

## CHAPTER 28

---

# PRACTICING

---

HARALD JØRGENSEN AND SUSAN HALLAM

## INTRODUCTION

---

PRACTICE is central to the development of all aspects of musical expertise. The musician not only needs to consider the development of technical skills but must also develop musical interpretation, may have to play or sing from memory, rehearse and perform in cooperation with other musicians, improvise and contend with stage fright. These elements require aural, technical, cognitive, communication, performance and learning skills. These complex skills cannot be acquired, improved and maintained by simple repetitious practice.

Effective practice has been defined by Hallam (1997c) as “that which achieves the desired end-product, in as short a time as possible, without interfering negatively with longer-term goals” (p. 181). This definition assumes that effective practice might take many forms and implies that the musician requires considerable metacognitive skills to facilitate the completion of task requirements or, in the case of the novice, appropriate support. Practicing may be addressed from a psychological viewpoint as an act of learning, where theories of psychomotor learning and motor programs are relevant and it may also be viewed as “self-teaching” (Jørgensen, 2004). The multifaceted nature of practice has been encapsulated in models which provide a framework for understanding its relationships with creativity, performance and instruction (see Chaffin and Lemieux, 2004; Hallam, 1997c; Miksza, 2011a).

Empirical research on practice has a history that dates back to the beginning of the twentieth century, although the majority of research has been undertaken in the last 30 years. Its focus has almost exclusively been in relation to the training of classical musicians and the individual practitioner.

## THE QUANTITY OF PRACTICE: TIME SPENT PRACTICING

---

Practitioners and researchers agree that there are two important variables relating to practice that determine progress and attainment: the *quality* and *quantity* of practice in interaction

with prior knowledge and skills. In the following section we will concentrate on the quantity of practice returning to quality issues in the section on practice strategies.

## Starting Age

Research on time spent practicing has addressed three different aspects: the initial starting age, the accumulated amount of practice from initial starting age to the present, and the amount of practice at one particular time or during a limited period of time. A major challenge to this type of research is the difficulty in obtaining reliable and valid measures of the amount of practice undertaken (Madsen, 2005).

Despite these difficulties some broad trends have emerged. First, most of those who reach a high level of expertise on an instrument have made an early start, on either their major instrument or another instrument. This phenomenon has been demonstrated for a broad range of instruments (Jørgensen, 2001; Sosniak, 1985). Pianists and violinists tend to be particularly early “starters,” aged from 3 to 8 years old, while brass and woodwind performers start a little later with their major instrument (Jørgensen, 2001). Starting to play at an early age, when physically the body is more flexible, may be important. Certainly, Wagner (1988) has demonstrated that pianists’ hands can change physically if they begin playing when very young.

Another trend is that time spent in practice usually increases as age and expertise develops with most young people practicing almost every day (Hallam et al., 2012; Sloboda, Davidson, Howe and Moore, 1996). There is evidence that the increase in practice time is greater for those who go on to become professional rather than amateur musicians. However, after entrance to the profession, duration of individual practice time is observed to decrease as pressures of rehearsals and public performance increase (Krampe, 1994).

## Accumulated Practice Time

Since many students start early and gradually increase the amount of time that they practice, it follows that many of them have accumulated a large amount of practice time by their late teens, and that expert performers have invested several thousand hours of practice over a period of 15–16 years before reaching a high performance level in their twenties (Sosniak, 1985). Accumulated practice time has also been found to relate to the performance of rehearsed music in novice players aged 7–9 years, although use of specific strategies seems to be more important when children engage in sight-reading, playing from memory, playing by ear or improvising (McPherson, 2005).

## Practice at a Particular Time

Most research on the amount of practice has not differentiated between instruments or has focused on only one instrument. An exception to this is a study by Jørgensen (1997). He found that the keyboard students in a conservatoire invested most time in practice, 25–30 hours a week, followed by strings, woodwind, brass and voice. There were also differences between specific instruments within these groups. Violinists, for instance, tended to practice for more time than double bass players, and trumpet players practiced more than tuba

players. Lammers and Kruger (2006) in a study of American and Japanese students reported similar results. Physiological restrictions related to the instrument's physical and technical demands (Jørgensen, 1997) and the nature and extent of the repertoire are probably important factors determining amount of practice.

