

Does practice make perfect?

**Current theory and research on
instrumental music practice**

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The effects of individual differences in motivation, volition, and maturational processes on practice behavior of young instrumentalists

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Introduction

Practicing is a fundamental activity of musicians. It is known that this activity has to start at an early age if a career of professional instrumentalists is supposed to be ultimately successful. Increase of quality of instrumental playing is not only based on an early start, but also on the quality of practice. Experts generally agree that motivation, starting age, prior experience, supervision, and metaknowledge of practice influence the quality of practice of sub-experts (e.g., Lehmann, in press, for an overview; Harnischmacher, 1993). The present study will show to what extent the influence of variables related to motivation and volition have on the practicing of sub-experts, including children and adolescents. To my knowledge, there are no studies on volitional influences on the practicing of music students during childhood and adolescence. It will also be investigated if the explanation of individual differences in practice behavior is more accurately predicted through motivation and volition or influences of maturational changes. Therefore, I will discuss instrumental practice and its relation to maturational processes, motivation, and volition. The present study continues the explorative approach of a previous study on instrumental practicing behavior of children and adolescents (Harnischmacher 1995). This study analyzed written essays on the topic "My practice" of 100 German students from private music studios.

Similarly, the present study attempts to describe instrumental practice as an everyday action (e.g., Hallam, 1995, Harnischmacher, 1993). From a theoretical perspective, the category of action describes only one aspect of human behavior (e.g., Ribke, 1985). Under normal circumstances, instrumentalists do not only use a single practice method, but a whole complex repertoire of practice methods. The structure of the practice methods can be described in larger interplay of individual methods. Experts distinguish different phases of practice, of which the first phase corresponds to the maintenance of performance level (warm-up, scales, technical exercises,

etudes, repetition of repertoire pieces), while the second phase is focused on skill-building and the acquisition of concert repertoire (acquiring new literature, new interpretation of learned repertoire pieces; see Harnischmacher, 1993). The present study tries to explain the use of corresponding methods, and it investigates more complex connections among those different aspects of children's and adolescents' practice.

One important explanation for differences in the practice behavior relies on maturational processes (Manturzeweska, 1990). Musicians tend to develop useful practice strategies relatively late, and the length of practice time varies at different stages of life (Harnischmacher, 1993; Sloboda, Davidson, Howe, & Moore, 1996). Harnischmacher (1994a, 1995) found four developmental stages in the practice of children and adolescents. During the first stage, the "Activity Phase", when students are approximately 8 to 10 years old, practice is characterized by the playful component as a self-generated form of action. In the stage of "Adoption" (age 11 to 12 years), the child adopts an externally imposed work ethic. Also, it starts to think about the causality and goal-orientation of practice. During the stage of "Assimilation" (age 13 to 14 years) practice becomes a chore that is integrated into the daily schedule. Here, the playful component of practice serves as relaxation. In the stage of "Identification" (age 15 to 18 years), the student reflects on the self-orientation of practice, and the increased quality and economy of practice plays a more important role. In the course of the stages, the initial and only playful component vanishes, yet it remains in the "social game" of playing with others.

It remains open to what extent these stages describe a qualitative characteristic of the development of practice specifically, or rather if these changes are the result of more general maturational processes. Therefore, the present study investigates the possible contribution of age and starting age (age at which instrumental training began) on instrumental playing (e.g., Ericsson et al. 1993, Sloboda et al., 1996, Lehmann, in press). Only those practice procedures will be considered that were previously found to be relevant for the practice behavior of children and adolescents (Harnischmacher 1994a, 1995).

Motivational and volitional processes are likely to predict and explain practice behavior to some degree. Motivation in a narrow sense describes the reflection on and choice of a goal for action based on an "expectancy-value" model (e.g., Heckhausen, 1989). Different motivational settings will be described below in the context of practice, distinguishing a real situation (performance preparation), a perceived situation (goal orientation, external action distraction), and a disposition (self-concept abilities of instrumental playing). Finally, I will outline dispositional aspects of volition pertaining to instrumental music practice.

Motivation depends primarily on the concrete situation (e.g., Kuhl & Beckmann, 1994). The distinction between practicing as performance preparation as opposed to practicing without performance preparation is a good predictor of practice times. Music students increase their practice times when practicing for an upcoming performance (Harnischmacher, 1993, p. 168). Thus, an upcoming performance seems to have an extrinsically motivating effect.

In addition to objective characteristics of the situation, subjective perception of situational aspects play an important role (Eckes, 1990; Forgas, 1983). This was investigated in the previous study (Harnischmacher, 1995). The cross-sectional analysis of 100 student essays showed affective-evaluative aspects and particularly

action promoting or action inhibiting aspects of practice, which is consistent with the general claims by King and Sorrentino (1983) for goal-oriented situations. In the action promoting category of goal orientation, students listed their short- and long-term goals of practice. In order of frequency of occurrence, practice is mainly oriented towards ensemble playing (60%), followed by the musical pieces (26%), the instrumental teacher (10%) and rarely directed toward the instrument (4%). The category of external action distraction captures negative influences on practice which are attributed to certain environmental conditions. The students did not see themselves as being responsible, but rather as falling "victim" to external influences. In this category of external action distractions, students named close relatives (47%), followed by (disliked) musical pieces (23%), competing leisure activities (20%), and finally the weather (10%) as influences that impinge on their practice. I suggest to view goal orientation and external action distraction as habitual perceptions of the practice situation.

