Finding focus : using external focus of attention for practicing and performing music

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5

Empirical Project One: The Effects of External Focus on the Skill Acquisition of Natural Trumpet Players

Introduction

Project One examined the effects of external focus on the learning of natural trumpet players – specifically the effects on accuracy (correctly placed notes), self-efficacy, confidence, motivation and engagement – the expectation being that all of these would be positively affected. The combination of the dependent variables would be an indication of objective and subjective learning success and experience.

The three research questions for Project One were: **[RQ 1]** *What are the effects of external focus of attention on the accuracy and self-efficacy of the participants?* **[RQ 2]** *What are the effects of external focus of attention on confidence, motivation and engagement of the participants?* **[RQ 3]** *What was the experience of using APT for the participants?* The hypothesis for Project One was that the participants would have higher ratings for accuracy and self-efficacy, as well as for confidence, motivation and engagement as a result of using the external focus practice tool (APT).

The form of external focus used in Project One was the Audiation Practice Tool: APT (see description in the previous section). As mentioned previously, natural trumpeters are appropriate as test subjects because accuracy can be relatively easily measured. A mixed methods design was used with the assumption that comparing two learning conditions using a combination of quantitative results (especially for measuring the main dependent variables: accuracy and self-efficacy) and qualitative results from questionnaires, logbooks and interviews, would give a rich representation of the effects of external focus on the participants. The project consisted of a "Control Phase" and an "Intervention Phase" – also referred to as "APT Phase". Participants gave verbal consent at the beginning of the project and later signed a release statement agreeing to the use of all data collected during the projects.

Method

Participants

The seven participants were all students of the researcher and were a diverse mixture of age (mean age 30.6 years, standard deviation 8.7 years, ranging from 24 to 45 years), gender (five male and two female), nationalities (Canadian, Singaporean, German, Dutch and Russian), years of experience playing the trumpet (ranging from 12 to 38 years) as well as experience on the natural trumpet (from 1.5 to 3.5 years). Years of study with the researcher ranged from

1.5 to 3.5, and the study levels ranged from first year minor through bachelor to second year masters. For further details, see Table 5.1.

Table 5.1 Participants in Project One

Participant	1	2	3	4	5	6	7
Age	28	26	24	24	45	41	26
Gender	M	M	F	M	M	M	F
Nationality	Can	Sing	D	NL	NL	RU	RU
Experience Trpt	16.5	20	12	14	38	29	14
Experience Nat	7.5	3.5	1.5	1.5	7	5	2
Study with SW	3.5	3.5	1.5	1.5	3.5	3.5	2
Study level	M2	B4	Min1	Min1	M1	M2	B2

Can=Canadian; Sing=Singaporean; D=German; NL=Dutch; RU=Russian
Trpt=trumpet; Nat=natural trumpet; SW=Susan Williams
M1=first year masters; M2=second year masters; B4=fourth year bachelor; B2=second year bachelor
Min1=first year minor; Min2=second year minor

Apparatus, Materials and Measures

Recordings

Recordings were made at the beginning and end of each practice phase with two devices. Audio recordings were made using MacBook and Recorder Pro software, and audio-video recordings using Sony digital HD video camera recorder. The sight-reading and sight-reading practice sessions were also recorded with both devices. More sophisticated recording quality was not needed for the purposes of this study, as artistic expertise was not being assessed.

Table 5.2 Sources and Descriptions of the Test Pieces (To view the scores, see Appendix A)

Group	Origin	Notes	Bars	Beats
Group A				
1a	C.P.E. Bach: No. 11 (Aria) from Auferstehung und Himmelfahrt Jesu	85	28	47
2a	J.S. Bach: No.8 (Aria) from BWV 20 "O Ewigkeit , du Donnerwort"	203	29	91
3a	J.S. Bach: No. 2 (Chorus) from BWV 31 "Der Himmel lacht"	100	9	33
4a	J.S. Bach: No. 7 (Choral) from BWV 19 "Es erhub sich ein Streit"	76	36	72
Total		**464**	**102**	**243**
Group B				
1b	C.P.E. Bach: No. 8 (Aria) from Einführungsmusik	143	29	53
2b	J.S. Bach: No. 7 (Aria) from BWV 43 "Gott fähret auf mit Jauchzen"	182	28	94
3b	J.S. Bach: No.1 (Chorus) from BWV 130 "Herr Gott, dich loben alle wir"	88	8	28
4b	J.S. Bach: No.9 (Choral) from BWV 31 "Der Himmel lacht"	59	15	44
Total		**472**	**80**	**219**

Test Pieces (repertoire)

The test pieces for Project One (four for the control phase and four similar pieces for the intervention phase) were excerpts from baroque trumpet literature chosen by the researcher (see Table 5.2). The chosen pieces were excerpts (some with slight adaptations by the researcher) from works by J.S. Bach and C.P.E. Bach, and representative not only of the difficulties that face natural trumpeters, but typical of the type of repertoire they are asked to play as professionals. Excerpts were chosen from relatively unfamiliar pieces to ensure that the subjects did not know them well. Each subject was asked before each phase if he/she was familiar with each test piece. Two groups each consisting of four pieces, were chosen so that each *group of pieces* taken as a whole matched in style, difficulty and length.

