avoiding stretching limits speed (see Fraser & Haji-Djurich, 2009). Some even accuse Taubman teacher John Bloomfield of refusing to take a legato seventh from C to D with fingers 1-5, when in fact Bloomfield chose not to play a physical legato with 2-5 (Yankovitch, 2011).

Figure 9. Stretching (Moran, 2008, p. 18).

In surveying the literature, and also in my professional practice, it still appears to be common pedagogical practice to prepare in advance by stretching for the next interval, or notes; stretching exercises are also frequently advocated (for example, see Faber & Faber, 1995, p. 21). Common examples include Cooke's (1985, p. 23), which aim to develop the span between the 3rd and 4th fingers, and Kullak's extreme stretches of 12ths or 13ths, which forbid assistance of the arm (1972, p. 185). Such practices have been described by Brandfonbrener as a "potential source of severe, permanent damage to joints and soft tissues" (2003, p. 233), although this seems unknown to many instrumental teachers.

Some studies identify small hands at significant risk of injury because of the need to stretch for large chords (for example, Culf, 1998, p. 67; Bragge, Bialocerkowski, & McMeeken, 2006a, p. 35). Yet, this does not account for some small-handed pianists, including child virtuosi, playing huge repertoire beautifully, and other small-handed pianists becoming injured. Neuhaus observed that small-handed pianists can develop a highly evolved understanding of movement and the body (1973, p. 3). Conversely, large-handed pianists can still stretch and subsequently incur PRMDs, as many intervals in the repertoire are larger than any hand (Golandsky Institute, 2007d).

Taubman claimed, "The size of the hand has nothing to do with power, large sound, or the ability to get across the keys for wide skips. It is all a matter of know-how" (cited in Schneider, 1983, p. 20). In her teaching, Taubman has "never come across a piece where the stretches could not be eliminated" (Taubman Institute, 1995, see DVD 1). She goes so far as to claim, "There are just three lines in the Barber sonata that pose a problem, and any 8-year-old can play them if he choreographs them for the body instead of against it" (cited in Dyer, 1995, p. B21).

Low Wrist

Finally, Taubman recognised that playing with wrists lower than the main knuckles, as in (Figure 10) causes arm weight to fall into the wrist, resulting in tension and pain (cited in Allen, et al., 1994, p. 14). In fact, Golandsky attributes Taubman as the first to understand the relationship between playing with a low wrist and Carpal Tunnel Syndrome (CTS) (Personal correspondence, Jan 27, 2010).

Figure 10. Breaking Stable Joints, such as the Wrist (Moran, 2008, p. 18).

Various studies attest that the wrist leaving the optimal midrange is a significant cause of injury, including CTS (Brandfonbrener, 2003, p. 236; Chaffin & Lemieux, 2004; Horvath, 2004, p. 96; Healthy Typing, 2009; Norris & Torch (Ed.), 1993; Watson, 2009). Carpal tunnel pressure rises with as little as 15 degrees of variation from neutral position (Rempel, cited in Wristen, 2000, p. 56). Surgery is commonly endorsed for CTS, but provides only initial relief in just 50% of cases, with subsequent retraining still required (Trouli & Reissis, 2009).

The most effective permanent solution is retraining, although the dilemma can be finding a teacher or practitioner skilled in rehabilitation (see Mark, 2003). Taubman also warns of octaves played from the wrist, underlined in various performing arts and analytical piano pedagogy literature (see Dawson, 2008; Norris & Torch, 1993; Sándor, 1981; Whiteside, 1955/1997). This isolated movement stresses the tendons in the carpal tunnel, creating "static muscular activity, co-contraction, and excessive force", and again may lead to CTS (Lidster, 1999; Mark, 2003, p. 143). As discussed previously, although the wrist height may vary, the alignment of the fingers, hand and arm is never broken by a low wrist in the Taubman Approach.

Conclusion

The fundamental principles of the Taubman Approach presented in this paper are a preliminary basis for coordinate movement. They are consolidated by numerous references to literature across disciplines of performing arts medicine, piano technique, and whole-body

disciplines such as the Alexander Technique. Yet, in my professional experience, there appears to be little awareness amongst the musical community of potentially harmful movements at the keyboard, illustrated by the ongoing and concerning numbers of PRMDs. Diligent students industriously practise what their well-intentioned teachers advise, despite the frustration of technical limitations, discomfort, and pain. The issues of PRMDs and unchallenged pedagogical instruction are still prevalent.

