

# The Performance of Music

---

Alf Gabrielsson  
*Department of Psychology  
Uppsala University  
Uppsala, Sweden*  
Presented by: **Erdem Unal** January 18<sup>th</sup>, 2006

## Outline

- Introduction
- Performance Planning
- Sight Reading
- Improvisation
- Feedback in Performance
- Motor Process in Performance
- Expressive Movements

## 1. Introduction:

- A Review Study
- Empirical research on music performance and related matters
- Topics discussed follow a chronological order
- Topics are discussed with emphasizing previous studies.

## 2. Performance Planning

- Excellence in music performance (Gerig 1976)
  - A genuine understanding of what the music is about, its structure and meaning
  - A complete mastery of the instrumental technique
- By the author's words
  - To acquire an adequate mental representation of the piece of music coupled with a plan for transforming this representation into sound
  - To practice the piece to a level that is satisfactory for the purpose at hand

*Performance Planning cont.*

- Representation and Performance Plan
- Practicing
  - Mental verses physical practice
  - Memorizing Music
  - Rehearsal Techniques

*Representation and Performance Plan:*

- Mental Representation of Music:
  - Type of music and the instrument
  - Performer's knowledge, personality, situational demands ...
- Performance: from scratch vs stored.
- Characteristics: overall vs unit structure
- Homophonic vs Polyphonic: music (Palmer)
  - Homophonic: more single note errors
  - Polyphonic: error intrusions were harmonically congruent with the correct notes.

*Representation and Performance Plan: cont.*

- Phrase endings (Palmer 1989)
  - Note deletion errors are more frequent within the phrases
- Palmer says these studies (concepts about musical theory) disregard individual interpretive preferences
- Every performance involves some kind of intention from the performer's side

*Representation and Performance Plan: cont.*

- Robson's (1992) study about interpretation of an unknown melody
  - Images, scenes, things, events, characters, and moods.
  - They seemed to be more concerned about their representation rather than structural matters about their performance
- Clarke
  - Verbal description or body movements

*Representation and Performance Plan: cont.*

- Schaffer(1992):
  - Questioned the relation of identifying musical meaning with musical structure, because listeners tend to hear, and performers tend to convey moods and emotions
  - Experiment: performing from full score vs performing from a score there all expressive markings were deleted:
  - Evidence of power of expressive markings to constraint the expression: helps to create a narrative for the piece

*Representation and Performance Plan: cont.*

- Baily (1985, 1990, 1991)
  - Representation also involves motor processes: African and Afghan music: music is much a question of movement as a sound.
  - The spatial properties of an instrument in combination of with convenient movement patterns in fingers and hands may very well be decisive factors.
  - A saxophonist: "sometimes ideas come from my mind... but other times they come from my fingers"

*In conclusion: Representation and Performance Plan*

- The representation of music may be generated in many different and interrelated ways: structure, meaning, expression, imagery, moods, spatiomotor patterns
- The question: how the structure and the meaning of the piece should be conveyed in a convincing way.
- → Preparation to a performance

*In conclusion: Representation and Performance Plan*

- 3 stages for Performance Plan
  - Acquire knowledge of the music and developing preliminary ideas about how it should be performed
  - Hard work on technical problems
  - A fusion of the two stages with trial rehearsals leading to the final version

## Practicing

- Mental vs Physical Practice
- Memorizing Music
- Rehearsal Techniques

## Mental vs Physical Practice

- Covert or imaginary rehearsal of a skill without any muscular movements
- Learning to perform music requires: instrument PRACTICE

### *Mental vs Physical Practice cont.*

- Quotes from Leimer (1932/1972):
  - “One must know the score or appropriate parts of it, by heart before proceeding to practice on inst. “
- Miller's(1956) Terminology
  - Practice sessions should be short and detailed
  - Short sessions evolve to more compound structures by the time of practice.
- Giesecking (1963)
  - Most of the practice was reading or memorizing the score

### *Mental vs Physical Practice cont.*

- Some researchers emphasize cognitive training, others exclusively training on the inst. and still others a combination of both.
- Rubin-Rabson(1930)
  - Groups that have analytical training of the score required less training time.
  - \*Mental rehearsal added after the instrument training was not beneficial

*Mental vs Physical Practice cont.*

- Coffman (1990)
  - Less advanced the person is on the instrument and the more difficult the music is, the more important is the motor practice.