Research on the relationship between amount of practice at a particular time and general achievement level at this time has considered a range of different instruments and age groups with varying outcomes. The different age groups and levels of expertise, lengths of time period studied as well as the variety of instruments included in the studies may partly explain why the results are different from study to study. All of the studies have found a positive correlation between amount of practice at a particular point in time and general achievement although Ericsson, Krampe and Tesch-Römer (1993) found no difference in length of weekly practice between the "best" and the "good" violin students. The difference between the "best" and "good" violinists was in amount of accumulated practice.

Ericsson et al. (1993) suggested a monotonic relationship between "deliberate practice" and an individual's acquired performance. Similarly, Sloboda et al. (1996, p. 308) stated that "We believe that we have established, beyond any reasonable doubt, that amount of relevant practice is a key variable in determination of music performance expertise." However, there are substantial individual differences in the relationship between the quantity of practice and attainment (Ericsson et al., 1993; Jørgensen, 2002; Sloboda et al., 1996) suggesting that attainment is not exclusively a question of quantity of practice, but also of quality, which is a result of individual engagement with and knowledge of practice strategies.

Several studies have related amount of current practice to more specific areas of achievement, with conflicting results. For instance, Williamon and Valentine (2000) looked at practice and performance among piano students from under 11 to more than 24 years in four levels of skill on one composition, and found that pianists at higher levels of expertise spent more time in each practice session, but that quantity of practice was not significantly related to quality of performance as rated by experienced teachers. In contrast, Wagner (1975), with college students, assessed performance on "a selection which best represented their level of musicianship at that time," and found a positive relationship between amount of practice and "level of musicianship."

## Practice Time and a Single Composition

A specific issue is the time spent practicing a single composition. To date, research has focused on the memorization of piano music by professional musicians or students with high levels of expertise (Chaffin and Imreh, 1997), or pianists with a broad range of skill levels (Williamon and Valentine, 2000). The findings illustrate how time-consuming the memorization process can be, depending on the complexity of the piece. Lehmann and Ericsson (1998) studied a university student preparing for her degree recital, memorizing eight unfamiliar pieces by Haydn, Prokofiev and Debussy. She spent a total of 531 hours practicing to prepare for a concert with a total playing time of 37 minutes.

## Practice Time and Assessment

Assessment, whether formal in examinations, or informal in a lesson, has an impact on practice time. Hallam (2001) reported that 95% of the novices and advanced students in her

study increased their practice time in the weeks preceding examinations. Practice activity increases as the number of lessons received increases (Sloboda et al., 1996), and there is an increase in practice time the day after a weekly lesson (Lehmann and Ericsson, 1998). Not surprisingly the quantity of practice decreases during holidays, even for students in a specialized music school (Sloboda et al., 1996).

## Motivation to Practice and Drop Out

The amount of practice undertaken is one predictor of whether students will discontinue having instrumental lessons (Costa-Giomi, Flowers and Sasaki, 2005; Hallam, 1998; McPherson and Davidson, 2002; Sloboda et al., 1996), although other factors such as socioeconomic status, musical self-concept, academic and musical ability and motivation are also predictors (Hallam, 1998; Hurley, 1995). While most beginners report enjoying practicing, this declines as expertise develops (Hallam et al., 2012).

## THE QUALITY OF PRACTICE

---

Quality is an elusive matter. The concept of “deliberate practice” defined as goal-oriented, structured and effortful, was introduced by Ericsson et al. (1993) to address the issue of quality. They also outlined constraints which might determine the quantity and quality of practice: motivation, resources, attention. Much of the research exploring issues relating to the quality of practice has focused on the strategies that musicians adopt when practicing. Jørgensen (2004) has proposed four strategy types, that is, planning strategies, strategies for the conduct (execution) of practice, strategies to evaluate practice and meta-strategies. A similar conception is that of practice as self-regulated learning (McPherson and Zimmerman, 2002), where the practitioner is recommended to engage in forethought, performance/volitional control and self-reflection.

## Planning Strategies

### *The Organization of Practice*

Instrumentalists and singers are expected to *practice regularly*. Several management strategies have been observed in relation to this. Some students in higher music education practice at the same time every day (Duke et al., 1997), while others integrate practice into a daily or weekly plan (Jørgensen, 1997). Most students, however, try to fit in practice sessions between other activities without any preconceived plan. The morning may be the best time for high levels of concentration (Lehmann and Ericsson, 1998). Ericsson et al. (1993) found that conservatoire students at the highest levels of expertise practiced in the morning, took naps in the afternoon, and then put in more practice in the evening. For novice students the regularity of practice may be more related to one specific day a week (Hallam, 2001), or a

specific period of the day, that is, “before bedtime” (Pitts and Davidson, 2000). Sloboda et al. (1996) showed that the students in a selective specialist music school distributed their repertory practice evenly to morning, afternoon and evening sessions. Studies have shown some overnight gain in performance speed and accuracy, but that the overnight consolidation of new skill memories is susceptible to interference from similar tasks (Allen, 2012; Simmons and Duke, 2006).