Practicing in the presence of listeners imposes a specific motivational problem. Children and adolescents report that the "supervision" of practice (mainly by the mother) can be perceived as either stimulating or irritating (e.g., Brokaw, 1983; Sloboda et al., 1991; Barry & McArthur, 1994; Harnischmacher, 1995). According to Heckhausen (1989) the extrinsic motivation of an affirmative feedback may possibly corrupt the extrinsic motivation in these children. Furthermore, it must be considered whether or not listening actually reaches the criterion for supervision (e.g., Barry, 1992) or of a "live-in-teacher" (e.g., Lehmann, *in press*). This present study asks if the total number of practice days with listeners influence the situational cognition and the practice at all.

In addition to being dependent on the real or perceived situation, motivation is also likely to be influenced by dispositional attributions (Heckhausen, 1989). According to Gollwitzer (1988), the motivational mental state includes the decision between alternative actions and uninterminated motivational tendencies (e.g., Atkinson & Birch, 1970) which are due to individually perceived competencies and ensuing expectations. A motivationally relevant construct is the self-concept of abilities (cf. Krampen, 1987). The domain-specific self-concept of instrumental playing abilities, defined as "cognitively and affective-evaluatively imparted reflection regarding one's individual competence for playing an instrument" (Harnischmacher, 1993, p. 52; also Svengalis, 1978; Austin, 1988). Among other things, it was shown that music students have differently shaped self-concepts of musical abilities which are in agreement with their identity goals (e.g., becoming a soloist, an instrumental teacher, or a music educator). Instrumentalists with a more positive self concept practiced more intensely than instrumentalists with a less positive self-concept; and after a few days of rest instrumentalists with a more positive self-concept already realized their decreasing playing skills (Harnischmacher, 1993).

Motivational processes do not imply that the action is indeed followed through to the intended goal (Heckhausen, 1989). According to Kuhl & Beckmann (1994), the initiation of an action, the persistence and overcoming of inner action obstacles can be explained through volitional processes. The authors distinguish the disposition of action from that of state orientation. Simplified, action-oriented subjects have it easy considering and choosing between different action tendencies and initiating an action until the intended goal is reached. Conversely, state oriented subjects are

excessively hesitant, ponder when considering different action tendencies, and are self-centered. In connection with instrumental practice, action-oriented music students tend to plan more and possess a well-structured method of practice. Also, they tend to use more of their time for practice and practice more regularly than state oriented students (Harnischmacher, 1993).

Action vs. state orientation and the self-concept of instrumental playing abilities can not only be related to volition and motivation, but these variables can also be understood as personality-related (e.g. Harnischmacher, 1994b, Kuhl & Beckmann, 1994). By this, I do not mean global, stable dimensions of personality, but specific constructions which to a large extent are based on fundamental learning processes.

Concluding, the present study suggests that motivation and volition have an influence on practice behavior of children and adolescents in addition to maturational processes. Maturational processes are implied in age and starting age of instrumental playing. Here, motivation is considered situational (performance preparation vs. no performance preparation) as well as dispositional (self-concept of musical abilities), while volition includes a disposition towards action or state orientation.

Note that the claim is not that motivational or volitional influences practice behavior as a whole (Harnischmacher, 1993), but only relevant behavior patterns of practice (e.g., Forgas, 1976). The influence of motivational and volitional variables is probably more obvious the less familiar, more restructured, or more stressful the practice situation is for the student (e.g., Krampen, 1987, for a general finding outside music; Land, 1979; Dews & Williams, 1989, for music students).

Method

Inventories

In order to understand instrumental practice as an everyday behavior, an extensive survey study was conducted. The inventories concerned practice methods, amounts of practice, and socio-demographic variables. Items regarding practice methods were formulated based on the findings of a recent qualitative study (Harnischmacher, 1995). The other questionnaires consisted of a short form of the Self-Concept Scale of Instrumental Abilities (Harnischmacher, 1993), adapted for children and adolescents. Also, scales for Goal Orientation of Practice, External Action Distraction, and Action Control Scale (ACS 90/ Hakemp 90) by Kuhl and Beckmann (1994) were administered.

The questionnaires were pilot tested with music students in order to test face-validity, the students' understanding of the questions and their readiness to answer. As a result, some questions were rephrased. The final form of the questionnaire was administered in a pre-test involving 44 students from different music studios between the ages of 9 and 14. Since instrument-specific selection effects and effects of confounding variables had to be expected (Harnischmacher, 1995), only woodwind players were allowed to participate. The observations from this pilot study (Harnischmacher, 1995), namely that children and adolescents are willing to report about their practice very candidly, were generally confirmed.