The intention was that Group A was, as a whole, of similar difficulty to Group B. Although the pairs of pieces: 1a and 1b, 2a and 2b etc., were similar, it is only as a group of four that they contain all the various difficulties and can be rated as similar to the other group of pieces. Music for the trumpet by J.S. Bach is very demanding (especially in the high and fast passages), and yet idiomatic for the instrument. C.P.E. Bach's trumpet parts are less idiomatic, as they often contain large and awkward intervals together with a large tessitura. To view the scores of individual test pieces, see Appendix A. In addition to the test pieces, a sight-reading piece was used to determine the skill level and usual practice style of the participant. A piece of repertoire was selected that was previously unknown to all of the

participants. The piece used for the sight-reading test for all seven participants was an excerpt from Leopold Mozart's Missa Solemnis in C (*Et resurrexit*), see Appendix A.

<u>Criteria for the selection of the test pieces</u>

As the participants ranged from beginners on the natural trumpet to players with several years of experience there was a wide skill level difference between the players. Each group of four pieces needed to be both challenging for all of the players as well as containing all of the main technical difficulties and challenges for natural trumpet playing. These challenges included large and/or awkward intervals, high range, low range, endurance, fast passages, entrances after rests, entrances on d'' and combinations of the aforementioned challenges. Examples of each of these challenges from the test pieces are illustrated below.

Figure 5.1 Examples of Technical Challenges from the Test Pieces

From 1b: large and awkward intervals and low range (♩ = 90)

From 1b: awkward intervals, entrance on d'' after rests

From 2a: large and awkward intervals and fast passage (♩ = 50)

From 2b: large awkward intervals, high range and fast passage

From 4b: high range and endurance (♩ = 64)

Figure 5.1 – excerpts from the test pieces that show examples of the difficulties within each of the pieces.

Questionnaires, Forms and Guidelines Used for Data Collection

Questionnaires, interviews, forms and guidelines designed by the researcher for collecting information and data from the project are listed and described below. The purpose for each is also outlined. For some of the questionnaires where ratings were required, a 10 cm visual analogue scale (VAS) was used, consisting of a line with a statement at each end where the participant indicates their answer with a mark on the line. This method is useful for measuring subjective characteristics.

A **general information questionnaire** was used at the beginning of the project, asking each participant their age, gender and nationality, as well as details about their trumpet playing experience and practice habits. The participants were also asked about what they find challenging about performing on the natural trumpet (to view the questions, see Appendix C). The purpose of the questionnaire was, in addition to profiling the participants, to establish their experience of natural trumpet playing, how much time they spent on it as well as their perception and awareness of the difficulties involved in playing and performing on the natural trumpet. Question 10: "What do you find – physically, mentally/cognitively, emotionally and organisationally challenging about performing on the natural trumpet?" checks whether the difficulties embedded into the design of the experiment correspond to the difficulties reported by the participants themselves.

A **pre-sight-reading/performance questionnaire** was filled out by each participant prior to playing the test pieces and the sight-reading piece, as well as prior to each performance. The questionnaire asked them to note how they felt – including embouchure strength, energy, motivation and confidence (see Appendix D). This particular questionnaire was included to check the participants' "current state", and whether there were any co-variants – extraneous reasons for the players' playing ability.

Each participant assessed in detail each of the four test pieces at the beginning of the control and intervention phases for how technically and musically challenging they were, using the **Repertoire assessment form** (see Appendix E). The purpose for this form was twofold. Firstly, answers to this questionnaire indicate to what extent the participants themselves had any difficulties with the test pieces in order to check if they had been well chosen for the experiment design. Secondly, the answers were compared with the responses to the same questions after the practice phase to see to what extent the perception of difficulty had changed.

In order to ascertain to what extent each participant already used external focus, a **practice style assessment form** (see Appendix F) was designed and implemented, asking what the participant was focussing on during a ten-minute practice session of the sight-reading piece. The results of this questionnaire were used to determine a "practice profile" for each participant. Different types of focus were randomly listed in the form. The answers could then

be tabulated into categories to ascertain a "practice profile", and see to what extent the participants already used external focus during practice. Table 5.3 lists the different types of focus from the form into categories.

Table 5.3 Types of Focus During Practice

I (internal focus) The body	T (technical focus)	E (external focus) The desired effect
My embouchure	The sound I am making	The musical phrase
My support	Rhythm	The sound I want to make
My breathing	Intonation	The meaning of the music
Relaxing my body	Hitting the right notes	Singing
The airstream	Avoiding the wrong note	
Tongue level	Certain notes	
Fingering	Tonality	
Tensing certain parts of the body	Musical structure	
Being relaxed	Trills	

Table 5.3 presents the types of focus that were presented in the assessment form (where they were presented in an order where the three types of focus were mixed). Participants were asked to first indicate whether they focussed on the aspect or not, and then to make a rating of the aspects that they focussed on, using a visual analogue scale (VAS).

In order to calculate how external focus affected the participants' self-efficacy, two self-efficacy scales (questionnaires) were used (see Appendix B): one for **self-efficacy for musical learning** and one for **self-efficacy for musical performance**. Both questionnaires were based on the validated self-efficacy scale devised by Ritchie & Williamon (2010). The original seven-point scale was changed to a nine-point scale in order to obtain a more nuanced result. The results from the measure of self-efficacy for musical learning were used to control for any differences in the participants' well-being between the two phases. The results from the measure of self-efficacy for musical performance would indicate if there is a difference in the participants' performance self-efficacy between the control phase and the APT phase.

Participants were given **logbook session sheets** (see Appendix G) – one for each practice session – so they could record how they felt before and after each session (embouchure condition, energy, motivation and confidence). At the end of the session they wrote in the log sheet how engaged they were, and any observations or comments relevant to their playing ability for that session. This questionnaire had several functions: to make sure that the participant did the sessions; to check in case there are is anything else that is affecting the players' results other than the experiment itself (co-variants); to see if the session is physically demanding (by comparing condition and energy levels before each session with those after each session); and to see how external focus affected motivation and confidence (dependent variables) by comparing them before and after each session.