Practice may be most effective when it is organized in a sequential and logical manner (Barry, 1992). At the start of practice sessions many musicians use warm-up exercises, although there is considerable individual variation in the extent to which these are perceived to be necessary (Hallam, 1995a). Technical exercises often follow with repertory work left until last (Duke, Flowers and Wolfe, 1997). For conservatoire students, there are pronounced differences between instruments in the relative amount of warming up exercises, technical work and repertory practice (Jørgensen, 1998).

### *Setting Goals and Adopting Effective Practice Strategies*

Ericsson et al. (1993) concluded that a well-defined task was one of four requirements for effective learning through practice, although the evidence suggests that novices and more accomplished students often fail to formulate goals for practice activities and mastering specific tasks (Jørgensen, 1998). Finding that the adoption of a range of effective practice strategies was not a statistically significant predictor of level of expertise among students ranging in level from beginners to the level required for entry to higher education conservatoires, but that the lack of ineffective practicing strategies was a relatively strong predictor, Hallam et al. (2012) concluded that we needed to know more about how the organization of practice contributes to the quality of expertise.

Musicians seem to approach practicing particular repertoire in different ways. Miklaszewski (1995) observed that professional musicians spent a much shorter time learning a late romantic miniature than three contemporary variations. Lehmann and Ericsson (1995) suggested that the increasing technical demands of twentieth-century music had influenced the nature of practice. Research on sight-reading and improvisation suggests that time spent engaged in these activities is the key element in their development to expert levels (see Lehmann and Kopiez, Chapter 34, this volume).

### *Developing Interpretation*

A specific task in formulating goals is the “performance plan,” and the way interpretation is planned and developed through practice sessions. Some musicians plan interpretation at the outset, based on a study of the score or from ideas gleaned from listening to a wide range of music and different interpretations of the same piece (Hallam, 1995b; Lisboa, Williamon, Zicari and Eiholzer, 2005), primarily letting the expressive ideas guide the technical work (Chaffin, Imreh, Lemiux and Chen, 2003). A second approach is to develop a performance plan after mastering most of the technical challenges (Nielsen, 2001). A study of conservatoire students showed that more than 40% considered themselves to be the primary source for an interpretation. They wanted to communicate something personal, especially feelings and emotions (Lindström, Juslin, Bresin and Williamon, 2003)

## Strategies for the Conduct of Practice

### *Variable Practice*

Schema theory suggests that motor programs, including those required for playing a musical instrument, are strengthened by increased variability in practice (for instance, practicing a passage with different articulations, at different tempi, or a technique using different examples), rather than repetition of the same actions. This facilitates transfer to other tasks (Schmidt, 1976). The evidence for the effectiveness of this is mixed (see Hallam, 1997c for a review).

### *Part–Whole Strategies*

Particularly relevant to the acquisition of musical skill is the question of *part–whole transfer* of training. Given a reasonably short piece of music to practice, observational studies have shown that many novice pupils play through the music without stopping to focus on difficult sections, and usually repeat the whole piece several times (see Hallam 1997b; Renwick and McPherson, 2002). Some novice and advanced students use a combined approach, starting with the whole and stopping to practice difficult sections en route (Hallam 1997b; Miklaszewski, 1989). This gives the performer an overview of the music, and the opportunity to identify and select parts which require more intense work while relating the parts to longer sections or the whole (Chaffin and Imreh, 1997; Nielsen, 1999). Sections for concentrated work are selected on the basis of a range of criteria including those relating to the formal structure and motor aspects of the performance (Miklaszewski and Sawicki, 1992), new or related elements (Nielsen, 1999) and the visual layout of the music and its harmonic progression (Holmes, 2005; Williamon and Valentine, 2000). As practice progresses and the music is increasingly mastered technically, the sections worked on become longer (Chaffin and Imreh, 1997; Nielsen, 1999), although attention to detail and work on small sections may continue throughout practice sessions. It is clear from these examples that the relationship between practicing a piece in its entirety, focusing on parts, and mastery is complex. For different tasks, whole or part strategies may be more appropriate.