Subjects

One hundred and fifty-one woodwind students (main instrument) from five German music studios participated in the main survey. The questionnaire asked the students to give information regarding their practice behavior during the previous week. The return rate for the questionnaires was 65% ($N = 142$). With 87% females and only 13% males, the gender distribution was problematic. In order to exclude possible selection biases and third variable effects, an arbitrary sample of 111 females ($N=111$) between 9 to 20 years with an average age of about 14 years (13.62) was examined. All other questionnaires were discarded. On average, the subjects had their first music lessons on their main instrument at an age of 10.1 years, with an age range from 6 to 17 years. As regards the distribution of instruments played, 82 of the young musicians were learning the flute, 16 the clarinet, 8 the recorder, and 5 were playing the oboe.

Results

Reliability and discriminant validity of the instruments

The tests of reliability and discriminant validity yielded first results for the scale for Self-Concept of Instrumental Ability (SCI), External Action Distraction (EAD), Goal Orientation of Practice (GOP), and subscales of the ACS 90 (1. action orientation after failure [AOF], 2. action orientation in planning actions [AOP], 3. action orientation in centered activity [AOC]). See Table 3.1.

Table 3. 1
Reliability scores (internal consistency), means, and standard deviations for unselected and selected (*) Items for selfconcept of instrumental abilities (SCI), goal-orientation of practice (GOP), external action distraction (EAD), and action control scales (AOF, AOP, AOC).

Subscale	SCI	GOP	EAD	AOF	AOP	AOC
Items	13	10	10*	12	12	8*
Mean	22.8	17.5	10	4.2	5	6.27
Standard deviation	4.86	4.81	3.91	3.26	2.82	0.88
Cronbachs alpha	0.86	0.76	0.71	0.81	0.7	0.71

Despite the shortness of the scales, acceptable reliability values, with Cronbach's alpha between 0.70 and 0.86, were found. The selected item pool of EAD and AOC scales contained only items with coefficients of more than 1.75.

The next section will demonstrate the discriminant validity of person-oriented scales (SCI, AOF, AOP, AOC) through the use of correlations, see Table 3.2.. The correlations confirmed the expected connection between SCI and action control scales (AOF, AOP, AOC).

Table 3.2
Correlations of the self-concept scale of instrumental abilities (SCI) with
action control scales (AOF, AOP, AOC).

	SCI	AOF	AOP
AOF	0.26		
AOP	0.29	0.44*	
AOC	-0.08	-0.37	-0.13

* $p < 0.05$

The positive correlation between AOF and AOP scales is also mentioned by Kuhl and Beckmann (1994). The negative correlation between AOC and the other Action Control scales is remarkable. Since the AOC scale also functions as control variable for excessive activism, it cannot be excluded that the AOP and AOF values in the present case describe a certain degree of volatility (activism) (cf. Kuhl & Beckmann, 1994). The low correlations suggests a generally satisfactory discriminant validity of the individual scales. It was further examined to what extent the variables of situational perception (EAD, GOP) were related to aspects of the real situation (e.g., number of practice days, siblings). There was an almost zero correlation between the number of practice days with listeners and the external action distraction ($r = .09$, n.s.), and between number of practice days with listeners and goal orientation ($r = -.004$). External action distraction did not significantly correlate with the number of siblings (living together) ($r = -.22$, n.s.). Also, separate correlations of relevant items (Nos. 1, 4, 7, 9) of the EAD scale (see Appendix) with the number of days practiced with listeners did not show significant correlations ($r < 0.162$, n.s.). There was a significant correlation between item no. 1 ("Other people disturb me during practice") and the number of siblings living together ($r = .32$, $p < 0.001$). In general, the low correlations confirm the theoretical assumption that the two variables (GOP, EAD) describe a habitualized situational perception and subjective components, which are only partially related to "objective" situational characteristics (e.g., practice days with listeners, number of siblings at home).

Relevant practice activities

The first step examined which practice methods were relevant for the present problem. It should be remembered that the supposed influences do not affect practice behavior as a whole (Harnischmacher, 1993). Kruskal-Wallis's non-parametric analyses of variance were used to test for significant ($p < .05$) differences in the distributions of the answer categories (always, frequently, rarely, never) of the scores from SCI, GOP, EAD, and action control scales (AOF, AOP, AOC).

Table 3.3 shows significant differences of situational perception (SP) and personality dispositions (PD) for the different practice methods (see discussion of Table 6 for the original questionnaire statements that correspond to the short descriptions). Of the 15 questionnaire items on practice methods, 9 practice methods differed significantly ($p < .05$) with regard to the SP/PD variables. The following questionnaire items of practice methods did not show significant differences: (a) At first, I play through the whole piece; (b) I repeat the piece a number of times in

succession; (c) I practice etudes; (d) At first, I practice everything slowly; (e) I closely look at the music before practicing; (f) I practice forte and piano in a piece right from the beginning.

