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## COACHES' USE OF FOCUS OF ATTENTION IN DISCUS THROW

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COACHES' USE OF FOCUS OF ATTENTION IN DISCUS THROW

by

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A Research Paper

Submitted in Partial Fulfillment of the Requirements for the  
Master of Science in Education

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Master of Science in Education

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**TABLE OF CONTENTS**

<u>CHAPTERS</u>	<u>PAGE</u>
LIST OF TABLES.....	ii
CHAPTER 1 – Introduction.....	1
CHAPTER 2 – Methods .....	13
CHAPTER 3 – Results .....	15
CHAPTER 4 – Discussion.....	19
REFERENCES .....	25
VITA .....	29

**LIST OF TABLES**

<u>TABLE</u>	<u>PAGE</u>
Table 1.....	16

## CHAPTER 1

### INTRODUCTION

Motor learning is a rapidly rising sport discipline. According to Magill (2004), motor learning focuses on learning, improving, or relearning motor skills, especially among people with disabilities, or other diseases. Our specific interest for the current study is the concept of focus of attention. It is an expanding topic in human science. Focus of attention refers to the cues that an individual focus on while performing a certain task. The past several years, various studies have been conducted on attentional focus in the motor learning discipline. A significant number of these study suggest that focus of attention plays a significant role in learning motor tasks at the different levels of learning such as novice or experts (Asadi, Abdoli, Farsi, & Saemi, 2015; Linda, Hagemann, Strauss, & Volker, 2009; Raisbeck, Yamada, & Diekfuss, 2018).

In any situations where a performer learns a task, instructions are generally given. The research has demonstrated that verbal instructions used by coaches, teachers and rehabilitators influence an individual's performance which in turn controls movement of performance (Marchant, Greig, Bullough, & Hitchen, 2011).

Therefore, it is important to provide the instructions as efficiently as possible for enhancing performance. Verbal instructions are given before a participant performs an action and augmented feedback is provided after the action being performed. When a participant receives feedback after performing this is, "augmented feedback is information about an athlete's performance that can only be obtained from an outside source such as a coach" (Porter, Wu, & Partridge, 2010, p 200). Coaches have several options to provide feedback which includes knowledge of performance or knowledge of results. Knowledge of performance (KP) focuses on kinematics of the movement (lower, upper limbs), and knowledge of result (KR) focuses on the

outcome of the movement, how far the implement was thrown, how fast an athlete accomplished the distance. Verbal instructions and feedback are significant for enhancing performance and both of them can use internal or external focus of attention (Porter, et al., 2010).

Focus of attention includes internal, external, and neutral (frequently used as a control in experimental settings) conditions. Internal focus of attention is directed towards the movement of the body (focusing on your foot, elbow, and knee) whereas external focus of attention focuses on the outcome of the movement, focusing on your shoes, and the ground (Raisbeck et al., 2018). Numerous studies in motor learning support that external focus is more beneficial than internal focus because the movement is more efficient when a person focuses externally (Marchant et al., 2001; Schucker, Hagemann, Strauss, & Volker, 2009; Wulf, Hob, & Prinz, 1998).

The benefits of focus of attention have been supported by the constrained-action hypothesis which was proposed in 2001 by Wulf, McNevin, & Shea. According to this view, “focusing attention on the movement effect promotes an automatic mode of movement control. Adopting an external focus allows unconscious, fast, and reflexive processes to control the movement” (Hossner & Wenderoth, 2007, p. 9). For example, during external focus of attention, people focus on the movement unconsciously, but in internal focus of attention they focus consciously which slows our processes and constrains our motor learning system. When an individual focuses consciously, they adopt an internal focus of attention and interrupt normal processes in the body. According to Hossner and Wenderoth (2007) individuals perform similar under internal focus of attention or “normal” because individuals might have a habit to control their movements, especially performing a novel task. The accuracy of the tasks decreases from conscious control, the movements become slower which leads to a worse motor performance (Wulf, 2007).