### *Transfer of Learning*

Exercises are sometimes used to address *specific challenges* within a given composition (Hallam, 1995a; Nielsen, 1999), but the alternative and more common solution is to practice difficult sections within the music being learnt. Transfer of learning in music needs to be considered in relation to particular tasks and different timescales. In the short term, practice seems to be most effective when it relates specifically to the task being undertaken, with the conditions for learning and performance being as similar as possible.

### *Strategies for Increasing Tempo*

When passages need to be played at speed, Drake and Palmer (2000) observed three approaches adopted by students at different levels of expertise. Beginners tended to stick to one tempo throughout practice sessions, novices increased tempo gradually until they

reached a limit, while the most accomplished students gradually increased tempo over each practice session. Research on the efficiency of these approaches has been equivocal probably due to the ambiguity of concepts such as “slow,” “fast” and “in performance tempo”; differences between beginners and experts; the way strategies relating to tempo are often combined with other strategies; and the length and complexity of music involved. Since the adoption of these strategies involves motor and muscular considerations, the observation by Altenmüller and Schneider (2009) that fast and slow speeds of movement are controlled by different motor programs is important.

### *Mental Practice*

Mental practice, where the learner thinks through the procedures without actually playing, has been compared with playing practice in several studies, with conflicting results (Kopiez, 1990; Ross, 1985). This is hardly surprising, taking into account: that the studies differ in the length, familiarity and complexity of the music used; that “mental strategy” has been operationalized differently; that the length of time using the strategies has differed; and that familiarity with the use of mental strategies has varied between those taking part in the studies. When mental practice and physical practice on a task is compared, mental practice is usually found to be less effective than physical practice. However, research in sports indicates that mental practice gives time for muscles and body to rest, and that the effect of mental practice is stronger the more the task involves cognitive elements. The conclusion by Ross (1985), that a combination of mental and physical practice is most effective because mental practice allows concentration on the cognitive aspects of music performance without the distractions of exercising motor control, is probably sound.

### *Strategies for Preparing for Performance*

Even if the music is well prepared, performance anxiety may jeopardize all prior efforts, particularly where the performer has to play from memory. The most common strategy for overcoming performance nerves is to be well prepared and overlearn, investing more time than is required for basic mastery (Lehman and Ericsson, 1998) (see Altenmüller and Furuya, Chapter 33, Lehmann and Kopiez, Chapter 34, and Chaffin, Demos and Logan, Chapter 35, this volume, for issues relating to planning, memorization and anxiety).

## **Strategies to Evaluate Practice**

### *Monitoring the Effectiveness of Practice*

Monitoring the effectiveness of practice requires that appropriate schemata against which to evaluate progress are developed. Many inexperienced learners when practicing a new piece leave errors uncorrected (Hallam, 1997a), although beginners report high levels of recognition of errors. This recognition decreases as improved internal schemata against which to assess learning are developed but rises as expertise increases (Hallam et al., 2012). Monitoring skills need to be developed until at expert level current information about progress can be utilized to develop more sophisticated mental representations. Several external



remedies and techniques have been used in the process of developing schemata. Some studies have reported that using a recording of the music is an efficient strategy while others have found no such effect (see Jørgensen and Hallam, 2009). Students report making greater use of recordings as their expertise develops, of pieces to be learned and of themselves playing (Hallam et al., 2012) suggesting that the latter are used to evaluate progress and performance. Training students to self-evaluate performance or formalize the process appears to have no greater benefit to performance than normal practicing (Hewitt, 2011), although this may depend on learners' existing self-regulation skills.

### *Metastrategies*

Metacognitive strategies are concerned with the planning, monitoring and evaluation of learning. There are considerable differences between beginners, novices and experts in their knowledge and deployment of different practicing and self-regulating strategies (Hallam, 1997b; Pitts and Davidson, 2000; Pitts, Davidson and McPherson, 2000) as well as individual differences among musicians and novices at the same level of competence (Austin and Berg, 2006; Nielsen, 1999, 2001). Hallam (1997b) demonstrated that professional musicians had well-developed metacognitive skills, including self-awareness of strengths and weaknesses, extensive knowledge regarding the nature of different tasks and what would be required to complete them satisfactorily, and strategies which could be adopted in response to perceived needs. This encompassed technical matters, interpretation and performance and issues relating to learning itself, concentration, planning, monitoring and evaluation. Novices demonstrated less metacognitive awareness. Knowledge about learning is related to the adoption of more effective practicing strategies (Miksza, Prichard and Sorbo, 2012) and there are also relationships between beliefs about metacognition, the nature of knowledge and conceptions of musical ability. Students holding complex beliefs about the nature of learning are more likely to use elaboration, organization and metacognitive strategies, while those who believe that ability is fixed are less likely to adopt metacognitive and effort regulation strategies (Nielsen, 2012). Constructive, expedient and impetuous learning patterns have also been identified, the latter frequently leading to lack of progress or failure (StGeorge, Holbrook and Cantwell, 2012).