Table 3.3
Differences among personality dispositions (PD) and situational perception (SP) for individual practice methods

Practice methods	SP	PD	corr.chi2	p value
Playing famil. pieces		AOC	7.9549	.047
Scales	EAD		12.7128	.005
New pieces	GOP		8.3534	.039
Warming up	EAD		8.1974	.042
Metronome	GOP		10.9578	.012
Raising tempo	GOP		9.1683	.027
Raising tempo		AOC	9.3520	.025
Correcting errors	GOP		15.3634	.001
Correcting errors		SCI	9.2133	.026
Improvising	GOP		8.8676	.031
Improvising		SCI	9.9091	.019
Dividing in sections	EAD		8.9894	.029
Dividing in sections		SCI	9.6627	.021

Practice times

Next, the practice times were analyzed separately, depending on whether or not the young musicians were preparing for a performance at the time of the survey. In addition, the various aspects of practice time are examined, determining whether practice was more influenced by age or by motivation and volition.

Compared to the group not preparing a performance, the group preparing for performance shows slightly more average practice time (see Table 3.4). With regard to the number of practice days during the previous weeks the two groups did not differ. However, the differences in practice times between those students with performance preparation and those without were not significant. Previous results suggested that the practice situation (performance preparation) has to be taken into account (e.g., Harnischmacher, 1993). In order to exclude possible third variable effects (e.g., influence of teacher or parents in connection with the performance situation), the practice times in the present case were analyzed by separating the students who were preparing and those who were not preparing a performance. The group "no performance preparation" was on average age 13.6 years old, the group "performance preparation" 13.7 years ($F = 1.23$, n.s.), and there was no reliable differences in starting ages of music training (both around 10.1 years).

Table 3.4
Mean practice times with and without performance (concert) preparation

	Concert preparation	No concert preparation
Ideal time*	39.16	36.26
Maximum time**	32.77	29.33
Minimum time**	14.44	11.41
Practice days***	4.69	4.69
Days with listeners***	1.08	1.37

Note: *Minutes per day in one week, **Minutes of one day in the last week, ***related to the last week.

Tables 3.5A and 3.5B shows the influence of personality dispositions (PD), of situational perceptions (SP), and of age, examined in separate, stepwise regression analyses for each of the variables relating to practice time: ideal time, maximum and minimum amount of practice per day, and also the number of practice days per week.

The results of the stepwise regression analyses ($P < .05$) will allow to show whether practice times are more influenced by age or by PD/SP variables. Age and PD/SP variables did not correlate significantly ($r < .11$).

Table 3.5A
Influence of age, personality dispositions (PD), and situational perceptions (SP) on practice times in the group without performance (concert) preparation. Results of stepwise regression analyses for practice times.

Ideal time	R ²	F	Sig. F	Beta	T	Sig. T
Age	0.055	2.108	0.128	0.226	1.959	0.053
EAD				-0.098	-0.854	0.395
Maximum time						
EAD*	0.062	4.868	0.030	-0.250	-2.206	0.030
Age				0.984	1.478	0.143
Minimum time						
EAD*	0.088	7.105	0.009	-0.298	-2.666	0.009
Age				0.984	1.221	0.225
Practice days						
AOP*	0.116	9.582	0.003	0.340	3.096	0.002
Age				0.994	0.094	0.925

Note: *Variables in the equation ($P < .05$)

Table 3.5B
Influence of age, personality dispositions (PD), and situational perceptions (SP) on practice times in the group with performance (concert) preparation. Results of stepwise regression analyses for practice times.

Ideal time	R ²	F	Sig. F	Beta	T	Sig. T
Age*	0.316	15.769	0.000	0.503	3.869	0.000
SCI*	0.456	13.813	0.000	-0.377	-2.901	0.006
Maximum time						
Age*	0.244	10.966	0.002	0.494	3.312	0.002
SCI				0.975	-0.024	0.981
Minimum time						
EAD*	0.311	15.362	0.000	-0.681	-4.802	0.000
Age*	0.418	11.867	0.000	0.349	2.466	0.019
Practice days						
AOF*	0.406	232.69	0.000	0.637	4.824	0.000
Age				0.926	0.144	0.886

Note: *Variables in the equation (PIN < .05)

The contributions of the individual variables (see Table 3.5) showed the expected results: the lower the self-concept of abilities (SCI) in the performance situation, the higher the estimate of daily ideal amount of practice time. In general, an increase of practice time correlated with a lower tendency to external action distraction (EAD). The tendency toward goal and action orientation (GOP, AOP, AOF) was associated with longer practice times. Under conditions of performance preparation the influence of age is noticeable.

The amount explained variance (R²) for the group preparing for performance differed significantly from that of the group not preparing for performance. In the group preparing for performance, the amount of variance explained is over 40%, while it varies between 5% and 11% in the group not preparing for performance.

Dimensionality of practice

During everyday practice behavior of musicians, practice methods are not used in isolation, but in complex methodical combinations. Hence, practice behavior is not characterized by a few ideal typified methods, but consists rather of a complex set of practice methodologies (Harnischmacher, 1993). The following explorative factor analysis will demonstrate if such connections exist for a set of relevant practice variables (see Table 3.3), and whether or not resulting factors can be meaningfully interpreted as basic dimensions describing the practice behavior of music students.

