

## **Practising for memorised performance: A comparison of thoughts and action**

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### **Abstract**

This paper discusses how an experienced cellist prepared the Prelude from Bach's Suite No. 6 for cello solo for performance. It describes the first author's experience and insights as a musician studying her own practice in collaboration with psychologists. It focuses on strategies, thoughts and artistic behaviours involved in learning a new piece for memorised performance. This longitudinal case study took place over a period of 3\_ years during which the entire process of learning, memorising and giving several public performances of the Prelude was recorded and analysed. The results show a significant contrast between thoughts and actions and also that expert music learning can be compared to expert problem solving in other fields.

Keywords: Practice, case-study, problem-solving.

Practice and performance have been the focus of research for many years, at least since Leopold Mozart's treatise on the fundamental principles of violin playing (Knocker, 1985) and Carl Czerny's famous report of his lessons with Ludwig van Beethoven (Badura-Skoda, 1970). More recently, Anders Ericsson and colleagues have provided empirical evidence for the importance of effective practice. Even among exceptional performers, the level of achievement is closely related to the amount of *deliberate* practice. A minimum of ten years and 10,000 hours of deliberate practice are required to achieve eminence (Ericsson, Krampe and & Tesch-Römer, 1993; Ericsson, 1997). Given the number of hours involved, even small differences in the effectiveness of practice may be important. One way of identifying the main aspects of effective practice is to interview musicians, but these can be limited in value due to the possibility of

inaccuracy and distortion. Naturalistic observation combines objectivity with ecological validity. This study<sup>1</sup> extends previous methodological approaches by enlisting the cooperation of the artist – i.e. the musician as a full member of the research team.

The noted pianist and pedagogue Heinrich Neuhaus suggests that when a great musician first approaches a new piece, “an instantaneous and subconscious process of ‘work at the artistic image’ takes place” (Neuhaus 1973: 17). Neuhaus’s dictum points to an important characteristic of expert problem-solving: experts start with the big picture. But how is this big picture formed? This study explores various sources of data which provide a comprehensive view of the strategies, thoughts and artistic behaviours involved in learning a new piece. It also explores how deliberate practice leads to the development of performance cues - musical features that the performer attends to during performance (Chaffin, Imreh & Crawford, 2002). It compares words with actions in order to identify how a musical conception of a new piece is developed during practice.

## **Method**

The entire process of learning Bach’s Prelude from Suite No. 6, BWV 1012, for cello solo for memorised performance was recorded in audio and video. An experienced cellist (the first author) in collaboration of psychologists, engaged in this longitudinal case study for 3½ years (75 sessions, 38 hours of practice and over 10 performances). During practice, the cellist provided periodical comments to the camera on her musical intuitions, goals in practice, progress, strategies, frustrations, and much else. Reports on every aspect of the music thought about during practice were also provided in various copies of the score. These included: bowing, fingering, technical difficulties, dynamics, intonation, and phrasing, along with performance cues for each (see Chaffin et al. 2010). This current study compares the analyses of playing with thoughts (through comments made to the camera) for the entire learning, memorising and performing period.

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<sup>1</sup> This paper is based on a book chapter to be published in the ‘subseries of the Collected Writings of the Orpheus Institute. University Press Leuven’.in 2011.

The Prelude explores both the mellow quality and virtuoso aspects of the instrument. Written originally for a 5 string instrument, it presents contemporary cellists with considerable technical challenges due to the adaptations of fingerings and left-hand positions needed to play the high register notes on a four strings cello. Notated in 104 bars in 12/8 time, the piece takes about five minutes to perform. The cellist had studied and performed Bach Solo Suites 1 to 5, but had yet to embark upon the Sixth Suite, thus providing the ideal circumstance for its selection for this study.

### **Results**

The results highlight a dramatic contrast between thoughts and actions - two different windows into a musician's mind. The cellist's thoughts (aims in practice, musical decisions, etc.) were expressed through comments to a camera during the entire practice period and also after all the performances. Her words generally referred to preoccupations (e.g., technique) which were easier to express. Her practice, however, reflected musical aspects that were less explicit (e.g., expressive goals that were hard to articulate, intuitions that shaped the music-making).