High levels of concentration and focus are crucial for effective practice and seem to depend on individual differences (Miksza, 2011b) rather than increasing expertise (Hallam et al., 2012), although it is possible to reduce distraction in practicing by raising awareness of it as it occurs (Madsen and Geringer, 1981). Nielsen (2001) suggests that students can enhance self-guidance by covertly or overtly describing how to proceed, giving comments on progress, noting concentration lapses and changes in motivation. Focus is crucial to avoid mindless repetition.

## REHEARSING IN SMALL GROUPS

Research on rehearsals in small groups has shown that there is no single best strategy for rehearsing repertoire (Davidson and King, 2004), although rehearsal techniques become more effective with increasing expertise (Ginsborg, 2012). Berg (2000) found that high school student ensembles adopted four main activities: initiating, performing, orienting and



assisted learning. Seddon and Biasutti (2009) comparing rehearsals in a string quartet and a jazz sextet identified verbal and nonverbal interactions in three modes: instruction, cooperation and collaboration, and nonverbal communication as sympathetic and empathetic attunement, and empathetic creativity. When sympathetically attuned the musicians played with coherence but took no risks; when empathetically attuned they played more animatedly, took risks and challenged previously rehearsed interpretations. Empathetic creativity was in evidence when a novel musical variation developed. Adoption of the cooperative mode was related to cohesive performance, while the collaborative mode facilitated creativity. While group cohesiveness centers on the music in the long term it needs to be underpinned by strong social frameworks (for a full review see Davidson and King, 2004).

## THE ROLE OF THE LEARNING ENVIRONMENT IN PRACTICE

---

The impact that institutional learning environments have on practice has been little studied. Papageorgi et al. (2010) comparing students in different higher education institutions pursuing different programs of study found no differences in approaches to practicing. At conservatoire level in Norway, Jørgensen (1997) reported that music education students and church music students practiced more than expected, probably due to the predominant performance values in a conservatoire.

Instrumental teachers may influence practice although research on the way that they teach about practicing has had mixed results. Jørgensen (2000), in research with beginning conservatoire students in Norway, reported that 40% indicated that their previous teachers had invested “little” or “no” effort in teaching them how to practice. However, in the United States, teachers have reported that they always or almost always include instructions about practice in their lessons (Barry and McArthur, 1994). Students do seem to be able to learn how to use expert practicing strategies (Barry, 1992) and having done so report more positive attitudes towards practicing, are more likely to engage in practice planning and problem identification, are better able to select appropriate performance goals and are able to formulate more cognitively complex goals (Kenny, 1992). This suggests that there can be benefits in teaching about practice.

## CONCLUSION

---

Over the last 30 years our understanding of the nature of practice and its importance in the development of expertise has increased enormously. We know that both the quantity and quality of practice contribute to the level of expertise attained and that the individual's ability to adopt more effective practicing strategies is inextricably linked with their level of expertise. There has also been recognition that musicians exhibit considerable diversity in the ways that they practice and that these can lead to equally successful outcomes. Despite the considerable progress made there are still areas where we know relatively little. In relation to the quantity of practice there is a need for more studies that address the interaction

between instrument, age, level of expertise and amount of practice within a range of different contexts. In relation to the quality of practice there is a need for studies exploring the following:

- How practice plans and goals are formulated and the way that these influence practice and subsequently performance.
- Skill transfer between warming up exercises, technical studies and repertory practice and the impact of these on performance.
- The effectiveness of aural models of what is to be learned and other types of feedback.
- Concentration in practice, and how self-regulating techniques and metacognitive skills can be developed.
- The relationships between learning approaches, motivation and practice efficiency.
- How best to teach practice strategies at all levels of expertise.
- The way that social interaction in groups, including nonverbal communication, affects performance.
- The ways in which practice is undertaken on a variety of different tasks, for example, sight reading, improvisation and in different genres, for example, popular music, jazz and world musics.

Such research will not only increase our understanding but also contribute towards enhancing learning and teaching.