In order to ensure that all participants followed the same protocol and had clear guidelines for practicing, at the beginning of the intervention phase the participants were shown how to use the APT tool and given a sheet with **guidelines and rules for using APT** (see Appendix H).

After performing at the end of the control and the intervention phases, the participants rated their own performance and once again rated the difficulty of each of the test pieces using a **post-performance questionnaire** (see Appendix J). After the intervention (APT) phase, the participants were also asked about their experience with using the Audiation Practice Tool (APT). This questionnaire checked to see if the participants' perception of difficulty had changed after the practice phase (which they recorded in the repertoire assessment form). The last questions were designed to gather qualitative data about how the participants experienced practicing with APT and how APT/external focus affected them.

Procedure

The current students of the researcher (at that time) were personally invited to take part in research involving "practice style" (they were not aware of the real inquiry of the research). All of them volunteered and gave verbal consent. At the beginning of the project, each participant submitted general information and reported their playing condition, after which they assessed the sight-reading piece for difficulty and then played it through. The playing of the sight-reading piece was recorded. The participant then practiced the sight-reading piece for 10 minutes. The initial sight-reading as well as the practice session was recorded. Immediately after the practice session the participant filled out the practice style questionnaire.

The four test pieces were then handed out and the participant assessed each one for difficulty. Four subjects played Group A in the control phase and Group B in the intervention phase, and three did the reverse (to account for any unexpected differences in difficulty through counterbalancing). The subjects were each asked afterwards which group they found more challenging (to check whether the selection was biased). The self-efficacy scale for musical learning was filled out, after which the participant played each of the four test pieces. The playing through of the test pieces was recorded. The log sheets were handed out and the guidelines and rules for practicing explained, in order to ensure that all participants followed the same protocol (see Appendix I for practice guidelines and rules).

For the next three days (control phase) the participants practiced three times a day for five minutes each session, at home. They were instructed to practice in their 'normal' way and to fill out the log sheet immediately after each session. The participants met with the researcher on days 1 and 5 for each phase.

On the day after the last practice day, each participant reported their playing condition, filled out the self-efficacy scale for musical performance and played through the four test pieces.

This performance was recorded. The participant rated their performance and the difficulty of each piece in the post-performance questionnaire.

The intervention phase where the participants practiced using APT took place eight weeks after the control phase. The order was not counterbalanced, as practicing with APT in the beginning might affect the control phase if it were to come afterward. The intervention phase differed from the control phase in that instead of practicing in their usual way, the participants were asked to practice using (only) APT. Each participant was given a demonstration by the researcher of how to practice by using APT. The post-performance questionnaire at the end of the APT phase included questions asking the participants to comment on their experience using the Audiation Practice Tool (APT). Table 5.4 shows the time flow of each of the two phases.

Table 5.4 Procedure of Control and Intervention Phases

	CONTROL PHASE	
DAY	**PROCEDURE**	**Recording**
Day 1	Each participant fills out general information questionnaire, pre-sight-reading questionnaire, piece assessment form.	
	Participant is shown sight-reading piece, fills out the repertoire assessment form and plays sight reading piece.	X
	Participant practices the sight-reading piece, then fills out practice style assessment form.	X
	Participant is presented with the four test pieces and assesses each (using the repertoire assessment form).	
	Participant fills out the self-efficacy form for musical learning.	
	Participant plays (sight-reads) through each of the four test pieces.	X
	Logbook session sheets are handed out and explained.	
Day 2	Participant practices in their usual way. 3 sessions (each 5 minutes) and fills out a log sheet for each.	
Day 3	Participant practices in their usual way. 3 sessions (each 5 minutes) and fills out a log sheet for each.	
Day 4	Participant practices in their usual way. 3 sessions (each 5 minutes) and fills out a log sheet for each.	
Day 5	Participant fills out pre-performance questionnaire.	
	Participant fills out the self-efficacy form for musical performance.	
	Participant performs each of the four test pieces.	X
	Participant fills out the post-performance questionnaire.	

	Intervention/APT PHASE (8 weeks later)	

DAY	PROCEDURE	Recording
Day 1	Each participant fills out pre-sight-reading questionnaire. Participant is presented with the four test pieces and assesses each (using the repertoire assessment form). Participant fills out the self-efficacy scale for musical learning.	
	Participant plays (sight-reads) through each of the four test pieces.	**X**
	Participant is given instructions on how to practice using APT.	**X**
	Session sheets are handed out and explained.	
Day 2	Participant practices, using APT. 3 sessions (each 5 minutes) and fills out a log sheet for each.	
Day 3	Participant practices, using APT. 3 sessions (each 5 minutes) and fills out a log sheet for each.	
Day 4	Participant practices, using APT. 3 sessions (each 5 minutes) and fills out a log sheet for each.	
Day 5	Participant fills out pre-performance questionnaire. Participant fills out the self-efficacy scale for musical performance.	
	Participant performs each of the four test pieces.	**X**
	Participant fills out the post-performance questionnaire.	

Data Analysis

The main inquiry of Project One was to find out whether and how external focus affected accuracy and self-efficacy. In addition, the effects on confidence, motivation and engagement were evaluated, as well as the participants' experience of using a practice tool based on external focus. The effects of external focus were compared to the effects of the participants' "usual" way of practice. The first sub-hypothesis for Project One was that *external focus would have a positive effect on the participants' accuracy.*

a) Determining accuracy [RQ 1a]

Differences in accuracy based on the training were determined by comparing the changes in accuracy (correct note placement) after a phase where the players used their normal practice methods to a phase where they used external focus. The first step in this process was to count the number of miss-pitched notes. Figure 5.2 is an example of how each of the pieces was scored.