There are various motor learning studies that have supported the benefits of utilizing an external focus of attention with a variety of different populations including elite athletes (Wulf, 2008), cancer patients (Porter & Anton, 2011), individuals with Parkinson's disease (Playfer, 2001), older adults (Yogev-Seligmann, Sprecher, & Kodesh, 2016), and students (Porter, Ostrowski, Nolan, & Wu, 2010). For instance, the instructions given to athletes during strength and conditioning are sufficient to significantly improve their training process (Porter et al., 2010). In this study, participants performed an agility test under external, control, and internal focus of attention. Every participant performed five trials under each condition and the test was composed of two parts. In the control condition, this instruction was given: was "run through the course as quickly as you can with maximum effort." The internal condition consisted of the instruction: "run through the course as quickly as you can with maximum effort." The test composed of two parts: running and turning parts. For each running part in the internal group they focused on "moving legs as rapidly as possible." For the turning part, they focused on "planting foot as firmly as possible." In the external group during the running part participants focused on "running towards the cone as rapidly as possible. For the turning part, participants focused on "pushing off the ground as forcefully as possible." The results showed that agility performance enhanced under external focus of attention. It required less time to perform this test. This research is beneficial for strength and conditioning coaches, and other sport coaches. Focus of attention is critical not just during strength and conditioning performance but muscle strength as well.

### **Muscle Strength**

Implementing focus of attention effects not just force production but muscular endurance (Porter, 2014) and numerous studies show that muscle strength, endurance (Marchant, Greig,

Bullough, & Hitchen, 2011), and force production (Marchant, 2011) increase under external focus of attention which is sufficient factor for the athletic performance. A study by Marchant et al. (2011), focused on using external focus to increase muscular endurance among the experienced participants. Participants were asked to perform three exercises such as bench press, free- weight bench press, and free back squat with weights that correspond to 75% of their one repetition maximum. In this study, internal focus of attention was elicited by directing, “attention to the limbs and movements associated with each movement” (Marchant et al., 2011, p. 467). On the other hand, external focus of attention was elicited by directing “attention towards exerting force through the bar being moved” (Marchant et al., 2011, p. 467). The results of this study showed that participants were able to perform more repetitions under external focus of attention, which supports the constrained action hypothesis. According to Marchant et al. (2011), when movement becomes more complex the benefits of external focus of attention is sufficient.

Another study by (Marchant, Greig, & Scott, 2009) showed an increase of force production and muscular activity throughout eccentric exercise when using an external focus of attention where participants performed a bicep curl. The results showed when individuals focused externally they performed more repetitions while doing bicep curls, and more motor units were recruited as well using electromyography (EMG) to measure the activity of the bicep muscle.

### **Electromyography (EMG) studies**

Additional studies among elite and trained athletes include baseball (Castaneda & Gray, 2007), soccer (Jackson, Ashford, & Norsworthy, 2005), and track and field, specifically discus throw ( Zarghami, Saemi, & Fathi, 2012). According to Schucker (2009), external focus of attention is beneficial for complex movements such as basketball, throwing darts, weight

training, discus throw, javelin throw, shot put, strength and conditioning training. According to Wulf, “a movement pattern is considered more efficient or economical if the same movement outcome is achieved with less energy expended” (2013, p. 84), and EMG is a way to estimate efficiency of the motor skill. In a study of dart throwing (Radlo, Steinberg, Singer, Barba, & Melnikov, 2002), the authors used physiological measurements to observe muscle activation during exercise. The results showed that heart rate and electroencephalogram (EEG) alpha waves were lower in external rather than internal focus of attention. Furthermore, focusing externally produces more efficient motor movement of throwing a dart. Especially, when focus is more distal than proximal (McKay & Wulf, 2012). In another study by Zachry, Wulf, Mercer, & Bezodis (2005), EMG was used to measure muscle contraction and showed that a group under external focus of attention had lower EMG activity in shooting basketball, and the precision of the throw was better under external focus. Several studies used EMG to measure muscular contractions during exercises under a specific focus of attention showed that muscular contraction increased under external focus of attention (Marchant et al., 2009; Vance, Wulf, Tollner, McNevin, & Mercer, 2004). The studies involving EMG support constraint action hypothesis.