## REFERENCES

- Allen, S.E. (2012). Memory stabilization and enhancement following musical practice. *Psychology of Music*, 41(6), 794–803.
- Altenmüller, E. and Schneider, S. (2009). Planning and performance. In S. Hallam, I. Cross and M. Thaut (Eds.), *The Oxford handbook of music psychology* (pp. 332–343). Oxford: Oxford University Press.
- Austin, J.R. and Berg, M.H. (2006). Exploring music practice among sixth grade band and orchestra students. *Psychology of Music*, 34(4), 535–558.
- Barry, N.H. (1992). The effects of practice strategies, individual differences in cognitive style, and gender upon technical accuracy and musicality of student instrumental performance. *Psychology of Music*, 20(2), 112–123.
- Barry, N.H. and McArthur, V. (1994). Teaching practice strategies in the music studio: a survey of applied music teachers. *Psychology of Music*, 22(1), 44–55.
- Berg, M.H. (2000). Thinking for yourself: the social construction of chamber music experience. In R.R. Rideout and S.J. Paul (Eds.), *On the sociology of music: Vol. 2. Papers from the Music Education Symposium at the University of Oklahoma* (pp. 91–112). Amherst, MA: University of Massachusetts Press.
- Chaffin, R. and Imreh, G. (1997). Pulling teeth and torture: musical memory and problem solving. *Thinking and Reasoning*, 3(4), 315–336.
- Chaffin, R., Imreh, G., Lemieux, A. and Chen, C. (2003). Seeing the big picture: piano practice as expert problem solving. *Music Perception*, 20(4), 465–490.

- Chaffin, R. and Lemieux, A.F. (2004). General perspectives on achieving musical excellence. In A. Williamon (Ed.), *Musical excellence: Strategies and techniques to enhance performance* (pp. 19–40). Oxford: Oxford University Press.
- Costa-Giomi, A., Flowers, P.J. and Sasaki, W. (2005). Piano lessons of beginning students who persist or drop out: teacher behaviour, student behaviour, and lesson progress. *Journal of Research in Music Education*, 53(3), 234–247.
- Davidson, J. and King, E.C. (2004). Strategies for ensemble practice. In A. Williamon (Ed.), *Musical excellence* (pp. 105–122). Oxford: Oxford University Press.
- Drake, C. and Palmer, C. (2000). Skill acquisition in music performance: relations between planning and temporal control. *Cognition*, 74(1), 1–32.
- Duke, R.A., Flowers, P.J. and Wolfe, D.E. (1997). Children who study with piano with excellent teachers in the United States. *Bulletin of the Council for Research in Music Education*, 132, 51–84.
- Ericsson, K.A., Krampe, R.T. and Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100(3), 363–406.
- Ginsborg, J. (2012). Rehearsal talk: familiarity and expertise in singer-pianist duos. *Musicae Scientiae*, 16(2), 148–167.
- Hallam, S. (1995a). Professional musicians' orientations to practice: implications for teaching. *British Journal of Music Education*, 12(1), 3–19.
- Hallam, S. (1995b). Professional musicians' approaches to the learning and interpretation of music. *Psychology of Music*, 23(2), 111–128.
- Hallam, S. (1997a). The development of memorisation strategies in musicians: implications for instrumental teaching. *British Journal of Music Education*, 14(1), 87–97.
- Hallam, S. (1997b). Approaches to instrumental music practice of experts and novices: implications for education. In H. Jørgensen and A. Lehman (Eds.), *Does practice make perfect? Current theory and research on instrumental music practice* (pp. 89–108). Oslo: Norges Musikkhøgskole.
- Hallam, S. (1997c). What do we know about practising? Towards a model synthesising the research literature. In H. Jørgensen and A. Lehman (Eds.), *Does practice make perfect? Current theory and research on instrumental music practice* (pp. 179–231). Oslo: Norges Musikkhøgskole.
- Hallam, S. (1998). Predictors of achievement and drop out in instrumental tuition. *Psychology of Music*, 26(2), 116–132.
- Hallam, S. (2001). The development of expertise in young musicians: strategy use, knowledge acquisition and individual diversity. *Music Education Research*, 3(1), 7–23.
- Hallam, S., Rinta, T., Varvarigou, M., Creech, A., Papageorgi, I., Gomes, T. and Lanipekun, J. (2012). The development of practicing strategies in young people. *Psychology of Music*, 40, 652–680.
- Hewitt, M.P. (2011). The impact of self-evaluation instruction on student self-evaluation, music performance, and self-evaluation accuracy. *Journal of Research in Music Education*, 59(1), 6–20.
- Holmes, P. (2005). Imagining in practice: a study of the integrated roles of interpretation, imagery and technique in the learning and memorization process of two experienced solo performers. *British Journal of Music Education*, 22(3), 217–235.
- Hurley, C.G. (1995). Student motivations for beginning and continuing/discontinuing string music tuition. *The Quarterly Journal of Music Teaching and Learning*, 6, 44–55.