A Principal Components factor analysis (see Table 3.6) extracted four factors with an eigenvalue greater than one (Kaiser criterion). Combined, the four factors explained about 63% of the total variance in practice methods, while the remaining

Table 3.6
Principal component factor analysis for selected practice variables

Factor	Eigen value	% of Var.	Cum. %
1	2.01389	22.4	22.4
2	1.40000	15.6	37.9
3	1.22800	13.6	51.6
4	1.01359	11.3	62.8
5	0.85717	9.5	72.4
6	0.81657	9.1	81.4
7	0.71214	7.9	89.3
8	0.53617	6.0	95.3
9	0.42247	4.7	100.0

37% of the variance were not explained by the factor model.

For the interpretation of the orthogonal rotated matrix (see Table 3.7), only loadings greater than .5 and their signs were considered. As a further interpretative help, a previous factor analysis on practice behavior of music students was considered (Harnischmacher, 1996, p. 169f). In the earlier study, 14 practice variables similar to those in the present analysis revealed 5 practice factors. In the present factor analysis (see table 3.7), the first factor consisted of the following items: (a) "I play scales" (no. 2), and (b) "At first, I warm up during practicing" (no. 4). It was very similar to the first practice factor already shown for older music students at colleges (Harnischmacher, 1993, p. 169). In both, the present and the preceding study, the first factor describes a practice behavior that presumably primarily serves for maintenance of performance level. Factor 1 was interpreted as a practice complex that primarily facilitates build-up and maintenance of fundamental technical skills, and it was accordingly referred to as *Basic practice*. The marker variables of the second factor were: (a) "I play new pieces that I do not know yet" (no. 3), (b) "I practice with a metronome (measure counter)" (no. 5), and (c) "I play until I make a mistake which I then correct" (no. 7). Factor 2 was also similar to the second factor of the college student sample (Harnischmacher, 1993, p. 169). This factor implies some aspects of analysis of music- or instrument-related technical problems, as well as the mediating control by metronome. This second factor was called *Analytical practice*. The marker variables of the third factor were: (a) "I gradually increase the tempo of the pieces (parts)" (no. 6), and (b) "I first split the piece in segments that I want to practice" (no. 9). This factor was also interpreted as a type of analytic practice, emphasizing the planned, stepwise, and constructive procedure. The planning aspect plays a role for tempo choice and the determination of the parts to be practiced. Therefore, this third factor is called *Constructive practice*. The marker variables of the fourth factor were: (a) "I play pieces that I play well" (no. 1), and (b) "I also improvise (invent) music" (no. 8). Since factor four emphasizes the musical, creative component of practice, it is labeled *Creative practice*.

Table 3.7
Varimax-rotated factor matrix of practice variables (components of practice behavior)

Items	Factors			
	Basic	Analytical	Constructive	Creative
.1. Playing known pieces	-0.12	-0.11	-0.20	0.74
.2. Scales	0.86	-0.09	0.04	0.10
.3. New pieces	0.39	0.50	0.06	-0.09
.4. Warming up	0.80	0.11	0.06	-0.04
.5. Metronome	-0.02	0.63	0.20	-0.17
.6. Raising tempo	-0.04	0.40	0.69	0.17
.7. Correcting errors	-0.02	0.76	-0.08	0.23
.8. Improvising	0.14	0.11	0.20	0.69
.9. Dividing in sections	0.15	-0.09	0.86	-0.11

In summary, the practice factors corresponded to a sequence of practice phased which is in agreement with a study on soloists (Harnischmacher, 1993, p. 103). The experts' practice was characterized by a division of practice into the sequence of warm-up, quality maintenance, and build-up. The present factor 1 can be seen as corresponding to the phases of warm-up and quality maintenance. Factor 2 and 3 somewhat correspond to a phase of build-up. Factor 4 seems to be typical for the practice of children and adolescents. The creative factor is consistent with the idea that "music" in the practice of adolescents is seen as a reward after the work is done (Harnischmacher, 1995).

Effects of situational perception and personality dispositions on the dimensions of practice

In the following section, it will be shown to what extent the more complex dimensions of practice (four factors) can be explained by situational and dispositional variables of motivation and volition. The four practice factors were not influenced by the variable preparing/not preparing for performance ($F < 1.78$, n.s.). The theoretically predicted influence of age, starting age, and number of days with listeners was taken into account. The correlations confirmed a connection between practice factor 1 and the variable capturing number of days with listeners ($r = .28$, $p < .05$), as well as between practice factor 3 and age ($r = .28$, $p < .05$). The starting age did not show a significant correlation with the practice factors.

ANCOVAs with the covariates age, starting age, and number of days with listeners were conducted for each of the four practice factors. The motivation and volition variables (GOP, EAD, AOC, AOP, AOF, SCI) had to be tested individually after a median-split (see Kuhl & Beckmann, 1994), because of the intercorrelations between some of the independent variables (see Table 3.2). In the classical experimental approach, the covariates should be tested first, then the main effects.

Possible effects of variables of motivation or volition were thus examined only after extracting the influences of age, starting age, and number of days with listeners. For the six factor levels of the motivation and volition variable, the significance level was first set to 5% and then corrected according to Bonferoni. The strength of the influences was tested in a Multiple Classification Analysis using SPSS.