Figure 5.2 Example of Accuracy Scoring

Figure 5.2 shows the accuracy scoring for participant 1 – piece 3a in the APT (intervention) phase. At the beginning of the APT phase, participant 1 played 35 miss-pitched notes. At the end of the three-day practice period there were seven miss-pitched notes resulting in an accuracy improvement of 28. After combining this score with the other three test pieces (and converting them to an ordinal scale – see below), the resulting score was compared to the score from the control phase.

Simply counting the number of mistakes does not give a true picture of accuracy, however. In order to rate each error accurately, the range of expertise within the group of participants needed to be taken into account. An improvement of just a few notes would be substantial for an expert player who made few initial mistakes, but would not have such a high value for a novice who made many mistakes in the first place. Another factor to consider was that during a very fast passage a player may stumble at the beginning and result in the whole passage going wrong. Such an inaccuracy should count for less on a scale of error, than the total of miss-pitched notes in the "blundered" section. In order to incorporate these factors, an ordinal scale was implemented where the number of mistakes had incrementally less value. Twenty errors or more for one test piece (the pieces were very short) was given the same value.

Table 5.5 shows how the metric scaled values were transformed into an ordinal scale.

Table 5.5 Metric Scaled Values for Accuracy Transformed to an Ordinal Scale

Metric scaled values (no. of miss-pitched notes)	Ordinal scaled values
0-1	1
2-3	2
4-5	3
6-10	4
11-15	5
16-20	6
> 20	7

After calculating the difference in the scaled accuracy between the control and APT phases (where the control score was subtracted from the APT score), the resulting score was denoted as the **EF score** (External Focus score).

The sub-hypothesis was tested by statistically comparing the differences between the accuracy improvement in the control and APT phases using a paired t-test, after checking the assumptions of a normal distribution. In case of a non-normal distribution, a non-parametric alternative (Wilcoxon signed-rank) test was used, with a threshold for statistical significance of $\alpha < 0.05$.

b) Determining Self-efficacy [RQ 1b]

The second sub-hypothesis for Project One was that *external focus would have a positive effect on the participants' self-efficacy.*

Self-efficacy for learning and for performance was measured by means of the validated self-efficacy scale developed by Ritchie & Williamon (2010). Learning and performance were each addressed in a separate questionnaire. The scale was adjusted from a seven-point scale to a nine-point scale in order to obtain a more nuanced result.

This sub-hypothesis was addressed by comparing the differences in self-efficacy scores between the control and APT phases using a paired t-test, after checking the assumptions of a normal distribution. In case of a non-normal distribution, a non-parametric alternative was used, with a threshold for statistical significance of $\alpha < 0.05$.

c) Determining Confidence, Motivation and Engagement [RQ 2]

The third sub-hypothesis was that *external focus would have a positive effect on the participants' confidence, motivation and engagement* compared to their usual way of practicing.

Participants provided self-report scores for confidence, motivation and engagement levels at the beginning and end of each practice session in a logbook, during both the control and the intervention phases. The scores were added together for each participant for each phase, and the resulting total was compared between the control phase and the APT phase. The sub-hypothesis was tested by comparing differences between the control and APT phases for each related measure using a paired t-test, after checking the assumptions of a normal distribution. In case of a non-normal distribution, a non-parametric alternative was used, with a threshold for statistical significance of $\alpha < 0.05$. The participants were also asked to provide any other explanations for an inability to play well (e.g. illness, tiredness, playing too much previously, mental problems).

d) Determining the Participants' Experience of Using APT [RQ 3]

The final sub-hypothesis for Project One was that *the participants would experience external focus by using APT.* In order to address this sub-hypothesis, a post-intervention questionnaire

included the questions: "What did you learn and notice about practicing APT?" and "How did you feel when practicing this way?" The answers were analysed using a global coding method (Frick, 2011) and identifying the themes that emerged (see Appendix L for the coding methods). Specific issues and themes connected with the research inquiry (e.g. evidence of positive or negative effects from using APT; evidence of experiencing external focus) were recognised and analysed.

Results

Participant Data and Design Findings

It was important at the outset of these empirical projects to ascertain both the skill level and the practice behaviour of each of the participants, as these may have been needed to interpret the results. The results of the sight-reading and practice session on day one revealed a large range of skill and sight-reading ability and a diverse range of practice profiles amongst the seven participants, as shown in Table 5.6.

Table 5.6 Skill Level of Participants

Participant	Study level	Errors	Skill assessment
1	2nd year Master	5	High skill level: facility, accuracy and high range good; expressive
2	4th year Bachelor	11	Medium skill level: facility and accuracy not always reliable; high range not strong
3	1st year Minor	42	Low skill level: facility and accuracy low; high range not strong
4	1st year Minor	33	Low skill level: facility and accuracy low; high range not strong
5	1st year Master	22	High skill level: facility, accuracy and high range good.
6	2nd year Master	21	High skill level: facility, accuracy and high range good
7	2nd year Bachelor	13	Medium skill level: facility and accuracy mostly good; high range weak

Table 5.6 gives an overview of the skill level of each participant, their study levels and an indication of their sight reading ability. "Errors" refer to the absolute number of wrong notes. The skill assessment was made by the researcher (also the participants' teacher at the time of the experiments) and based on observation. Facility refers to flexibility with fast passages and large intervals.