### **Endurance sports running economy**

A study by Schucker et al. (2009) examined how running economy is influenced by the focus of attention. Running economy is a potential objective measure that cannot be influenced by the runner’s motivation” (Schucker et al., 2009, p. 1243). This study included 24 experienced runners, who were placed in two experimental groups (i.e., internal and external focus of attention). In the internal group, participants were instructed on breathing conditions and the external group was focused on surroundings. Participants was asked to change their focus of

attention every 10 minutes. Internal focus instructions stated, “concentrate on the running movement especially on the movement of the feet; breathing; in the external: surrounding condition, on a film clip displayed on a monitor in front of them.” The results show when athletes focused internally on their breathing, it did not improve their performance. Furthermore, external focus exhibited lower oxygen consumption rather than internal focus of attention.

An additional study that focused on trained runners is by Raisbeck et al. (2018), involved 16 distance runners, 11 females and 5 males, who run at least 20 miles a week (i.e., they were considered to be trained). The runners’ focus during practice and competition was examined. It was hypothesized that trained runners would focus internally rather than externally. Also, it was assumed that trained runners would seek the information on how to enhance their running performance from their coaches or teammates. According to Raisbeck et al., (2018), “focus of attention of experienced runners depend on context (i.e., practice or competition)” (p. 5). The authors pointed out that athletes do not fully use just external or internal focus at practice or competition. This study shows that high skilled athletes perform at the higher level without accepting just external focus of attention. In this study, experienced runners received the information about training from their training partners and coaches. The assumption is the instructions runners receive is what they use during practice and competition. According to the previous research, “it appears more likely that experienced individuals have adopted a strategy that allows them to switch between attentional focus disciplines without disruption to their performance, rather than adhering to one focus” (Raisbeck et al., 2018, p. 6).

### **Track and field studies**

Several studies on the impact of focus of attention in track and field performance have also been completed. Studies examining performance on a standing long jump (Porter et al.,

2012; Wu, Porter, Partridge, Young, & Newman, 2012) showed significantly better results under external focus of attention in increasing jumping distance. The study by Porter et al. (2013) included highly skilled athlete-jumpers in four different conditions. The control group used focus of attention, whatever normally they use. The second conditioning was internal focus, third is external and the last conditioning focused normally on a target what was a three meters away. The results of this study showed that athletes significantly improved their jumping distance after adopting external focus of attention. In addition, the performance increased even more when the athletes focused on a target. This study supports previous studies that implementing external focus will enhance the performance and supports constrain action hypothesis.

Additional essential studies in track and field involve throwing events: effect of focus of attention in shot put performance among elite athletes (Makaruk et al., 2013); enhancing discus throw performance using external focus of attention (Zarghami et al., 2012); various attentional focus instructions among novice javelin throwers (Asadi et al., 2015). The study by Makaruk et al. (2013) involved elite track and field athletes from various track events such as jumpers, throwers, and sprinters. All participants were current members of the Polish national team and performed a task under three conditions (external, internal, and control). The participants threw shot put underhand and overhead in these conditions. The internal condition had to focus on instructions such as "when you are putting the shot, focus on extending your arms rapidly" (p. 57). In the external condition instructions were "when you are putting the shot, focus on hitting the visible target," (p. 57). There was a white target in the field. The last was the control condition when participants had to "perform the task to the best of your abilities" (p. 57).

The results of the Makaruk et al. (2013) study show that participants had significantly superior results when they were in external conditioning group for both underhand and overhead

throws. According to Makaruk et al., (2013) "when participants were instructed to focus externally, they generated more force to when they were instructed to focus internally or neutrally" (p. 58). Previous research by Wulf and Dufek (2009) show that participants produce more force under external focus of attention while performing a long jump. It is also possible that "adopting an external focus of attention resulted in a more optimal trajectory angle of the shot put" (Makaruk et al., 2013, p. 59). This study supported constrain action hypothesis and directing attention externally does enhance shot put performance because it is "reducing the load on the motor control system which is consequently facilitated a more autonomous motor behavior" (Makaruk et al., 2013, p. 59).