Table 3.8 shows *factor 1*. The covariate "number of days with listeners" and the external action distraction (EAD) had a significant effect on practice factor 1 (Basic Practice). The variable "days of practice with listeners" and EAD explained about 14% of the variance in practice factor 1. The mean value for factor 1 of the EAD group below the median is higher ($M = .27$) than the average of the group above the median ($M = -.19$). The group with little inclination to EAD tended to practice consistent with factor 1. The number of days with listeners had a positive influence on factor 1.

Table 3.8
Results of ANCOVA for first factor ("Basic practice")

Source	Sum of squares	df	F	p	Eta	Beta*	R ²
Covariates	7.315	3	2.766	0.046			
Age	0.193	1	0.219	0.641			
Starting age	0.650	1	0.738	0.393			
Listener present	4.972	1	5.639	0.020			
GOP	0.211	1	0.219	0.641	0.04	0.05	0.10
EAD	6.002	1	6.807	0.011	0.29	0.27	0.14
AOC	0.616	1	0.632	0.429	0.04	0.09	0.10
AOP	2.643	1	2.836	0.096	0.22	0.17	0.10
AOF	1.385	1	1.482	0.227	0.14	0.13	0.10
SCI	2.450	1	2.667	0.106	0.23	0.17	0.10

Note:*Adjusted for independent variables and covariates

Table 3.9 show *factor 2*. Goal orientation of practice (GOP) had a significant effect on factor 2 (Analytical practice); it also explained about 14% of the variability of this factor (see table 3.9). However, the volition variable (AOC) did not reach the corrected significance level. The GOP group above the median tended to practice more with the methods of factor 2 ($M = .42$) than the group below the median ($M = -.25$).

For *factor 3*, see Table 3.10. For this factor, only the covariate age was a significant influence, which accounted for about 10% of the variance on this factor (see table 3.10). The effects of EAD and AOC did not reach the required level of significance.

Table 3.9
Results of ANCOVA for second factor ("Analytical practice")

Source	Sum of squares	df	F	p	Eta	Beta*	R ²
Covariates	1.688	3	0.563	0.592			
Age	0.306	1	0.348	0.557			
Starting age	0.953	1	1.084	0.301			
Listeners present	0.238	1	0.271	0.604			
GOP	7.848	1	8.122	0.005	0.29	0.28	0.14
EAD	1.693	1	1.668	0.200	0.06	0.14	0.05
AOC	4.297	1	4.886	0.030	0.25	0.24	0.07
AOP	0.000	1	0.000	0.987	0.01	0.00	0.05
AOF	0.015	1	0.014	0.905	0.00	0.01	0.05
SCI	3.674	1	3.671	0.058	0.16	0.20	0.08

Note: *Adjusted for independent variables and covariates

Table 3.10
Results of ANCOVA for third factor ("Constructive practice")

Source	Sum of squares	df	F	p	Eta	Beta*	R ²
Covariates	7.927	3	3.071	0.032			
Age	5.172	1	6.011	0.016			
Starting age	0.064	1	0.074	0.786			
Listeners present	0.228	1	0.265	0.608			
GOP	1.047	1	1.147	0.287	0.09	0.11	0.10
EAD	3.531	1	4.009	0.048	0.13	0.21	0.12
AOC	4.767	1	5.540	0.021	0.30	0.25	0.14
AOP	0.439	1	0.505	0.479	0.05	0.07	0.10
AOF	2.972	1	3.118	0.081	0.12	0.18	0.13
SCI	1.807	1	1.982	0.163	0.17	0.14	0.10

Note: *Adjusted for independent variables and covariates

Table 3.11 shows *factor 4*. For this factor (*Creative practice*), a significant effect of GOP (goal orientation during practice) explained about 12% of the variance. The group above the median tended to practice more creatively ($M = .36$) than the group

below the median ($M = -.16$). The volition variables of the Action Control Scale (AOP, AOF) did not reach the corrected significance level.

Table 3.11
Results of ANCOVA for fourth factor ("Creative practice")

Source	Sum of squares	df	F	p	Eta	Beta*	R ²
Covariates	4.944	3	1.820	0.149			
Age	1.702	1	1.879	0.174			
Starting age	3.072	1	3.392	0.069			
Listeners present	0.107	1	0.118	0.732			
GOP	7.310	1	8.074	0.006	0.26	0.28	0.12
EAD	0.398	1	0.408	0.524	0.00	0.07	0.04
AOC	0.663	1	0.718	0.399	0.14	0.09	0.05
AOP	4.136	1	4.538	0.036	0.22	0.21	0.07
AOF	4.783	1	5.176	0.025	0.25	0.23	0.10
SCI	2.771	1	2.949	0.089	0.20	0.18	0.08

Note: *Adjusted for independent variables and covariates

Discussion

Amount and type of practice could not be explained by motivation and volition variables alone. Some practice methods, such as multiple repetitions or slow practice are presumably so habitualized (routine activities), that they are not motivationally relevant any more.

