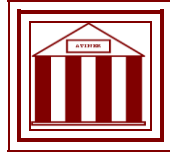


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**Playing Right – from the End.
Basics and Application of Retro
Sequential Practice (RSP)**

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**Playing Right – from the End.
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Abstract

In everyday life musicians of all genres and levels are faced with multiple challenges practicing their instruments: mastering difficult passages, increasing tempi, improving metric/rhythmic precision, expanding or memorizing repertoire, sight-reading...etc.

Related sciences, particularly from the fields of skill development, motor and language learning, showed that these tasks heavily depend on the automatization of the musician's motor and cognitive skills. Therefore most methods suggest start practicing in lower tempi – usually from the beginning of the musical piece, section or phrase. Nevertheless, sometimes even the most effortful and ambitious practice seems to leave the learning process ineffective and the musical skills unstable.

Consequently, Retro Sequential Practice (RSP) draws some attention as a musical practice method trying to approach those problems more successfully by focusing on the primary automatization of the terminal sequences of a musical object and its stepwise (sequential) backward oriented elongation.

It is argued that RSP optimizes the musical learning effect by conclusively aligning instrumental practice according to neurophysiological and neuropsychological facts, conditions and phenomena.

The conference participants get introduced to the RSP method, gaining insights to its basic features, its main principles of operation and the current state of development.

Furthermore the talk will discuss differences and possible advantages of RSP in comparison to anterograde practice methods. Moreover, the examples of some empiric findings should emphasize the interrelation of musical fluency and design of practice, general physical/psychological conditions and a perhaps mal-estimation of the practicing results.

Finally, since there is surprisingly no scientific research or study on RSP so far, the presentation seeks to encourage the scientific community as well as musicians of all levels and genres to direct some attention to a continuative academic support, practical integration and further procedural improvement of the promising method of RSP.

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Introduction

The impetus for the elaboration of RSP gets back to an informal conversation about the efficiency of several practice methods concerning performance quality with a fellow student of mine. He commented that the difficult note would usually not be the one he is actually singing but always the next to come. So the obvious advice was to practice this note first and not combine it with the note before until it got sufficiently stable.

Like most approaches to learn or improve playing a musical instrument RSP pursues the objective of developing musical competences covering the acquisition, maintenance and perfection of the related motor and cognitive skills.

Recent research in motor control and cognitive neurosciences not only proved some of the empiric knowledge accumulated in learning music over the centuries but also supports some challenging perspectives on continuously enhancing and improving those methods in the future. So there is much accordance between RSP and the traditional methods concerning the underlying learning principles leading to the aspired improvements. But RSP's originality is made of a distinctive difference in the procedural orientation of the learning process. In contrast to all other methods RSP explicitly focuses on the primary automatization of the terminal sequences of a musical object (phrase, pattern, section or piece) and its stepwise (sequential) backward (retro) oriented elongation.

Interviews showed that the principle of RSP is not completely unknown to musicians, teachers or students and is even used partially or in some kind of variation by few of them.

Objective

The questions arising now are: does RSP possibly have realistic advantages in comparison to other practice methods? If so, how can they be explained?

To follow up these questions the practical need will be portrayed first, followed by the theoretical analysis of the method and discussion of some implications drawn from empiric findings.

Background – the practical need of enhanced practice methods

Regardless of the proficiency level and genre, musicians in everyday life are faced with multiple challenges practicing their instruments: mastering difficult passages, increasing tempi, improving metric/rhythmic precision, expanding or memorizing repertoire, sight-reading...etc. Moreover, those tasks are accompanied by a certain pressure of time usually arising from the next lesson, a forthcoming competition or a tight rehearsal or concert schedule.

But even despite of effortful and ambitious practice sometimes the learning process appears to be ineffective, leaving the results unstable and unsatisfying. These problems usually arise from different sources:

1. Design of practice

In order to successfully learn the music practice usually starts at the beginning of a musical object (anterograde practice). As soon as difficulties occur the learner interrupts and starts again from the very beginning. Often further trials performed in the same way do not help to overcome the problem but something else is consolidated instead of the music: the difficulty forcing the interruption.

In this case isolating the problematic spot, shortening the musical object or decreasing the tempo are common use and sometimes helpful. But with every unsteady passed run through the knowledge about the instability is continuously consolidated, as are the accompanying negative emotions that often provoke further failure like a self fulfilling prophecy.