The outline of this complex technique provides an introductory foundation of understanding for further exploration. To gain a deeper insight into the Taubman Approach and to personally experience how the Taubman Approach can benefit your own playing and teaching, further study with a certified Taubman teacher is recommended.

Reference List

ACKERMANN, B. & WIJSMAN, S. 2011. *Musicians' Health National Curriculum Initiative:*

Healthy practice and performance for young Australian musicians. [Online]. n.p.: Australian Learning and Teaching Council Priority Projects Scheme. Available: www.health.music.uwa.edu.au [Accessed 17 June 2011].

ALEXANDER, F. M. 1931/ 2001. *The use of the self: Its conscious direction in relation to diagnosis functioning and the control of reaction,* London, Orion.

ALLEN, J., BRANDFONBRENER, A., LEHRER, P., MAGRATH, J., MCCRAY, M., SIMON, A., SHANNON, R., TAUBMAN, D. & TRUE, N. 1994. Harmful practices that cause injuries. *Clavier,* 33**,** 13-22.

ALLSOP, L. & ACKLAND, T. 2010. The prevalence of playing-related musculoskeletal disorders in relation to piano players' playing techniques and practising strategies. *Music Performance Research, Special Issue Music and Health,* 3**,** 61-78.

ALTENMÜLLER, E. & KOPIEZ, R. 2010. Suffering for her art: The chronic pain syndrome of pianist Clara Wieck-Schumann. *Frontiers of Neurology and Neuroscience,* 27**,** 101-118.

BERKOWITZ, M. 1998. Taubman's way, naturally: An interview with Dorothy Taubman. *Clavier,* 37**,** 8-12.

BERMAN, B. 2000. *Notes from the pianist's bench,* New Haven, CT, Yale University Press.

BRAGGE, P., BIALOCERKOWSKI, A. & MCMEEKEN, J. 2008. Musculoskeletal injuries in elite pianists: Prevalence and associated risk factors. *Australian Journal of Music Education***,** 18-31.

BRAGGE, P., BIALOCERKOWSKI, A. E. & MCMEEKEN, J. 2004. Elite pianists' perceptions of injury risk: Preliminary results. *Australasian Epidemiologist,* 11**,** 18-22.

BRAGGE, P., BIALOCERKOWSKI, A. E. & MCMEEKEN, J. 2006a. A systematic review of prevalence and risk factors associated with playing-related musculoskeletal disorders in pianists. *Occupational Medicine,* 56**,** 28-38.

BRANDFONBRENER, A. & KJELLAND, J. M. 2002. Music Medicine. *In:* PARNCUTT, R. & MCPHERSON, G. E. (eds.) *The science and psychology of music performance.* New York: Oxford University Press.

BRANDFONBRENER, A. G. 2003. Musculoskeletal problems of instrumental musicians. *Hand Clinics,* 19**,** 231-239.

BROWN, S. 2000. Promoting a healthy keyboard technique. *In:* TUBIANA, R. & AMADIO, P. C. (eds.) *Medical problems of instrumentalist musicians.* London: Martin Dunitz.

CAREY, G. 2004. *New understanding of 'relevant' keyboard pedagogy in tertiary institutions.* Ed D. doctoral dissertation, Queensland University of Technology.

CHAFFIN, R. & LEMIEUX, A. 2004. General perspectives on achieving musical excellence. *In:* WILLIAMON, A. (ed.) *Musical excellence: Strategies and techniques to enhance performance.* New York: Oxford University Press.

CONABLE, B. & CONABLE, B. 2000. *What every musician needs to know about the body: The practical application of body mapping to making music.,* Portland, OR, Andover Press.

COOKE, M. 1985. Tone, touch and technique: For the young pianist. Rev ed. Melbourne: Allans Music Australia.

CULF, N. 1998. *Musician's injuries: A guide to their understanding and prevention,* Tunbridge Wells, UK, Parapress.

DE ALCANTARA, P. 1997. *Indirect procedures: A musician's guide to the Alexander technique,* Oxford, Clarendon Press.