In addition to this, there is a study that involved throwing that uses external focus of attention for enhancing discus throw performance (Zarghami et al., 2012). In this study, participants were familiar with tasks and involved two conditions: internal and external. External is "using your maximum strength, throw the discus as far as you can, while concentrating on the discus, particularly on the landing location of the discus" (p. 48). Internal focus is "using your maximum strength, throw the discus as far as you can, while concentrating on your hand and wrist that is throwing the discus" (p. 48). The mean performance was significantly higher in the external group compared to the internal group, which supported all previous studies. Discus throw, just as other throwing events, is associated with force production. Zarghami et al. (2012) pointed out that "a greater throwing distance requires greater force production and a more effective and efficient inter- and intramuscular coordination" (p. 49). Therefore, it requires more research in discus throw.

One more study that involved throwing events was conducted by Asadi et al. (2014). In this study participants had limited knowledge about the javelin throw but had passed a collegiate

track and field course. Participants performed a total of 20 throws under four different conditions such as control, external, internal, and distal-external. In the internal group, participants “were asked to throw the javelin with all their might, while focusing on their sprint and the position of their hand” (p. 4). In the external group “to throw the javelin with all their might, while focusing on the javelin’s trajectory” (p. 4). Additionally, participants in the distal-external had to throw “the javelin with all their might, focusing on the javelin’s landing place” (p. 4). This study showed that distal external group had better results than the external group. These results support that focusing away from your body enhances performance rather than focusing on parts of your body. On the other hand, the results in the external group were higher than in the internal and control groups, which support constrained action hypothesis. The majority of the studies, focused on the effects of external and internal focus of attention however, not many focused on “the effect of the distance of external attentional focus” (Asadi et al., 2014, p.6). Most of the research in motor learning focuses on the general population and not elite athletes. The topic including athletes has been researched to a certain extent, which is why the current study will be beneficial to our understanding of focus of attention.

Focus of attention is an important aspect in increasing motor learning (Wulf, 2008). Numerous studies among elite and non-elite athletes (Makaruk et al., 2013) showed that utilizing external focus of attention demonstrate better motor learning than focus under internal or controlled focus of attention. The study by Porter, Wu and Partridge (2010) focused on elite coaches’ verbal instructions to their athletes in the long jump. This study’s purpose was to investigate what strategies elite coaches use in teaching long jump and if elite coaches use motor learning research. Participants were nine elite jump coaches from the United States and Europe. Coaches were categorized as elite because of their experience, averages 27.3 years, the fact that

they held various professional certifications, and coached nationally and internationally recognized athletes. Coaches filled out a questionnaire via email, some questions asked about coaching experience, as well as questions about, “their approach for teaching the long jump events, list the formal training you had for the long jump..., what resources you use to design the technical portion of training the long jump approach...also asked if they believed toe-board accuracy was a skill that could be developed” (Porter et al., p.118). Coaches reported that they use few strategies regarding practice variability, including strategies such as using a “distance of their approach run (4 out of 9 coaches), using hurdles at varying intervals (3 out of 9)”. Most of the coaches used a blocked schedule practice with low contextual interference. According to the previous research (Brady, 1998; Magill & Hall, 1990), a blocked schedule practice lead to a worse motor learning. The findings show elite horizontal jump coaches are not familiar with research on motor learning and control.

As mentioned above, there are plentiful amount of studies that show advantages of using external cues for different sport skills. It is important for throwing coaches to understand the best instructions that could be provided to their athletes to maximize their throwing distance and performance. Previous studies show when working with highly skilled athletes do not direct their attention to the movement they do (Beilock, Wierenga, & Carr, 2002; Gray; 2004). Some interesting studies by Porter et al. (2010) with elite track and field athletes found out that coaches provide feedback that focused on internal cues. In addition, the same participants responded that they use internal cues during competition. Another study that concentrated specifically on sprinting performance (Porter & Sims, 2013) included highly trained collegiate football players. Participants had to perform 10 and 20 yard runs under three conditions (control, internal and external). In the control, participants were instructed to, “run 20-yard dash with maximum