2. Dispositions of physical condition and attentiveness

Regarding to human nature all musicians are subject to given physiological dispositions of physical and psychological conditions, which means physical strength and endurance weaken gradually as well as focused attention does. That explains the usually appropriate consolidation of the initial musical objects in anterograde practice as well as the uncertainty concerning the following musical objects. With weakening physical condition and fading attention the difficult spot is either approached with limited processing depth or – in the worst case – not even reached at all.

3. Mal-estimation of capability

Practice is accomplished by repetition. But after the first successful run through a problematic musical object students often tend to exclaim an euphoric ‘got it!’ moving right on to the next issue. The problem here is mixing up trial (in the meaning of learning by trial and error) and practice (in the meaning of consolidation by correct or intentional repetition). Since no stabilization has taken place the results remain at the level of an uncertain capability, which still needs in- (and ex-) -tensively further efforts to develop to a reliable skill. Experiencing that and knowing how are important prerequisites for musical learning but don’t necessarily include the practical proficiency. The practice starts where the trial ends – with the first success!

Also statements of dissatisfied students like: ‘Usually I can play it’ or ‘it did work at home’ indicate that there are obviously several stages of consolidating skills. On the one hand the first accurate performance in a familiar environment is a first step towards the ability to succeed also under unfamiliar, even unpredictable conditions as they might occur at recitals, concerts or competitions. On the other hand there is not really certainty about whether the ‘usually’ stable skill is actually the xth. trial that finally worked out fine. That of course, is not in accordance neither with the way of presenting practice results in lessons nor with the conditions occurring in public performances.

The method - how does RSP work?

In order to an appropriate application of RSP a musical object (MO) has to be selected first. This musical object has not necessarily to be the end of the piece - although of course it well might be - but just any section, phrase or motif at someplace within the music. Of real importance is how the once selected MO is proceeded furthermore.

Applying RSP, practicing starts by playing the very last sequence of the selected MO about 5-10 times in 'blocked condition' (unvaried). Hereby a sequence is defined as the smallest, yet automatized (internalized) part of the MO, which can be performed fluently at the original or intended tempo without any inherent problems (see fig.1). Most likely, this will be a group of 3-9 notes, but also just might be an interval as well. After 5-10 consecutive and successful repetitions a first level of consolidation is achieved, allowing the elongation of the actual sequence by the preceding note, interval or group of notes. Now, this backward extended new sequence is played again approximately 5-10 times and also elongated after successful accomplishment. This approach is to be continued until the very beginning of the MO is reached.

The goal of shortening a MO in RSP is to play the emerging sequences 'right' or at least 'intended' regarding sound, related motor action and tempo as well as according to additional parameters as i.g. articulation, phrasing and dynamic etc. from the very first trial.

Approaching the complexity of the music this way takes practice a lot more towards 'playing music' than just 'sticking to the text' could do.

Implications and discussion

Although there are no specific studies on RSP yet, recent fundamental research of cognitive neurosciences and motor control might help to explain some of the implications of RSP, which were drawn from empiric findings during the last 10 years of work with students as well as from interviews with musicians and music teachers and from my own experience in applying RSP.

These findings indicate that RSP apparently has certain effects on the musical learning process, especially regarding to:

- Accomplishing of complexity and structuring of learning content
- Specifying of perception and sharpening of imagery
- Enhancing of retention and accelerating of skill development
- Strengthening self-confidence, intrinsic motivation and improving stage presence

Accomplishing those aspects is always a central concern of practice methods. In RSP this is achieved by applying the general learning principles of selection, reduction, temporarily isolation, simplification and repetition to musical objects. Accordingly, shortening MO's to yet consolidated sequences is a key feature of RSP, allowing learners to perform the music - although partially - in an aspired or at least intended tempo from the first trial in all of

it's musical complexity. Favoring tempo instead of the sequence's length seems to be essential for several reasons:

Musical reasons: music is a function of time, in which the perception and production of musical features strongly depends on the frequency (tempo) of single physical events, starting from rhythmic impulses, distinct pitches, timbre and resonance up to soulful shaped sound. Furthermore, most of the musical phenomena like embellishments, phrasings, stylistics or voice-leading are tempo-specific as well.

Neurophysiological reasons: (musical) motor movements are based on underlying neuronal patterns, defining extend and strength of muscles contraction. The specific motor neurons are located in the motor cortex (MC) of the brain and are triggered by higher-ranking motor control programs of the supplemental motor area (SMA). The development of these supplemental motor programs (SMP) - amongst others - occurs to be tempo-specific as well, i.e. fast motor movements require other motor programs than slower motor movements. Therefore, to accomplish the ability to perform higher tempi it is necessary to practice in higher tempi, even if it requires the (temporarily) shortening of a musical object to an already consolidated sequence.

