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Practicing perfection: How a concert pianist prepares for a performance

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We have all experienced the fascination and awe of witnessing a world class performance, whether a musician in a virtuoso rendition, an ice skater making triple axel leaps, or a kayaker hurtling down a class six rapid. And most of us have marveled at the skill that makes such feats possible. For example, the performance of even a moderately complex piano piece places incredible demands on memory and physical dexterity, requiring the execution of between 10 and 20 notes a second for minutes on end. How does a performer do this: remembering it all, hitting every note, and at the same time creating beautiful music? Practice, of course, is part of the answer -- it's what makes the performance automatic. But how can a performance that is totally automatic be aesthetically satisfying? What does the performer think about as the fingers fly across the keyboard? And what happens if something goes wrong?

To answer these questions we convened an unlikely trio: a concert pianist and two psychologists. The initial impetus for the study came when Gabriela Imreh (a concert pianist) invited Roger Chaffin (a cognitive psychologist) to talk to her students about memorizing for performance. Gabriela was struck by how well cognitive psychology's understanding of expert memory meshed with her own experience as a performer. As the conversations that followed grew into collaboration, Mary Crawford (a social psychologist) joined the team in order to record how two people from such different backgrounds would work out the differences between their viewpoints to arrive at a common understanding.

Gabriela videotaped her practice as she learned the third movement, *Presto*, of the *Italian Concerto* by J.S. Bach for an all-Bach CD. The *Presto* was the perfect choice for our study.

While not unusually difficult, it is hard to memorize. Its rapid tempo provides little opportunity for the performer to think ahead, while its recurring themes require close tracking of what comes next to avoid taking a wrong turn. Keeping head and hands together is a challenge. As Gabriela it,

“ *My fingers were playing the notes just fine. The practice I needed was in my head. I had to learn to keep track of where I was. It was a matter of learning exactly what I needed to be thinking of as I played, and at exactly what point*”.

The solution was the practice of *performance cues*. Performance cues are the landmarks of the piece that the pianist attends to during performance, carefully selected and rehearsed during practice so that they come to mind automatically and effortlessly as the piece unfolds, eliciting the highly practiced movements of fingers, hands, and arms. Performance cues become an integral part of the performance and provide a way of consciously monitoring and controlling the rapid, automatic actions of the hands.

Performers are faced with a paradox. On the one hand, the performance must be completely automatic. Gabriela played the *Presto* at a tempo that required 14 notes a second. At that speed there is no time to think about each note, or even each bar. Playing also needs to be automatic to cope with the highly charged atmosphere of the concert stage. If the pianist's actions are not as mechanical and unthinking as tying her shoes, they will be forgotten in the adrenaline rush of stepping in front of an audience. On the other hand, a performer must play mindfully. Performance is a creative activity, not simply the rote, mindless repetition of overlearned

movements. Mindfulness is also needed to recover from mistakes. What do you do if your fingers are flying along on automatic and something goes wrong? This happens all the time. Performers constantly have to deal with mistakes, their own and other people's. To recover, you have to know where you are, what is coming next, what went wrong -- and then make a quick jump back onto the right track. Usually, the recovery is graceful. Potential catastrophe is averted and, with luck and good preparation, the audience may not even notice. Only the performer knows that she has teetered on the verge of disaster.

Performance cues are a way of being mindful of a skill that has become automatic. They provide the road map that allows the performer to keep track of where she is in the piece, and they provide strategically distributed points of intervention where the performance can be restarted in mid-flight when something goes wrong.

We distinguish four types of performance cues. *Structural* cues are critical places in the formal structure of the music, such as section boundaries. *Basic* and *interpretive* cues are critical spots where some aspect of technique or interpretation requires attention, e.g., a critical fingering or phrasing. *Expressive* cues represent the musical feelings to be conveyed to the audience, e.g., surprise or excitement. In learning a piece, the pianist pays attention to each type of cue in turn, revisiting each at different stages of learning. For most of the learning process, attention is directed mainly towards the critical details represented by basic and interpretive performance cues. In front of an audience, however, these details must recede into the background so that musical expressiveness can take center stage, both in the mind of the performer, and, as a result, in the experience of the audience. This transformation does not

happen by magic, but requires careful preparation. In the final practice sessions before a performance, the artist focuses on the expressive cues.

We saw the development of performance cues on our videotapes of Gabriela's practice sessions, both in what she practiced and when she explained what she was doing and why. There were three occasions when she played the piece through from memory and then paused to describe the performance cues that she had used. The first time she did this, in Session 12, the only cues mentioned were structural.

“ *Probably now the seams [between sections] are quite obvious... It's going to take a while to get through this, but it's good [for me]. Now I have to check each transition [between themes] because each time it's something different. That's the second time, so ... Oh, I confused them.*

The next time was in Session 17, and this time structure was hardly mentioned. Now the focus was on basic cues -- technical difficulties, fingerings, and patterns of notes.

” *Eventually at this level you start to have a sort of map of the piece in your mind and you ... focus on certain places in it. I'll try to tell you... I have a thing in bar 42 where I have to remember to go all the way to the G ... I have to concentrate on the fingering in bar 65, the left hand divided between two, four fingers.....I have, oh boy, the scale in the left hand at [bar] 124, the two fours in a row.... The fingering in 186”.*

The third description was at the end of Session 24, the day before Gabriela performed the piece in public for the first time. Now the focus was on interpretation; basic cues were hardly mentioned.