- Jørgensen, H. (1997). Time for practicing? Higher level students' use of time for instrumental practicing. In H. Jørgensen and A.C. Lehmann (Eds.), *Does practice make perfect? Current theory and research on instrumental music practice* (pp. 123–140). Oslo: Norges Musikkhøgskole.
- Jørgensen, H. (1998). *Planlegges øving?* [Is practice planned?] Oslo: Norwegian Academy of Music.
- Jørgensen, H. (2000). Student learning in higher instrumental education: who is responsible? *British Journal of Music Education*, 17(1), 67–77.
- Jørgensen, H. (2001). Instrumental learning: is an early start a key to success? *British Journal of Music Education*, 18(3), 227–239.
- Jørgensen, H. (2002). Instrumental performance expertise and amount of practice among instrumental students in a conservatoire. *Music Education Research*, 4(1), 105–119.
- Jørgensen, H. (2004). Strategies for individual practice. In A. Williamon (Ed.), *Musical excellence* (pp. 85–104). Oxford: Oxford University Press.
- Jørgensen, H. and Hallam, S. (2009). Practising. In S. Hallam, I. Cross and M. Thaut (Eds.), *The Oxford handbook of music psychology* (pp. 265–273). Oxford: Oxford University Press.
- Kenny, W.E. (1992). *The effect of metacognitive strategy instruction on the performance proficiency and attitude toward practice of beginning band students*. (Unpublished doctoral dissertation.) University of Illinois, Urbana-Champaign, IL.
- Kopiez, R. (1990). *Der Einfluss kognitiver Strukturen auf das Erlernen eines Musikstücks am Instrument*. [The influence of cognitive structures on the learning of instrumental music.] Frankfurt: Peter Lang.
- Krampe, R.T. (1994). *Maintaining excellence: Cognitive-motor performance in pianists differing in age and skill level*. Studien und Berichte /MPI für Bildungsforschung, 58. Berlin: Sigma.
- Lammers, M. and Kruger, M. (2006). Brass and woodwind student practice habits in Norway, Japan and the United States. *NACWPI Journal*, 54, 4–13.
- Lehmann, A.C. and Ericsson, K.A. (1995). *The relationship between historical constraints of musical practice and increase of musicians' performance skills*. Paper presented at the 7th European Conference on Developmental Psychology, Poland, 23–27 August 1995.
- Lehmann, A.C. and Ericsson, K.A. (1998). Preparation of a public piano performance: the relationship between practice and performance. *Musicae Scientiae*, 2(1), 67–94.
- Lindström, E., Juslin, P.N., Bresin, R. and Williamon, A. (2003). "Expressivity comes from within your soul": a questionnaire study of music students' perspectives on expressivity. *Research Studies in Music Education*, 20, 23–47.
- Lisboa, T., Williamon, A., Zicari, M. and Eiholzer, H. (2005). Mastery through imitation: a preliminary study. *Musicae Scientiae*, 19(1), 75–110.
- Madsen, C.K. (2005). A 30-year follow-up study of actual applied music practice versus estimated practice. *Journal of Research in Music Education*, 52(1), 77–88.
- Madsen, C.K. and Geringer, J.M. (1981). The effect of a distraction index on improving practice attentiveness and musical performance. *Bulletin of the Council for Research in Music Education*, 66–67, 46–52.
- McPherson, G.E. (2005). From child to musician: skill development during the beginning stages of learning an instrument. *Psychology of Music*, 33(1), 5–35.
- McPherson, G.E. and Davidson, J. (2002). Musical practice: mother and children interactions during the first year of learning an instrument. *Music Education Research*, 4(1), 141–156.
- McPherson, G.E. and Zimmerman, B.J. (2002). Self-regulation of musical learning. In R. Colwell and C. Richardson (Eds.), *The new handbook of research on music teaching and learning* (pp. 348–372). Oxford: Oxford University Press.