DE LISLE, R., SPEEDY, D. & THOMPSON, J. 2009. The effects of pianistic retraining via video conferencing as a means of assisting recovery from focal dystonia: A case study. *In:* WILLIAMON, A., PRETTY, S. & BUCK, R. (eds.) *Proccedings of the International Symposium on Performance Science.* Utrecht, The Netherlands: European Association of Conservatoires (AEC).

DEAHL, L. & WRISTEN, B. 2003. Strategies for small-handed pianists. *American Music Teacher,* 52**,** 21-25.

DEL PICO-TAYLOR, M. 2004. My "super teacher": Dorothy Taubman. *American Music Teacher,* 53**,** 104.

DEL PICO-TAYLOR, M. & TAMMAM, S. 2005. The wisdom of Dorothy Taubman. *Clavier,* 44**,** 19, 46-47.

DUBAL, D. 1997. *Reflections from the keyboard: The world of the concert pianist,* New York, Schirmer.

Author. 1981. When a pianist's fingers fail to obey. *New York Times,* June 14, p.1.

DYBVIG, T. 2007. Moving naturally. *Clavier,* 46**,** 8-12, 28-31.

Author. 1995. Dorothy Taubman teaches piano without pain. *Boston Globe,* August 13.

FABER, N. & FABER, R. 1995. Technique & artistry book: Primer level *Piano Adventures.* Fort Lauderdale, FL: FJH Music.

FEINBERG, S. 2007. The road to artistry. *In:* BARNES, C. J. (ed.) *The Russian Piano School: Russian pianists and Moscow Conservatoire Professors on the art of the piano.* London: Kahn & Averill.

FRASER, A. 2003. *The craft of piano playing: A new approach to piano technique,* Lanham, MD, Scarecrow Press.

FRASER, A. & HAJI-DJURICH, J. 2009. *Dorothy Taubman, Edna Golandsky, and the Taubman Approach.* [Online]. Maple Grove Music Productions. Available: http://www.pianotechnique.net/dorothy-taubman-edna-golandsky-and-the-taubman-approach [Accessed November 9 2009].

FRY, H. J. 1986a. How to treat overuse injury: Medicine for your practice. *Music Educators Journal,* 72**,** 46-49.

FRY, H. J. 1986b. Incidence of overuse syndrome in the symphony orchestra. *Medical Problems of Performing Artists,* 1**,** 51-55.

FRY, H. J. 1986c. Overuse syndrome in musicians: Prevention and management. *Lancet,* 2**,** 728-31.

FRY, H. J. 1987. Prevalence of overuse (injury) syndrome in Australian music schools. *British Journal of Industrial Medicine,* 44**,** 35-40.

FRY, H. J. 2000. Overuse syndrome. *In:* TUBIANA, R. & AMADIO, P. C. (eds.) *Medical Problems of the Instrumentalist Musician.* London: Martin Dunitz.

GÁT, J. 1974. *The technique of piano playing,* London, Collet's.

GELB, M. 1994. *Body learning: An introduction to the Alexander technique,* London, Aurum Press.

GERIG, R. R. 1974. *Famous pianists and their technique,* New York, Luce.

GOLANDSKY, E. 1999a. Introductory lecture: Concepts, principles and philosophy of the Taubman Approach. *MTNA conference, Los Angeles.* Los Angeles, CA.

GOLANDSKY, E. 1999b. They took pains. *Piano and Keyboard* 4**,** 72.

GOLANDSKY INSTITUTE 2007a. Advanced seminar on Schumann's Carnaval. New York: Golandsky Institute.

GOLANDSKY INSTITUTE 2007b. Chopin Ballade no 1. *The Golandsky Institute Discovery Series.* New York: The Golandsky Institute.

GOLANDSKY INSTITUTE 2007c. Chopin Ballade no 3. *The Golandsky Institute Discovery Series.* New York: Golandsky Institute.