### **Comments**

Figure 1 shows the proportion of comments (by category) for each of the five stages of the learning process: *exploring* (sessions 1-10); *smoothing out* (sessions 11-19); *listening* (sessions 20-32); *reworking technique* (sessions 33-35) and *preparing for performance* (sessions 36 -75). Inspection shows that at initial stages, comments were mostly about technique, because decisions about basic fingering and bowing needed to be made, prior to playing the piece with fluency. There were very few comments on interpretation at the start. Across the five stages, however, the proportion of comments on technique decreased steadily, and the proportion on interpretation increased. The pattern makes sense: first technique, then interpretation. However, this is the opposite of the pattern for practice identified in Table 1 (below). The analysis of practice showed that the extended work needed to secure technique was not done until much later sessions (e. g., when the cellist was sure that her technical decisions

would work musically). Meanwhile, playing was shaped by musical intuitions which were not talked about, both because they were less problematic and also because they were hard to articulate. Towards the final stages, when work was directed towards projecting musical ideas, there were more comments on interpretation.

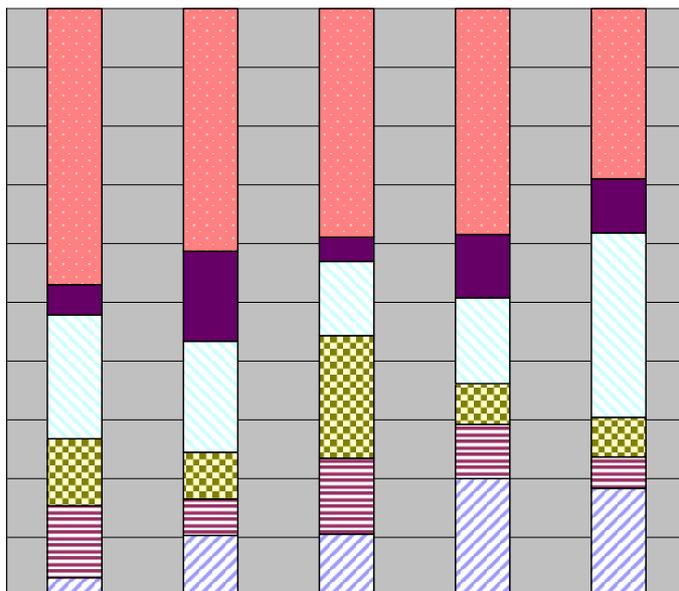


Figure 1 Proportion of the different categories of comments in each of five stages of learning.

Some goals were however articulated, as for example, in session 3 (*exploring* stage) the cellist said “I have to decide musically what I want and then I can choose a fingering” but they mostly remained implicit. In summary, throughout the five stages of learning, the amount of comments reflected the main concerns at that particular stage. Another example is related to the comments on memory: Figure 1 shows less comments on memory during the *smoothing out* stage (sessions 11-19) because in session 15, the piece had been basically memorised and the cellist did not have to talk about this anymore. She then engaged in practice to secure memory and the amount of comments increases again during the *listening* stage, until she had the piece securely memorised for performance - there is a decrease in the proportion of comments again during the *rework technique* and *prepare for performance* stages.

### ***Practice***

All practice sessions were analysed and related to the reports of bowing, fingering, technical difficulties, dynamics, intonation, phrasing, and performance cues. Using practice graphs such as Figure 2, it was possible to determine when each of these different aspects of the music related to the way in which the piece was practised. The main question for each report was whether starts, stops, and repeats in practice, at these places in the music, happened more than at others. This would indicate focus of attention at particular features of the music as well as which aspects received more intensive practice.

Figure 2 shows the analysis of all practice sessions (sessions 1-75). The graph reads from bottom to top with horizontal lines representing practice *segments*: uninterrupted playing. The horizontal axis represents the music, in half bars. Half bars were used as the unit of analysis for the 12/8 time signature because it reflected the way in which the cellist understood bar structure. The vertical lines represent reporting of the beginnings of main sections and sub-sections (e.g., the cellist's understanding of harmonic sections). These were important points in practice – i.e. often starting and stopping at these locations. The intersections of horizontal lines, representing practice, and vertical lines, representing the reports, show that the formal structure of the music provided a framework for practice. This is a characteristic of expert practice (Chaffin et al. 2002; Williamon et al. 2002).