The scores from the practice style questionnaire were calculated in order to see which type of focus each participant favoured (See Table 5.3 for examples of types of focus reported). The results are shown in Table 5.7.

Table 5.7 Practice Profile Results

Participant	Internal focus	Technical focus	External focus
1	**53**	26	17
2	8	**28**	0
3	21	**24**	10
4	16	**46**	0
5	9	**35**	8
6	28	**50**	24
7	23	**50**	10

Table 5.7 shows the total focus scores for each participant. The preferred focus for each participant is indicated with bold font.

The results show that all seven participants favoured a technical and internal focus over an external focus (see *Criteria for the selection of the test pieces* in Table 5.3 for the individual elements). There was very little external focus evident in the participants' practice style at the beginning of the project. It could be therefore assumed that a practice regime based on external focus would be new and not usual. Some of the participants were relatively new to the natural trumpet and others very experienced. Whether external focus can be beneficial to all skill levels – as claimed by Wulf (2013) – can be tentatively explored with this participant group, even though the group is relatively small. For detailed results on practice style, see Appendix K.

The participants were asked which group of test pieces they found more difficult – in order to test if the two groups were perceived to be equally challenging for each phase. Four of the participants found Group B harder (while for three of these four participants Group B was the intervention phase), one found Group A harder, and two found them equal in difficulty, so overall they did not consistently find one group of pieces to be more difficult than the other.

The assessment of the pieces made by the participants confirmed the researcher's intentions – i.e. that the participants also perceived the specific difficulties embedded in each piece. Answers to question one revealed that both researcher and participants agreed on what the general difficulties of playing the natural trumpet were (i.e. entrances, high range, endurance, awkward intervals, very low mixed with high passages and entrances on d'').

Participants' reports about whether there were any other explanations for an inability to play well (e.g. illness, tiredness, playing too much previously, mental problems) showed quite a few instances of extra physical or mental stress amongst the participants. The self-efficacy scores for musical learning indicated that this, however, did not seem to affect their self-efficacy. A Shapiro-Wilk test showed that the data relating to self-efficacy for learning were not normally distributed and a (non-parametric) Wilcoxon signed-rank test indicated no statistical difference for this measure between control (Mdn = 87) and APT (Mdn = 93) phases, $Z = -0.73$, $p = .465$.

Main Results

The following results are concerned with describing and comparing the differences between the participants' normal way of practicing (control phase) and when they used APT (intervention phase), its effect on their accuracy, their self-efficacy, as well as their confidence, motivation and engagement. All statistical results were checked for normality of distribution using the Shapiro-Wilk test and where distribution was not normal, a Wilcoxen signed-ranks test was used. All tests carried out were two-sided.

a) <u>Accuracy</u>

Statistical results for the comparison between the control and intervention phases revealed a positive result for improvement of accuracy using APT (i.e. external focus) compared to normal practice. As the data for this measure are non-normally distributed, a Wilcoxon signed-ranks test was used. The results indicated that the group's accuracy scores were better using external focus (*Mdn* = 1.5) than using their standard practice method (*Mdn* = 0.75), Z = 2.214, $p < .05$. Both inexperienced and experienced players were positively affected – except for participant 3, who appeared to play worse at the end of the control phase and showed no obvious improvement using APT, and participant 5 who showed no difference between control and APT. The accuracy scores displayed in Table 5.8 and Figure 5.3, below, show the External Focus Scores – the difference between the control phase and the intervention phase for each participant and the mean value for the group.

Table 5.8 External Focus Scores

Participant	Diff. Control	Diff. APT	EF Score* (Diff. between Control & APT)
1	1.25	1.5	**0.25**
2	0.75	2	**1.25**
3	-0.5	0	**0.5**
4	0.5	1.25	**0.75**
5	1.75	1.75	**0**
6	0.25	1.5	**1.25**
7	1	1.5	**0.5**
Median	**0.75**	**1.5**	

Table 5.8 shows the differences in accuracy between the beginning and end of each phase, and between the control phase and the APT (intervention) phase (ordinal values). The number of errors were counted and then transformed into an ordinal scale to account for the discrepancy between the value of an error for an advanced player and a less skilled player. *EF score = External Focus score.

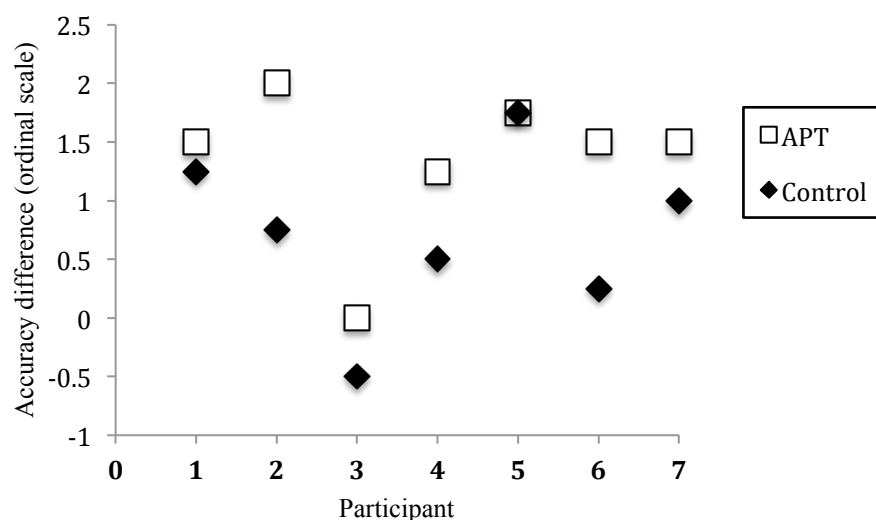**Figure 5.3 Differences between Pre- and Post-practice Accuracy for Control and APT Phases**