## Memorizing Music

- Rubin-Rabson (1939)
  - Studied skilled pianists' memorization of short pieces: some minutes of analytical study was made before training on the instrument
- P. Johnson(1984)
  - Distributed practice is more efficient than massed practice (distributed: time between sessions)
- O'Brien (1985)
  - Practicing in parts was more efficient for longer pieces

## Rehearsal Techniques

- Gruson (1998)
  - Video taped different piano grade levels rehearsals for unknown pieces
    - Most common event: uninterrupted playing followed by repeating a single note, measure and slowing down
    - Higher the performance level, the more time was devoted to self guided speech, whereas the repeating notes were decreased
- Miklasweski(1989)
  - Video taped
    - Most frequent activity was playing alternately in fast and slow tempo.
    - Some fragments were short due to complexity

## 3. Sight Reading

- 4 main topics
  - General Characteristics
  - Eye Movements
  - Sight Reading and Memorizing
  - Relation to Musical Structure

*Sight Reading cont.*

## ■ General Characteristics

- Means: performing from a score without any preceding practice on the instrument of that score
- Combination of reading and motor behavior
  - A good sight reader: is a rapid reader and has a good instrumental technique.
- Reading patterns make one not notice misprints (Godowsky Experiment for poor sight reader and pianists. )

*Sight Reading cont.*

## ■ Eye Movements

- Horizontal and vertical readings and mixture of these
- Obviously depends on the structure of the music but also varied within and between pianists
- Goolsby(1994) infrared eye tracker.
  - Group study showed that, skilled sight-readers had more but shorter progressive as well as regressive fixations than less skilled ones.
  - Less skilled sight-readers fixated on virtually every note but rarely on expressive markings

*Sight Reading cont.*

## ■ Sight Reading and Memorizing

- Bean (1974)
  - Even excellent musicians may be poor sight-readers
  - Sight reading and memorizing are different processes
  - Good sight-reader works with effective chunking using short-term memory

*Sight Reading cont.*

## ■ Relation to Musical Structure

- Slobada (1974)
  - Sight reading is determined by various structural features in the music
  - Experimented on the eye-hand span
    - Suddenly removed the score
    - The best sight-reader had a span of 6-8 notes\
  - Experiments on reproducing notated patterns on musicians and non musicians.
    - Good melodies were easier to remember and reproduce for both groups.
- Musical Printing effected the sight-reading performance. (crowded notes, inconsistent spacing...)

#### 4. Improvisation

- Even performance of strictly notated music involves a certain degree of improvisation in the individual interpretation.
- On the other hand even performers of free jazz can not avoid using previously stored material.
- Between these two extremes are many intermediate levels.

#### *Improvisation cont.*

- Pressing(1984)
  - Survey of different areas:
    - Physiology, neuropsychological, motor control, intuition and creativity...
  - Seen as: sequence of non overlapping sections, each contains a number of musical events, called clusters
  - Improvisation is ordered union of events
  - The generation of each cluster is based on previous events, a referent, long term memory and current goals.
  - Two methods: associate and interrupt generation
    - Associate: similarity of clusters
    - Interrupt : totally going to a different direction.