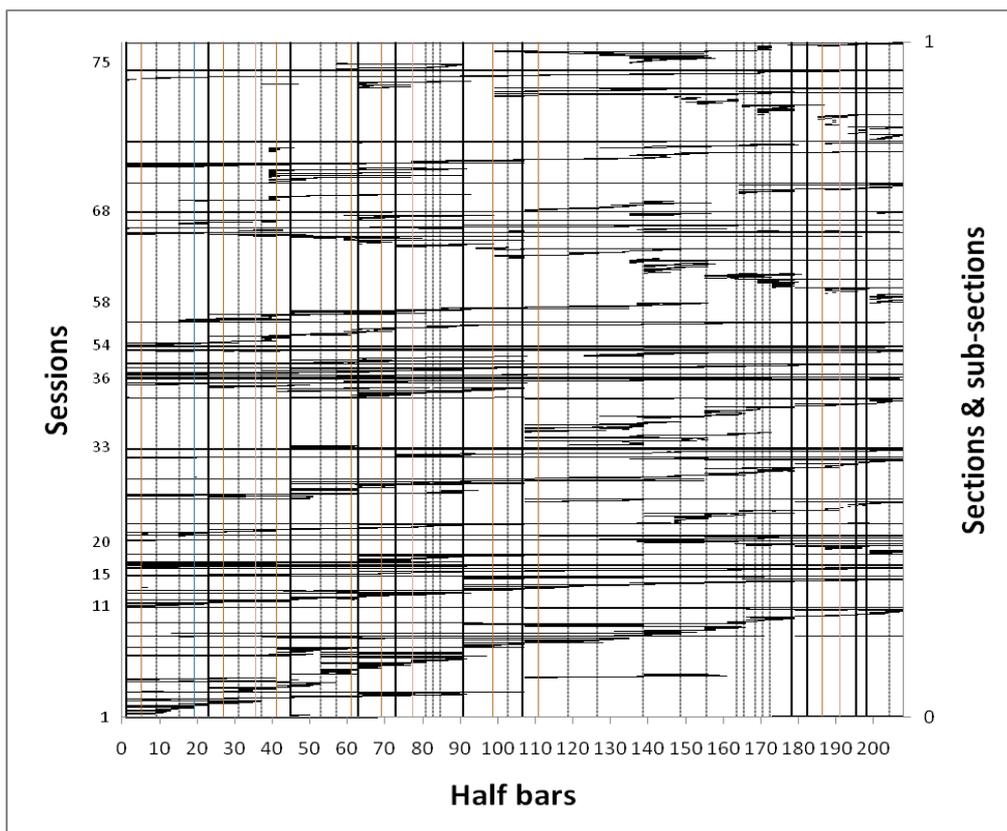


Figure 2. Practice graph of sessions 1—75 with vertical lines marking the locations of sections (dark lines) and sub-sections (paler lines).

Multiple regression analysis was also used to simultaneously relate each of the different reports to the number of starts, stops, and repeats. Table 1 summarises the results, showing when each of the fifteen types of report related to starts, stops, or repetitions. The top two rows of data in Table 1 show that the beginnings of sections and subsections were used as starting and stopping places throughout most of the learning process. The statistical analyses thus confirm the conclusion already reached from visual inspection of Figure 2: the musical structure provided the framework for practice.

**Table 1:** Summary of effects ( $p < .01$ ) on practice at each stage of learning. Effects on starts (B), stops (E) and repetitions (R) are shown separately for different types of performance cues and for each type of decision about interpretation and basic technique. Intensive practice (simultaneous effects on starts, stops and repetitions) is shown in ***bold italics*** (condensed from Chaffin et al. 2010, Table 2).

<b>Stage</b>	<b>Explore</b>	<b>Smooth</b>	<b>Listen</b>	<b>Re-work</b>	<b>Prepare Performance</b>
<b>Sessions</b>	1-10	11-19	20-32	33-35	36-75
<b>Structural cues</b>					
Expressive/Sections	B	BE	BE	B	B
Subsections	BE	BE	B		BE
Switches	E		E		
<b>Performance Cues</b>					
Interpretive				<b><i>BER</i></b>	<b><i>BER</i></b>
Intonation				ER	ER
Basic: left hand		ER	ER	E	<b><i>BER</i></b>
Basic: right hand			<b><i>BER</i></b>		-E
<b>Interpretation</b>					
Dynamics	<b><i>BER</i></b>				-R
Sound quality	R	R		R	<b><i>BER</i></b>
Intonation	R	-E	ER		<b><i>BER</i></b>
Phrasing		BR			B
<b>Basic Technique</b>					
Hand position	R	R	R		R
Fingering					
Bowing/Change string		E	ER		E
Technical difficulties			ER		<b><i>BER</i></b>