GOLANDSKY INSTITUTE 2007d. Debussy Danse Tarentelle Styrienne: Problem solving in action. New York: Golandsky Institute.
GOLANDSKY INSTITUTE 2009. Teaching rotation: An in depth analysis of the key points and issues related to the teaching of rotation
. New York: Golandsky Institute.
GOLANDSKY INSTITUTE 2010. The art of diagnosing: What do we do when practice does not make perfect? Princeton, NJ: Golandsky Institute.
GOLANDSKY INSTITUTE. 20011. *Golandsky Institute website.* [Online]. Available: http://www.golandskyinstitute.org/ [Accessed October 28 2011].
GRAFFMAN, G. 1986. Doctor, can you lend an ear? *Medical Problems of Performing Artists,* 1**,** 3-6.
GRINDEA, C. 1978/1991. Tension in piano playing: Its importance and dangers. *In:* GRINDEA, C. (ed.) *Tensions in the performance of music.* London: Kahn & Averill.
GUPTILL, C. 2011. The lived experience of professional musicians with playing-related injuries: A phenomenological inquiry. *Medical Problems of Performing Artists,* 26**,** 84-95.
HASEMAN, B. & MAFE, D. 2009. Acquiring know-how: Research training for practice-led researchers. *In:* SMITH, H. & DEAN, R. T. (eds.) *Practice-led research, research-led practice in the creative arts.* Edinburgh: Edinburgh University Press.
HEALTHY TYPING 2009. Healthy typing using the MoveRight system: How to keyboard quickly and efficiently without pain, injury or discomfort. New York: MoveRight Consulting.
HORVATH, J. 2004. *Playing (less) hurt: An injury prevention guide for musicians,* Minneapolis, MN, J. Horvath.
KOCHEVITSKY, G. 1967. *The art of piano playing: A scientific approach,* Princeton, NJ, Summy-Birchard Co.
KULLAK, A. 1972. *The aesthetics of pianoforte-playing.,* New York, Da Capo.
LAST, J. 1980. *Freedom in piano technique: With an appendix for teaching-diploma candidates,* London, Oxford University Press.
LIDSTER, D. 1999. Healing injuries and facilitating technical abilities: Applying the research of Dorothy Taubman to the marimba. *Percussive Notes,* 37**,** 52-56.
LISTER-SINK, B. 1994. Rethinking technique. *Clavier,* 33**,** 29-33.
LISTER-SINK, B. 1996. Freeing the caged bird: Developing well-coordinated, injury-preventive piano technique. Winston-Salem, N.C.: Wingsound.
LISTER-SINK, B. 1999. Piano technique, plain and simple. *Piano & Keyboard,* 47**,** 18-23.
MARK, T. 2003. *What every pianist needs to know about the body: A manual for players of keyboard instruments: piano, organ, digital keyboard, harpsichord, clavichord,* Chicago, GIA Publications.
MATTHAY, T. 1932. *The visible and invisible in pianoforte technique: Being a digest of the author's technical teachings up to date,* London, Oxford University Press.
MILANOVIC, T. 2005. *To play or not to play: An exploration of students' experiences of the Taubman approach to piano technique.* masters dissertation, Queensland Conservatorium Griffith University.
MORAN, M. 2008. Basic alignment and rotation. Book 1: Teacher edition. *In:* GOLANDSKY, E. (ed.) *Beginning piano lessons in the Taubman Approach.* New York: Golandsky Institute.
NEUHAUS, H. 1973. *The art of piano playing,* London, Barrie & Jenkins.
NIEMAN, A. 1978 / 1991. The composer and creative tension. *In:* GRINDEA, C. (ed.) *Tensions in the performance of music.* London: Kahn & Averill.