The practice times in the absence of an anticipated public performance were not influenced by age, but by external action distraction (EAD) and action orientation in planning actions (AOP). This result supports the notion that practice times--without the extrinsic "push" of performance preparation--tend to be influenced by planning and action-oriented aspects of personality. However, the explanatory value of motivation and volition variables was more obvious when subjects were anticipating a performance situation. It is likely that an anticipated performance situation at this age is particularly stress inducing, which explains the influence of external action distraction (EAD) and of variables related to competence and success/failure, such as self-concept of instrumental music ability (SCI) and action orientation after failure (AOF).

The observed age influence on performance preparation could be attributed to a habitualized increase of practice time which results from experience with similar situations. In this situation, the dispositional aspects would only play a minor role (cf. Harnischmacher, 1993). Alternatively, one could hypothesize that the group of young instrumentalists preparing for performance was practicing more because they were at a higher level of instrumental ability than the group which was not preparing for performance. This would create a selection bias by confounding the

distinction of performance preparation with level of performance. Albeit, this is not the case, because all music students in this sample have to perform regularly, regardless of their level of performance.

The positive influence of practice days with listeners on Basic practice (factor 1) could imply that other persons involved may help young instrumentalists structure their practice by reminding them of technical exercises or warm-ups. With experience, scales and warm-ups may quickly turn into a routine and become more sensitive to disturbances and are therefore susceptible to distraction or persevering cognition. In this context, the observation that young instrumentalists with an inclination toward external action distraction practice less scales and warm-ups, makes sense. Analytical practice (factor 2) implies the definition of goals and goal orientation, which explains the influence of GOP. Constructive practice (factor 3) is subject to a positive maturational effect (age), while Creative practice (factor 4) is influenced by GOP. The assumed influence of starting age has not been confirmed for the four dimensions of practice behavior, a result which may in the present study be caused by the relatively homogeneous sample of music studio students. A connection between starting age and practice methods may be more likely in more heterogeneous groups such as adult beginners.

In sum, complex aspects of practice methods of children and adolescents were more influenced by motivation-relevant aspects of situational perception (GOP, EAD) and less by maturational processes. It is still possible, however, that older instrumentalists have more knowledge about different practice methods. The present results are consistent with the findings of Karmiloff-Schmith (1988), in which the use of knowledge was shown to be an age independent achievement. Further studies are necessary to clarify the relation of habitualized situational cognition and motivation and volition. Maturational processes were assessed with regard to age and starting age, not with regard to the stages of development or practice that individuals had attained. Finally, there are still questions concerning the efficiency of practice (see Lehmann, in press). Future longitudinal studies will determine to what extent the efficiency of practice of young instrumentalists is influenced by the different developmental stages of practice and by motivational and volitional aspects.

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References

- Atkinson, J. W. , & Birch, D. A. (1970). *A dynamic theory of action*. New York: Wiley.
- Austin, J. R. (1988). The effect of musical contest format on self concept, motivation, achievement and attitude of elementary band students. *Journal of Research in Music Education*, 36, 95 - 107.
- 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, 112-123.

- Barry, N. H. , & McArthur, V. (1994). Teaching Practice Strategies in the Music Studio: A Survey of Applied Music Teachers. *Psychology of Music*, 22, 44-55.
- Brokaw, J. P. (1983). The extent to which parental supervision and other selected factors are related to achievement of musical and technical-physical characteristics by beginning instrumental music students. (Doctoral dissertation, University of Michigan, 1983). *Dissertation Abstracts International*, 43, 3252-A.
- Dews, B. , & Williams, M. S. (1989). Student musicians' personality styles, stresses, and coping patterns. *Psychology of Music*, 17, 37 - 47.
- Eckes, T. (1990). Situationskognitionen: Untersuchung zur Struktur von Situationsbegriffen. *Zeitschrift für Sozialpsychologie*, 21, 3, 171 - 188.
- Ericsson, K. A. , Tesch-Römer, C. , & Krampe, R. T. (1993). The role of deliberate practise in the acquisition of expert performance. *Psychological Review*, 100, 363-406.
- Forgas, J. P. (1976). The perception of social episodes: Categorical and dimensional representations in two different social milieus. *Journal of Personality and Social Psychology*, 34, 199-209.
- Forgas, J. P. (1983). Episode cognition and personality: A multidimensional analysis. *Journal of Personality*, 51, 34-48.
- Gollwitzer, P. M. (1988). *Motivationale und volitionale Bewußtseinslage*. München, Germany: Ludwig - Maximilian - Universität. Habilitationsschrift.
- Hallam, S. (1995). Professional musicians approaches to the learning and interpretation of music. *Psychology of Music*, 23, 111 - 128.
- Harnischmacher, C. (1993). *Instrumentales Üben und Aspekte der Persönlichkeit. Eine Grundlagenstudie zur Erfassung physischer und psychischer Abweichungen durch Instrumentalspiel*. Frankfurt am Main, Germany: Lang.
- Harnischmacher, C. (1994a). Grundlegende Dimensionen, Progression und Entwicklungsstufen des instrumentalen Übens von Kindern und Jugendlichen. In H. Gembris, R. -D. Kraemer & G. Maas (Eds.). *Musikpädagogische Forschungsberichte 1993*, (pp. 481 - 484). Augsburg, Germany: Wißner.
- Harnischmacher, C. (1994b). Handlungstheoretische Persönlichkeitsforschung in der Musikpsychologie. Überlegungen zu interdisziplinären Konzepten. In H. Gembris, R. -D. Kraemer & G. Maas (Eds.), *Musikpädagogische Forschungsberichte 1993*, (pp. 71 - 83). Augsburg, Germany: Wißner.
- Harnischmacher, C. (1995). Spiel oder Arbeit? Eine Pilotstudie zum instrumentalen Überverhalten von Kindern und Jugendlichen. In H. Gembris, R. - D. Kraemer, G. Maas (Eds.), *Musikpädagogische Forschungsberichte 1994*, (pp. 41 - 56). Augsburg, Germany: Wißner.
- Heckhausen, H. (1989). *Motivation und Handeln (2nd. edition)*. Berlin, Germany: Springer.
- Karmiloff-Schmith, A. (1988). The child is a theoretician, not an inductivist. *Mind and Language*, 3, 1-13.
- King, G. A. , & Sorrentino, R. M. (1983). Psychological dimensions of goal-oriented interpersonal situations. *Journal of Personality and Social Psychology*, 44, 140-162.
- Krampe, G. (1987). *Handlungstheoretische Persönlichkeitspsychologie*. Goettingen, Germany: Hogrefe.