Figure 5.3 – the diamonds represent the improvement in accuracy (ordinal values) for the control phase for each of the seven participants (horizontal axis), and the squares represent the difference in accuracy for the APT phase.

b) <u>Self-efficacy for performance</u>

Self-efficacy for performance was measured using the validated self-efficacy scale developed by Ritchie and Williamon (2010). In some cases there were doubts about whether the (non-native English speaking) participants interpreted the questions correctly. For this reason, in addition to calculating the results of the whole questionnaire, the statistical results for just the first statement: 'I am confident that I can give a successful performance' were also calculated (with the same procedure described below). The difference between the score of the whole questionnaire and the first statement was not significant.

As the data on self-efficacy for performance were normally distributed, a T-Test was conducted. The results indicated no statistical support for a difference between the control (*M* = 58.43, *SD* = 17.377) and APT (*M* = 65.14, *SD* = 15.225), *t(1.754), p* =.130. The direction of the difference in the results suggests however a trend that APT could be beneficial to higher self-efficacy in performance.
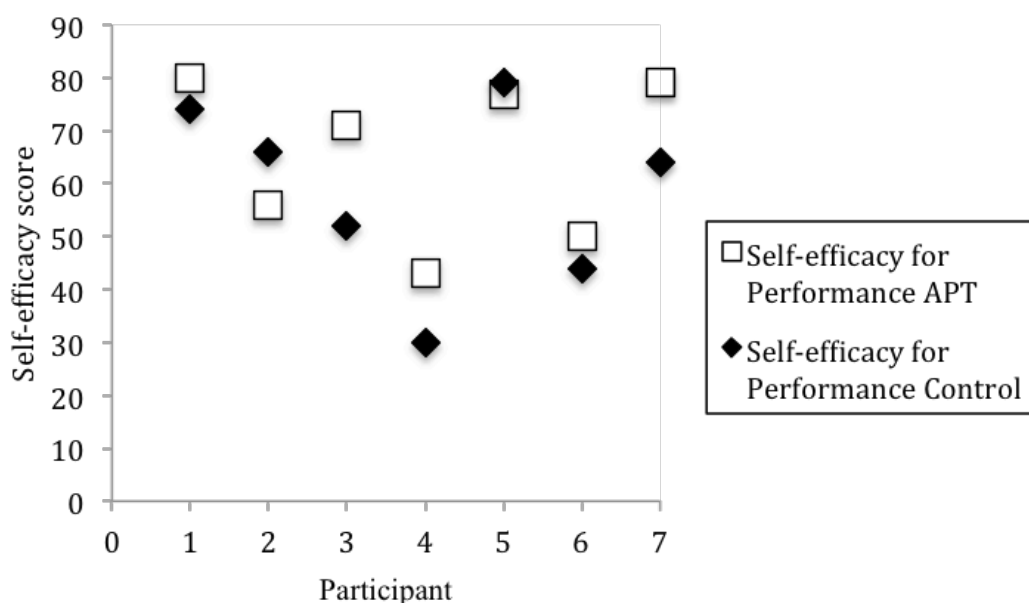
Figure 5.4 Self-efficacy for Performance

Figure 5.4 shows the scores for self-efficacy for musical performance for each participant. The highest possible score for this test is 99 and the lowest is 11.

c) <u>Confidence, Motivation, Engagement</u>

In addition to the main independent variables (accuracy and self-efficacy), confidence, motivation and engagement levels were also recorded. Paired t-tests gave no statistical indication that confidence was higher in the APT phase (*M* =0.302, *SD* = 0.523) than in the control phase (*M* = -0.259, *SD* = 0.664), *t*(1.619), *p* = .160. There was statistically no significant difference between the control phase (M = 0.067, SD = 0.418) and the APT phase (M = 0.201, SD = 0.702) effect on motivation, *t(.575), p* = .586. Paired samples t-tests for the participants' self-reports of engagement indicate no difference between the control phase (*M* = 5.389, *SD* = 2.128) and the APT phase (*M* = 7.284, *SD* = 1.569), *t*(2.064), *p* = .108. However, because of missing data in the engagement scores, these results are not as reliable.

Figures 5.5 and 5.7 suggest (despite the negative statistical results) a possible positive trend for confidence and for engagement, when considering the direction of the absolute differences.

Figure 5.5 Difference between Pre- and Post-confidence in the Control and APT Phases
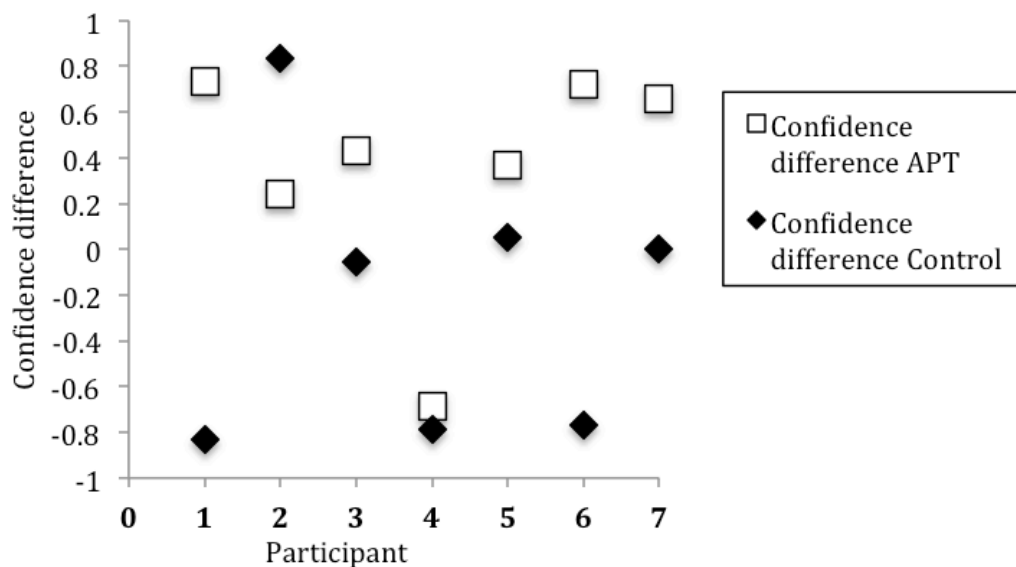