- Miklaszewski, K. (1989). A case study of a pianist preparing a musical performance. *Psychology of Music*, 17(1), 95–109.
- Miklaszewski, K. (1995). Individual differences in preparing a musical composition for public performance. In M. Manturzevska, K. Milaszewski and A. Bialkowski (Eds.), *Psychology of music today: Proceedings of the International Seminar of Researchers and Lecturers in the Psychology of Music* (pp. 138–147). Warsaw: Fryderyk Chopin Academy of Music.
- Miklaszewski, K. and Sawicki, L. (1992). Segmentation of music introduced by practicing pianists preparing compositions for public performance. In R. Dalmonte and M. Baroni (Eds.), *Secundo Convegno Europeo di Analisi Musicale [Proceedings of the Second European Conference on Musical Analysis]* (pp. 113–121). Trento: University of Trento Press.
- Miksza, P. (2011a). A review of research on practicing: summary and synthesis of the extant research with implications for a new theoretical orientation. *Bulletin of the Council for Research in Music Education*, 190, 51–92.
- Miksza, P. (2011b). Relationships among achievement goal motivation, impulsivity and the music practice of collegiate brass and woodwind players. *Psychology of Music*, 39(1), 50–67.
- Miksza, P., Prichard, S. and Sorbo, D. (2012). An observational study of intermediate band students' self-regulated practice behaviours. *Journal of Research in Music Education*, 60(3), 254–266.
- Nielsen, S.G. (1999). Learning strategies in instrumental music practice. *British Journal of Music Education*, 16(3), 275–291.
- Nielsen, S.G. (2001). Self-regulating learning strategies in instrumental music practice. *Music Education Research*, 3(2), 155–167.
- Nielsen, S.G. (2012). Epistemic beliefs and self-regulated learning in music students. *Psychology of Music*, 40(3), 324–338.
- Papageorgi, L.E., Haddon, A., Creech, A., Morton, F., de Bezenac, C., Himonides, E., ... Welch, G.F. (2010). Institutional culture and learning 1. Perceptions of the learning environment musicians' attitudes to learning. *Music Education Research*, 12(2), 151–178.
- Pitts, S. and Davidson, J. (2000). Developing effective practising strategies: case studies of three young instrumentalists. *Music Education Research*, 2(1), 45–56.
- Pitts, S.E., Davidson, J.W. and McPherson, G.E. (2000). Models of success and failure in instrumental learning: case studies of young players in the first 20 months of learning. *Bulletin of the Council for Research in Music Education*, 146, 51–69.
- Renwick, J.M. and McPherson, G.E. (2002). Interest and choice: student-selected repertoire and its effect on practicing behaviour. *British Journal of Music Education*, 19(2), 173–188.
- Ross, S.L. (1985). The effectiveness of mental practice in improving the performance of college trombonists. *Journal of Research in Music education*, 33(4), 221–230.
- Schmidt, R.A. (1976). The schema as a solution to some persistent problems in motor learning theory. In G.E. Stelmach (Ed.), *Motor control: Issues and trends* (pp. 41–65). New York: Academic Press.
- Seddon, F. and Biasutti, M. (2009). A comparison of models of communication between members of a string quartet and a jazz sextet. *Psychology of Music*, 37(4), 395–415.
- Simmons, A.L. and Duke, R.A. (2006). Effects of sleep on performance of a keyboard melody. *Journal of Research in Music Education*, 54(3), 257–269.
- Sloboda, J.A., Davidson, J.W., Howe, M.J.A. and Moore, D.G. (1996). The role of practice in the development of performing musicians. *British Journal of Psychology*, 87, 287–309.
- Sosniak, L.A. (1985). Learning to be a concert pianist. Developing talent in young people. In B.S. Bloom (Ed.), *Developing talent in young people* (pp. 19–67). New York: Ballantine.

- StGeorge, J.M., Holbrook, A.P. and Cantwell, R.H. (2012). Learning patterns in music practice: links between disposition, practice strategies and outcomes. *Music Education Research*, 14(2), 243–263.
- Wagner, C. (1988). The pianist's hand: anthropometry and biomechanics. *Ergonomics*, 31, 97–131.
- Wagner, M.J. (1975). The effect of a practice report on practice time and musical performance. In C.K. Madsen, R.D. Greer and C.H. Madsen Jr (Eds.), *Research in music behaviour* (pp. 125–130). New York: Teachers College Press.
- Williamon, A. and Valentine, E. (2000). Quantity and quality of musical practice as predictors of performance quality. *British Journal of Psychology*, 91, 353–376.