- Kuhl, J. , & Beckmann, J. (Eds.). (1994). *Volition and Personality: Action and State Orientation*. Toronto/Göttingen: Hogrefe.
- Land, M. S. (1979). *The role of conselling in the career development of musicians. A case study*. Dissertation. New York: Columbia University.
- Lehmann, A. C. (in press). The acquisition of expertise in music: efficiency of deliberate practice as a moderating variable in accounting for sub-expert performance. In I. Deliege & J A. Sloboda (Eds.), *Perception and Cognition of Music* (pp. 165-191). Hove, UK: Erlbaum, Taylor & Francis.
- Manturzeweska, M. (1990). A biographical study of the life - span development of professional musicians. *Psychology of Music*, 18, 112 - 139.
- Ribke, W. (1985). Lernvorgänge beim Instrumentalspiel. In H. Bruhn, R. Oerter & H. Rösing (Eds.), *Musikpsychologie*. (pp. 227 - 235). München, Germany: Urban und Schwarzenberg.
- Sloboda, J. A. , & Howe, M. J. A. (1991). Biographical precursors of musical excellence: an interview study. *Psychology of Music and Music Education*, 19, 3-21.
- Sloboda, J. A. , Davidson, J. W. , Howe, M. J. A. , & Moore, D. G. (1996). The role of practice in the development of performing musicians. *British Journal of Psychology*, 87, 287-309.
- Svengalis, J. (1978). Music attitude and the preadolescent male. *Dissertation Abstracts International*, 39, 4800A (University Microfilms No. 79 - 02953).

Appendix

Self-Concept Scale of Instrumental Playing Abilities (SCI)

(Adapted for children and adolescents; to be answered by indicating agreement to a given statement; possible answer categories were always, frequently, rarely, never. The negative items no. 2, 3, 5, 7, 9, 10, 11, 12 were re-coded for the analysis.)

- My instrumental performance is rather good.
- I really have to work on my expression.
- I think that my abilities for playing an instrument are not sufficient.
- I have a talent for instrumental music.
- Many people have difficulties with music making, but my problems are particularly obvious.
- I learn rather quickly on my instrument.
- I experience instrumental music playing as an effort that I cannot cope well with.
- Compared to others (who have been playing equally long), I am rather good.
- My performance level is still far away from how I want to play in the future.
- The progress I am making on my instrument leaves a lot to be desired.
- When I play my instrument, I notice that I am not very talented.
- Playing an instrument causes me problems.

Scale for Goal Orientation of Practice (GOP)

(For children and adolescents; to be answered by indicating agreement to a given statement; possible answer categories were always, frequently, rarely, never. The negative items no. 3, 6, 7 were re-coded for the analysis.)

- I mostly like to practice for a performance.
- I pick nice pieces I would like to play.
- I do not feel like making music with others.
- I prefer to practice pieces that I will also play together with others.
- If I were asked, I would participate in concerts.
- I do not like to practice pieces much that afterwards I only can play by myself.
- I mostly hate to practice for a performance.
- I like practicing best when I like to perform the piece later for others.
- I am looking forward to making music with others.
- Whether or not I like the pieces I practice is not important for my perseverance during practice.

Scale for External Action Distraction (EAD)

(For children and adolescents; to be answered by indicating agreement to a given statement; possible answer categories were always, frequently, rarely, never. The negative item no. 9 was re-coded for the analysis.)

- When practicing, I am disturbed by others.
- I find it totally aggravating when I have to practice pieces that I do not like.
- TV keeps me from practicing.
- I would practice more if I were not disturbed by others.
- I do not practice everything I should because I do not like the pieces.
- My other hobbies take up so much time that I do not get a chance to practice.
- I cannot practice enough because someone interrupts me.
- If I do not like the piece, I soon stop practicing.
- I can almost always practice in peace and quiet.