Figure 5.5 shows the difference in confidence for the control and APT phases according to how participants rated themselves before and after each of the nine practice sessions.

Figure 5.6 Difference between Pre- and Post-motivation in the Control and APT Phases
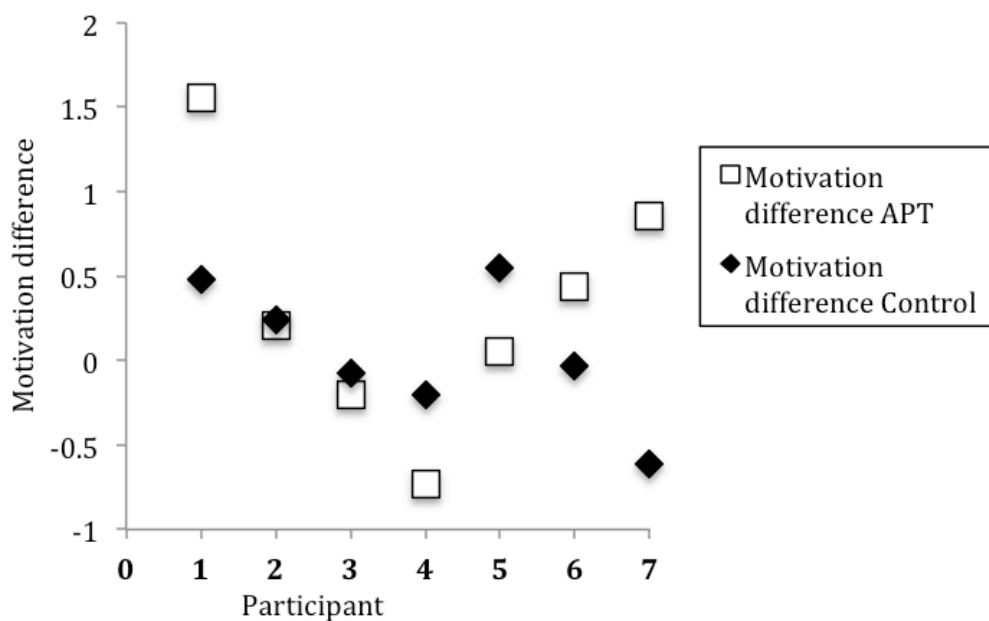

Figure 5.6 shows the difference in motivation for the control and APT phases according to how participants rated themselves before and after each of the nine practice sessions.

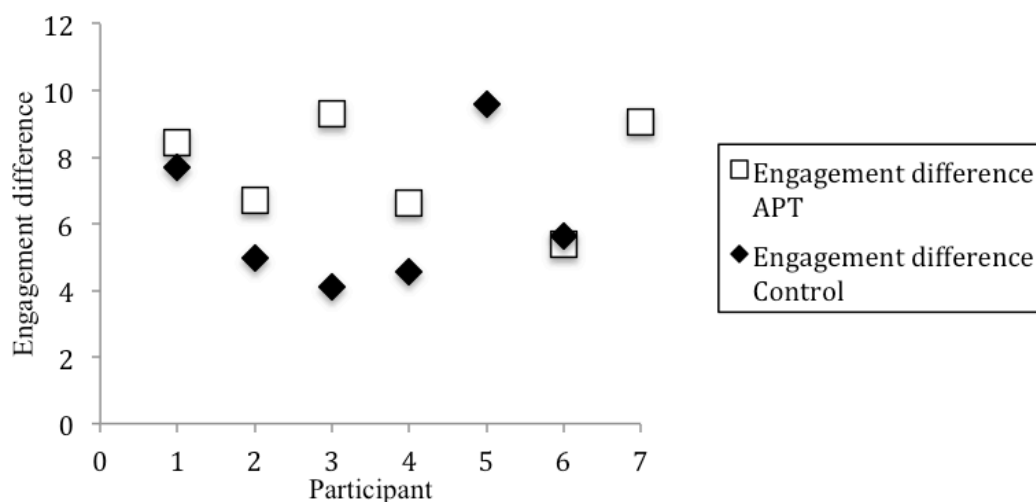**Figure 5.7 Difference between Pre- and Post-engagement Levels in Control and APT Phases**

Figure 5.7 shows the difference in engagement for the control and APT phases according to how each participant rated themselves before and after each of the 9 practice sessions.

d) The Participants' Experience of Using APT

To address the question "What was the experience of using APT for each of the participants?" a post-performance questionnaire (see Appendix J) was filled out directly after Project One. Results of the qualitative analysis are summarised here (for full transcripts of the answers to this questionnaire, see Appendix L).