“ *Then I return to very lightly pianissimo. And again, just the left hand Bb (accented), and then I return to pianissimo.... And that gives me again room for a nice crescendo in [bar] 86 and on... ”*

There was almost no mention of expression. This does not mean that her first performance the next day was not expressive. There was plenty of expression built into the automatic actions of the fingers. But Gabriela was not yet thinking about expression as she performed. She was still focussed on interpretation, e.g., the crescendo in bar 86. This means that preparation of the piece was not yet complete. At this point, the pianist had put in nearly 20 hours of practice. Another 13 hours would be needed before she felt ready for the commercial recording session five months later for which the *Presto* was being prepared.

Insert Figure 1 about here (performance cues for Section Cb)

The first mention of expressive cues came after Session 31. Gabriela was asked to describe the performance cues she was using for one section of the piece. In reply she sent back the diagram shown in the accompanying figure. She had marked the cues she was using on copies of the score using arrows to point to the location of cues. Expressive cues were listed alongside basic and interpretive cues. The “*nice crescendo in [bar] 86*” that was mentioned in Session 24 was now marked as an interpretive cue in bar 85 labelled , “*start crescendo*”. Bar 85 also contains an expressive cue marked, “*start building tension*”. “*Crescendo*” and “*build tension*” are two different ways of talking about the same event. In Session 24 Gabriela was thinking in

terms of the interpretive goal of making a crescendo. By Session 31, she had begun to think of what she was doing in terms of its expressive effect, building musical tension.

Insert Figure 2 about here (practice record for Session 9, Section Cb)

We can, however, see the effects of expressive cues on practice in the sessions leading up to the first performance, and also earlier at the very beginning of the learning process. By looking at which bars were singled out for attention, we were able to see what aspects of the music were the main focus of practice in each session. For example, the accompanying figure shows the practice, during Session 9, of the passage containing the crescendo mentioned in Session 24. Some bars were repeatedly used as starting points while others were not, as the pianist worked over the passage repeating different parts of it. Was there something special about the bars used as starting places? They contain the performance cues. Gabriela was setting up the interpretive and expressive cues in Session 9 by using them as starting points. This was true, not only of this passage, but across the entire piece. When Roger pointed this out to her, Gabriela was delighted. She was very aware of how bad practice sounds in its early stages -- there is little real music to be heard. But the systematic methods of scientific analysis had plucked from her practice evidence of the innermost creative intentions that guided her work.

We were also able to see the effect of expressive cues in the performance Gabriela recorded on the CD. The tempo is very regular, but when we measured it electronically we could detect small variations. We found that bars containing expressive and structural cues were played slightly slower than other bars. The differences are very slight -- about 1/100th of a second -- and

barely perceptible, but they occurred consistently. They show that Gabriela was attending to expressive and structural cues as she performed and was drawing the listener's attention to these expressive and thematic turning points of the piece by playing them very slightly slower. (This performance can be downloaded from Roger's Web page, at <http://psych.uconn.edu> by clicking successively on <go to main site>, <faculty>, and <Roger.Chaffin>)

One final bit of evidence that the expressive and structural cues provided the main landmarks for the final performance, comes from Gabriela's memory for the piece more than two years later. One day, Roger arrived at Gabriela's house for a visit and unexpectedly asked her to play the *Presto* from memory. Gabriela indignantly refused. She had not played the *Presto* since the recording session and felt that the mistakes she would surely make would interfere later when she needed to relearn it. Relenting, she agreed to write out the score from memory. Her memory was remarkably good, more than 70% accurate. Most interesting, though, was the effect of the expressive and structural cues. Memory was strongest for the bars containing these cues and weakened with each successive bar away from them. This tells us that the expressive and structural cues provided the landmarks in her memory for the *Presto*.

A visitor to New York once asked a passerby, "How do you get to Carnegie Hall?" . "Practice, practice, practice", was the reply. The 33 hours of practice that Gabriela put in on the *Presto* certainly bear out the truth behind this old joke. But it takes much more than simply hours at the keyboard. A world-class performance requires a deep knowledge of music, the skill to capture this knowledge in performance cues, and the patience to embed the cues amidst the rapid, automatic motions of hands and fingers. When this is done, the performer plays with a

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mental map of the piece clearly in mind, guiding and monitoring the unfolding performance.

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Figure Captions.

Figure 1. The performance cues (represented by arrows) that the pianist reported attending to during practice and performance for bars 77-84.

Figure 2. The record of practice during Session 9 of bars 77-84. The record reads from bottom to top, with each line representing the playing of the music shown below. Each time the pianist stopped and started again the record begins again on the next line up. The starting places correspond with the location of the performance cues for the passage. In Session 9, the pianist was setting up the performance cues by using them as starting places.

Discography for Gabriela Imreh

J. S. Bach. New York: Connoisseur Society, CD 4207.

Hungarian Fantasy for Piano and Orchestra. In Bizet-Shchedrin - Carmen Ballet and Liszt-

Spalding - Hungarian Fantasy. New York: Connoisseur Society, CD 4213.

Soirees de Vienne: Liszt. New York: Connoisseur Society, CD 4225.