NORRIS, R. & TORCH (ED.), D. 1993. *The musician's survival manual: A guide to preventing and treating injuries in instrumentalists,* Saint Louis, MO, MMB Music.
OLTUSKI, I. 2009. *Crafting the well-tempered pianist: Introducing the Taubman Approach.* [Online]. Available: http://blogcritics.org/music/article/crafting-the-well-tempered-pianist-introducing/ [Accessed January 9 2010].
ORTMANN, O. 1929/1962. *The physiological mechanics of piano technique: An experimental study of the nature of muscular action as used in piano playing and of the effects thereof upon the piano key and the piano tone,* New York, Dutton.
OSTWALD, P. F. 1997. *Glenn Gould: The ecstasy and tragedy of genius,* New York, Norton.
PALMER, W. A., MANUS, M. & LECTHCO, A. V. 1993. Prep course for the young beginner: Technic book level A. *Alfred's Basic Piano Library.* Van Nuys, CA: Alfred.
PRATT, R. R. 1989. An interview with Dorothy Taubman. *Journal of the International Association of Music for the Handicapped,* 4**,** 15-30.
PURSER, D. 2005. Performers as teachers: Exploring the teaching approaches of instrumental teachers in conservatoires. *British Journal of Music Education,* 22**,** 287-298.
SÁNDOR, G. 1981. *On piano playing: Motion, sound, and expression,* New York, Schirmer Books.
SCHNEIDER, A. 1983. Dorothy Taubman: There is an answer. *Clavier,* 22**,** 19-21.
SHIELDS, N. & DOCKRELL, S. 2000. The prevalence of injuries among pianists in music schools in Ireland. *Medical Problems of Performing Artists,* 15**,** 155-160.
STRAUSS, E. 2004. How craft becomes art - piano festival and institute. *princetoninfo.com.*
SUTTON, J. 2005. Distance learning for focal dystonia. *Journal for the International Study of Tension in Performance,* 13**,** 37-40.
TAUBMAN, D. 1984. A teacher's perspective on musicians' injuries. *In:* ROEHMANN, F. L. & WILSON, F. R. (eds.) *The Biology of Music Making Conference, Denver, CO.* St Louis: MMB Music.
TAUBMAN INSTITUTE 1986. Choreography of the hands: The work of Dorothy Taubman. Amherst, MA: Sawmill River Productions.
TAUBMAN INSTITUTE 1995. The Taubman Techniques: An in-depth analysis of a technique for virtuosity and prevention of injuries among musicians. Vols. 1-5. Medusa, NY: Taubman Institute.
TAUBMAN INSTITUTE 2003. Virtuosity in a box: The Taubman techniques, Vols. 6-10. Medusa, NY: Taubman Institute.
TAUBMAN SEMINAR. 2009. *Taubman seminar homepage.* [Online]. Available: http://www.taubmanseminar.com. [Accessed August 13 2009].
TROULI, H. & REISSIS, N. 2009. Pianists with carpal tunnel syndrome: Conservative versus surgical treatment. *In:* WILLIAMON, A., PRETTY, S. & BUCK, R. (eds.) *Suffering for one's art: Performance related musculoskeletal disorders in tertiary performing arts students in music and dance.* Utrecht, The Netherlands: European Association of Conservatoires (AEC).
WARRINGTON, J. 2003. Hand therapy for the musician: Instrument-focused rehabilitation. *Hand Clinics,* 19**,** 287-301.
WATSON, A. H. 2009. *The biology of musical performance and performance-related injury.,* Lanhan, MA, Scarecrow Press.
WHITESIDE, A. 1955 / 1997. *On piano playing,* Portland, OR, Amadeus Press.
WILSON, F. 1987. Dorothy Taubman and Fernando Laires. *Piano Quarterly,* 139**,** 56-59.
WOLFF, K. 1986. Dorothy Taubman: The pianist's medicine woman. *Piano Quarterly,* 34**,** 25-32.

WRISTEN, B. 2000. Avoiding piano-related injury: A proposed theoretical procedure for biomechanical analysis of piano technique. *Medical Problems of Performing Artists,* 14**,** 55-64.

YANG, K. C.-H. 2001. *Pianists' physical injuries: Strategies of treatment and prevention.* masters dissertation, Queensland Conservatorium Griffith University.

YANKOVITCH, M. 2011. *Debunking the myths of the Taubman Approach.* [Online]. Available: http://reviews.pianotechnique.org/dorothy-taubman-piano-technique.php [Accessed August 15 2011].

ZAZA, C., CHARLES, C. & MUSZYNSKI, A. 1998. The meaning of playing-related musculoskeletal disorders to classical musicians. *Social Science & Medicine,* 47**,** 2013-2023.

About the Author:

Therese Milanovic completed her training with the Golandsky Institute in New York, 2009, to become the first certified Taubman Instructor in Australia. She teaches at Queensland Conservatorium Griffith University, Young Conservatorium, St Peters Lutheran College and privately. Therese conducts masterclasses and teacher-training sessions.

Previous performance highlights with Collusion ensemble include ABC broadcasts, Musica Viva Country Wide and In Schools touring. Of late she has performed frequently with Topology, including collaborations with the Brodsky String Quartet, Grant Collins, national touring, Brisbane Festival, and festival concerts in Indonesia. Other performance projects focus on her ensemble Ikon Music, with soprano Emma-Baker Spink. Therese is currently completing her doctoral studies, on Learning and Teaching the Taubman Approach, at QCGU, and continues her training with Edna Golandsky via Skype.