Several main themes emerged from the analysis. There was clear evidence that using APT promoted external focus. Six of the seven subjects described experiences of external focus with comments such as "I was actively thinking about the way I really wanted it to sound"; "APT encourages my sound imagination"; "[…] a great way to really get to know what you actually want"; "I get into expressing and audiating".

The participants' belief that APT leads to better learning was evident. Four of the participants mentioned that they thought APT helped them to learn: "[…] helps with learning the music"; "Faster result by playing less". Two participants expressed frustration when there was no immediate evidence of improvement: "it was uncomfortable that it did not help with developing endurance and mechanical securities"; "When it worked I was motivated, when not, I was unmotivated".

Using APT was reported as enjoyable, engaging and comfortable. Five of the participants said something about enjoyment and engagement or how easy it felt: "The practice sessions were never boring … how easy it was to focus"; "It felt easy for the brain; it was always active and everything I practice feels fresh even though I am physically tired … I enjoyed this practicing process overall"; "It was a lot of fun and never boring".

For some, gesturing was new and/or uncomfortable and not all believed gesturing was helpful: "I did not feel that dramatic gestures help much". Some noticed that the method used less physical playing than usual, which was useful in avoiding too much physical strain to the embouchure muscles (this is true generally with mental training): "It also spares the lips".

Discussion

General Discussion of Project One

Project One was designed to investigate the effects of external focus in learning and on the performance experience of a group of seven trumpet players. The expectation was that accuracy, self-efficacy, confidence, motivation, and engagement would be affected in a positive way.

Positive results were found for the effects of external focus on accuracy. The results for self-efficacy, although not statistically significant, do suggest a trend for performance self-efficacy improvement in the APT phase, compared to the control phase. Results for confidence also suggest a positive trend. Given the low sample size, further exploration of these trends is needed to establish this effect more fully. Scores for motivation and engagement from the participants' logbooks were not conclusive (did not support the hypothesis) but the questionnaire answers revealed that APT encouraged most of them to audiate/experience external focus, and that it was engaging and enjoyable to use.

Accuracy for natural trumpet players – the production of a centred tone of the desired pitch – is an indication of fine motor skill acquisition. This is especially true for fast passages where the notes are in the high register, where the overtones are closer together and the differences in airstream minute. In addition, the high register is in itself more difficult to play than lower registers. This was evident in the less experienced players. The findings showed a positive result for accuracy overall. Only one of the participants (participant 5) showed no difference in improvement of accuracy when they used their own practice methods compared to using APT. Participant 3 got worse after the control phase and stayed the same after the APT phase, still yielding a positive difference. No one showed evidence that using the external focus tool was less effective than his or her regular practice methods. The slower pieces (piece 4 in both Groups A and B) showed the least improvement for all participants – suggesting that the more complex the piece, the more dramatic or obvious the effect of external focus during a short time period. Wulf (2012) mentions the importance of having challenging tasks when testing the effects of external focus. High range and endurance (the difficulties in pieces 4a and 4b) are skills that usually require more than three days to improve. Wulf's claim that external focus can benefit both skilled and unskilled players is reflected in the results of this experiment. Participants 1, 5 and 6 were highly skilled; Participants 3 and 4 were beginners, and Participants 2 and 7 were relatively skilled.

It was noteworthy to discover that none of the participants favoured external focus in their regular practice – as was revealed in the practice profile results (considering the findings by Trusheim that brass experts relied heavily on external focus). All of the participants used internal focus – mainly focussing on steering their lip muscles (embouchure) and breathing mechanisms. This is typical of most brass players (both beginners and advanced players) as traditional teaching is highly focussed on how to direct and strengthen airflow. The technical focus used by the participants was mostly concerned with focussing on producing each note, correct intonation and correct rhythm. Presumably the players were accustomed to breaking down the music into separate elements during practice. This is also a usual way to practice for musicians where the individual elements are practiced or focussed on separately, and later combined when the musician is confident enough to focus on "music". The question of whether the experience of using external focus methods influenced the players' future practicing habits was asked and explored at the end of Project Two.

Limitations, Problems and Potential Biases for Project One

The fact that there were only seven participants allowed an in-depth controlled study but not the production of enough data to give more robust statistical results. All of the participants were students of the researcher and could have been biased to try to produce positive results – although this was hindered by the fact that they were not informed about the true subject of the research (they were told it was to look at the effectiveness of their practicing). In addition, the research was designed so that they were not aware of the fact that there was an intervention phase until after the control phase was over. One of the reasons there is so little empirical research on musicians is that measuring musical results is difficult, complex and contentious (Schmidt and Lee in Mornell, 2012). For this reason note-accuracy and the participants' own subjective experience were chosen as independent variables. It is not possible to know exactly how they practiced during the practice sessions, as the sessions themselves were not recorded. For future studies video recording each session would be recommended. Although there were only seven participants, the group was very inhomogeneous – containing large differences in playing level (although this could also be seen as an advantage).

New Questions and Future Research

The results of Project One strongly suggest that musicians' motor skill learning benefits from using external focus in terms of playing accuracy. Further studies using more participants and longer practice phases could give more strength to this claim. A similar design could be applied to other instruments, though there would be more problems in determining accuracy. Brass instruments – trumpet, trombone, horn and tuba – would be relatively easy. Clearer results for self-efficacy and confidence may also be gained with further studies using more participants. Experiments studying external focus for musicians could include other forms of

external focus – for example using metaphors, narrative or scenarios for practicing repertoire. Testing participants over a longer period of time may also bring added information as to the possible long-term benefits of using external focus.