Psychological reasons: our brain is 'programmed' to succeed and rewards accomplishment by the release of endorphins that trigger an even more striving attitude towards practice. That cycle of positive self-enhancement might well be initialized by the prior correctly performed sequences and get's perhaps furthermore amplified by the discovery of something unexpectedly exciting: the ability to accomplish even difficult spots or passages – although shortened – in original tempi and musical complexity. This, of course helps gaining self-confidence, which helps improving overall stage presence.

In addition to the aspects of the specificity of time the procedural orientation of the method is of essence as well. Regarding to 'playing forward' and 'extending backward' RSP connects the anterograde and the retrograde orientation in music. This phenomenon is well known as bi-directionality, which is the most accomplished principle in nature at all. The examples span from simple caloric processes or osmosis and diffusion, the construction of our subjective perception up to the most sensitive procedures of the replication of the genetic code. This has a lot to comment about the practicability of bi-directionality, finding the functionality of RSP probably resting on one of the most robust and resilient principles of operation at all.

Furthermore, RSP adequately complies with the given dispositions of physical condition and attentiveness, which both are subject to gradually weakening (fig. 2). In contrast to anterograde practice methods the principle of retrograde elongation in RSP always gets the novelty, i.e. the difficulty, on top of the practice. It is apparent, that having the most demanding spot at the beginning of the practice has the advantage of approaching it in fresh shape and with focused, i.e. unsplit attention. Both these factors are essential to increase the probability of successful performance by the first trial and further correct repetitions and leading directly to initial automatization and stable retention. The emerging automatization of auditory perception and related motor action gradually allows redirecting some attention to additional

parameters of the performance such as haptic, kinesthetic, visual, semantic or emotional aspects, which supports the development of a solid multimodal internal representation of the entire action (Altenmüller 2006).

Thus, RSP unfolds its special value for the musical learning process by antagonizing the naturally given dispositions of decreasing physical condition and fading concentrativeness during practice in the only possible way: by increasing the degree of the automatization of musical skills the opposite direction. That is critical due to the functionality of our brain, which sorts, proceeds and stores all input by the criteria of frequency, similarity and relevance. In a musical context that means: frequent, and intense practice of correct (or intended) musical sequences is more beneficial for internal representation than infrequent and unemotional repetition of incorrect sequences.

Of certain importance for the practicability of RSP is the functional combination of two practice methods, usually discussed contrary by motor scientists and music educators: blocked and varied practice. Blocked practice is based on the unvaried and identical repetition of a certain learning content, which leads to better results during the acquisition phase. In contrast, varied practice relies on consecutively switching focus between different parameters of a skill such as articulation, phrasing, dynamics, tempo, etc. or generally alternating skills. Hereby the more frequently retrieval of different memory contents leads to better retention than under blocked conditions (Shea & Morgan 1978, Schmidt 2006, Schmidt & Lee 2005). Obviously, both the methods provide advantages, which are linked in RSP by combining blocked repetition of the terminal sequence and its successive retrograde elongation (variable aspect).

Conclusion

The theoretical analysis of RSP and the discussion of the implications for the musical learning process lead to the following outcomes here:

First, RSP is a musical practice method and therefore similarities and differences in comparison to anterograde practice methods appear.

Among the common ground RSP shares with anterograde practice methods are the underlying fundamental learning principles (such as selection, reduction, temporarily isolation, simplification and repetition) and the objectives pursued (proficient development of musical skills).

But the explanation of RSP's key features pointed out some distinct differences as well:

First of all, there is to make mention of the methods starting point and procedural orientation, saying: RSP is a musical practice method that focuses on the primary automatization of the terminal sequences of a musical object and its stepwise (sequential) backward (retro) oriented elongation.

Furthermore, by playing forward and extending backward RSP implements bi-directionality - the most often accomplished principle in nature - as its main principle of operation.

Moreover, RSP takes advantage of merging the positive learning effects of other practice methods (such as blocked and varied practice).

Overall, RSP optimizes the musical learning effect by conclusively aligning instrumental practice according to neurophysiological and neuropsychological facts, conditions and phenomena and unfolds its special value for the musical learning process by antagonizing the natural given facts of decreasing physical condition and fading concentrativeness during practice in the only possible way: by increasing the degree of the automatization of musical skills the opposite direction.

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Figure 1. *Functional schematic of RSP*



Figure 2. *Schematic diagram of the interrelation of concentrativeness, physical condition, automatization and performance in RSP*