#### 5. Feedback in Performance

- Perceptual feedback in performance may be auditory, visual, proprioceptive, that is, tactile, kinesthetic, and vestibular
  - The importance of Proprioceptive feedback is obvious. (for hearing impaired or deaf musicians)
    - Vibrotactile feedback from skin,
    - Kinesthetic feedback for the fingers to control the dynamics of the performance
  - Visual feedback
    - Communicating with the conductor, partner or with the audience (social feedback)

#### *Feedback in Performance cont*

- Delayed Auditory Feedback (DAF) has a damaging effect on performance as well as speech
  - Performers tend to slow down their performances
  - Three strategies are followed: play fast get in front of the feedback, play slow to catch up with it, or ignore it.
- Auditory Feedback also involves hearing sounds from other instruments

## 6. Motor Processes in Performance

- 1. Some General Questions
- 2. Motor Exercises
- 3. Theories of Motor Skill
- 4. Empirical Investigations
- 5. Expressive Movements

### *Motor Processes in Performance cont.*

- 1. Some General Questions:
  - Although central to music, they are still little understood
  - Sidnell(1981) asked questions concerning efficient motor practice, motor memory, the role of proprioception, and application of current motor models.
  - Hedden, Handel, Roehman Taubmann, Ortmann, McArthur tried to find answers to these questions from the perspective of relation between practicing and motor movements. (ie. Fast vs slow practicing.)
    - Ortmann: concluded that the correct shape of the movements in fast playing must be analyzed and brought into slow playing.

### *Motor Processes in Performance cont.*

- 2. Motor Exercises
  - There is evidence that note timing changes with different tempi in motor exercises
    - For intermediate tempo smallest variability of inter-note intervals was found while, for slower or faster tempi, the variability increased.
    - Velocity of key-press increases with increased tempo.
    - Left and right hands differed in key press velocities, note durations and overlap between consecutive notes.

### *Motor Processes in Performance cont.*

- 3. Theories of Motor Skill
  - Closed-loop
  - Open-loop
  - Schema theory
  - Bernstein Theory

*Motor Processes in Performance cont.*

- Closed loop theory:
  - Sensory information from the produced movement is fed-back to the central nervous system and compared with an internal referent to check consistency between the intended and the actual movement
  - Self disciplinary
  - Such feedback is too slow to account

*Motor Processes in Performance cont.*

- Open-loop theory:
  - postulates a central or executive control of all movements in a sequence
  - Not relying on a feed-back system
  - Assumes a hierarchical structure with higher levels containing abstract representations which are suitable for fast movements, more and more specificity is added on lower levels.

*Motor Processes in Performance cont.*

- Schema Theory
  - Assumes that there exist abstract representations of classes of motor actions
  - One must not learn and store every single movement, it can be generated from the stored schema
  - A recall schema is concerned with the execution of the movement and a recognition schema with the evaluation of the response

*Motor Processes in Performance cont.*

- Bernstein Approach
  - Argues that the number of combinations of muscle setting for different movements is too large to be managed by a controlling executive
  - Muscles are not individually controlled but function in muscle linkages or coordinative structures.
  - Muscle groups functions as functional units

*Motor Processes in Performance cont.*

## ■ 4. Empirical Investigations

- Shaffer(1980)
  - Theory of motor programming: meaning that a sequence of movements can be coordinated before they are executed
  - Ensures fluency, expressiveness, and generate flexibility of the performance

*Motor Processes in Performance cont.*

- Timing is handled by an internal clock, that acts like a reference and is used for timing of the beat or appropriate unit.
  - Rate can be changed to achieve expressive variation in timing.
- High degree of reproducibility in repeated performances suggests that the musician's interpretation of the score, in combination with his general knowledge of music theory and musical style is able to generate appropriate expressive structures in the motor program on different occasions.

*Motor Processes in Performance cont.*

## ■ 5. Expressive Movements

- Performers move in many other ways not directly related to the generation of sound from the instrument but to the character of the music.
- Such expressive movements are important parts of performer listener communication
- Davidson(1993) tracked the movements of elbows head, wrist and knees and analyzed whether the movement is correlated with the expressiveness.

*Motor Processes in Performance cont.*

## ■ Davidson's experiment

- A piano player performed the melody in three different moods: deadpan, projected (concert performance) and exaggerated
- Observers were presented: vision only and audio only
  - Point light patterns are effective for distinguishing the manner of the performance