*Intensive practice* (multiple repetitions of the same short passage), shown in bold italics in Table 1, indicates focus of attention on a particular problem, starting, stopping and repeating. In Figure 2, intensive practice is represented by the small blocks of black ink that show where the same passage was repeated over and over, starting and stopping at the same place. Table 1 shows when the various aspects of the music reported received this kind of intensive treatment. The distribution of intensive treatment suggests that practice was guided more by musical conception of the piece than by its technical challenges

(Chaffin, Imreh, Lemieux & Chen, 2003). Intensive practice in the initial, exploratory stage was directed at dynamics, as the building blocks of interpretation. Intensive practice of technique does not appear until the final stage, preparing performance. The performer felt that it was important to acquire a general musical conception of the piece before investing the time necessary to master the technique to project musical ideas. This contrasts with the results from the analysis of comments, which suggests exactly the opposite strategy.

## **Discussion**

This study provides a complete picture of the musician's approach to learning and preparing for memorised performance. Practice and commentary both reveal the performer's concerns, but in different ways and at different times. The different sources of data offered access to two different windows into the musician's mind. The participation of the musician as an active researcher added yet another dimension.

The findings point at parallels between the way in which the cellist approached musical learning and theories of general expert problem solving: when a mathematician or physicist tackles a new problem, she or he starts by identifying underlying principles. If these are not immediately evident, time is taken to develop a deeper understanding of the issues before proceeding. The steps then taken towards solving the problem are guided by this big picture. Novices, in contrast, plunge into the details without developing a clear idea of the big picture. As a result, their understanding of problems is more superficial and their efforts in problem-solving less effective (Glaser and Chi 1988; Chi, Feltovich and Glaser 1981). In similar fashion, Neuhaus suggests that a musician's first goal in approaching a new piece should be to develop an "artistic image" of its musical shape (Neuhaus 1973). The artistic image guides detailed decisions with regard to technique and interpretation (Chaffin et al. 2003). This study of the Prelude shows how the process works when the music is difficult to play fluently at the outset. Of course, the cellist knew the Prelude, one of the best-known works of the cello repertoire, but she had never learned it nor did she have strong preconceptions about how to play it.

At the end of the study, the cellist said that she was gratified to discover that she seemed to have followed Neuhaus's advice. From the outset, practice was organised around the musical structure. In other words, she was thinking about the general musical shape of the piece (Chaffin et al. 2003). She also gave priority to developing her artistic image for the piece over solving its technical difficulties. Intensive practice during the initial exploratory stage was directed at developing interpretation and building the dynamic contrasts implied by the score. She did not invest in intensive practice of the technical difficulties until she was sure that her musical ideas were going to work - not until the stage of preparing for performance.

At the time, however, she stated that musical and technical issues were scarcely separated in her mind. In her words: "It was not until I saw the analyses of the early practice sessions that I became aware that my playing was directed much more by my emerging musical image than by technical issues. In retrospect, I can now see how tensions between the two are reflected in the divergence between what I did and what I said."

### ***Self-study***

Although the prospect of studying one's own learning can be terrifying as scrutinising practice may compromise the "freshness" of performance, systematic self-study seems to be a fine route to improving the effectiveness of practice in expert performance.

When participating as both the artist and researcher, however, tensions can arise between the two roles which, in this case, needed to be constant managed. Deep reflection upon the artistic processes can disrupt the flow of artistic work, a risk of reflection-in-action (Schöen 1987). Providing reports of musical decisions and understanding – reflection-on-action (Schöen 1987) – was seen by the cellist as 'extremely difficult' as she felt that she had to exteriorise feelings and intuitions about the music that normally remain tacit. On the other hand, the strains imposed by the nature of the project have had beneficial effects. The cellist observed that the effort of noting musical decisions on the score helped to consolidate her musical ideas and she suggested that

she gained an objective picture of her practice which has increased the efficiency and focus of her practising of other repertoire.

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Tânia Lisboa's is Research Fellow at the Royal College of Music in London. Her research focuses on musical development, memory and practice strategies. Her concerts as a cellist have taken her to Asia, Europe, North and South America. Her recordings for *Meridian Records* include standard repertoire as well as the complete works for cello and piano and all the piano trios of Villa Lobos and C. Guarnieri.

Roger Chaffin is Professor of Psychology at the University of Connecticut, where he is also Director of the Music Psychology Lab. In addition to pioneering the longitudinal case study method of studying the cognitive processes underlying musical performance, he has published widely on the topics of memory, language and problem-solving. He is an amateur flautist and singer.