effort.” (p. 45) In the internal group, participants were instructed, “while you are running the 20-yard dash with maximum effort, focus on gradually raising your body level. Also, focus on powerfully driving one leg forward while moving your other leg and foot down and back as quickly as possible” (Porter & Sims, 2013, p. 45). According to Porter, these instructions are taken from a seminal coaching instruction book from Carr (1999), which focuses on fundamentals in track and field, and explains proper technique in track and field events. The last group in this study was the external focus of attention condition, they were instructed “while you are running the 20-yard dash with maximum effort, focus gradually raising up. Also, focus on powerfully driving forward while clawing the floor as quickly as possible” (Porter & Sims, 2013, p. 45). Results show that there was no difference between control, external, and internal groups in 20 yards dashes but there was a significant difference in 10-yard dashes in control group this group was faster than external or internal groups, which does not support the constrained-action hypothesis.

An additional study by Wulf (2008), included top level balance acrobats, where participants performed a balanced task under three conditions: external, internal, and control. The external focused on “minimizing the movement of the disk,” internal focused on “minimizing the movement of the feet”, and control had no focus of instructions and participants used their normal focus of attention. Findings show that results were significantly better when participants adapted their “normal” focus of attention rather than internal or external. According to Wulf (2008), this study shows that there are maybe “a limit to the performance-enhancing effects of the external focus of attention” (p. 323). A similar study (Porter, Anton, Wikoff, & Ostrowski, 2013) involved skilled athletes using focus of attention in jumping performance, participants were male athletes’ members of Division I sport teams including baseball, football, basketball,

and swimming. All participants of these study were familiar of the task because it was used as part of their training process. Motor learning continuously show that participants dominate performance under the external focus of attention, what is not well known is how verbal instructions are used by coaches during practice and competition.

The purpose of the current study was to examine what verbal instructions (focus of attention) coaches use during practice to their athletes and where they gathering their information. What kind of feedback coaches provided to their athlete such as knowledge of performance (KP), or knowledge of result (KR). It was hypothesized that coaches would report that they provided verbal instructions related to the body parts, which induce internal focus of attention. It was also hypothesized that majority of the throwing coaches in the sample would use internal focus of attention during practice and competition because majority of them are not aware of the current research in motor learning. That is why this study will be beneficial not just for research but it is applicable to all throws coaches at the different levels.

## CHAPTER 2

### METHODS

#### Participants

Ten elite throwing coaches from the United States participated in the study. They were randomly identified through the university website, and had to be a member of the National Collegiate Athletic Association division I or II. Coaches were assigned as “elite” based on their coaching experience and holding nationally and internationally recognized classifications. Also, in addition to certification, they trained and coached nationally, and internationally recognized athletes. The Human Subjects Committee approved the protocol, and informed consent form was sent via email, participants responded to an email agreeing to participate in the study. After agreeing, the cover letter and a link to survey monkey was sent. It took around five to seven minutes to respond to the researcher. Twenty coaches were contacted via email and ten of them agreed to participate in the study.

#### Procedure

Each coach was emailed a link with a questioner by the researcher. The first two questions focused on the coach’s experience. These two questions were adapted from the studies by Porter et al. (2010) and Wu et al. (2012).

1. “How many years have you coached the discus throw?”
2. “List the years of experience you have coaching different level of athletes?
  - a. High School: \_\_\_\_\_
  - b. College: \_\_\_\_\_
  - c. Post Graduate/Professional: \_\_\_\_\_”

Question number three was adapted from Wu et al., (2012) but modified to answer our question related throws.

3. “List the formal training you have had for the throws events (this may include but is not limited to: certification courses, sport science seminars, mentorships, etc.)”

Question number four was created by the researcher.

4. “What do you tell your athletes to focus/concentrate on the most when they are practicing their discus throw technique?”

Questions number five was created by the researcher.

5. “Why you think these particular instructions are optimal?”

Question number six adapted from Porter et al. (2010).

6. “When do you typically provide feedback during practice?”

Question number was adapted from Wu et al. (2012).

7. “Are you aware of scientific research addressing external focus of attention and cues?”

Question number eight adapted from Wu et al. (2012).

8. “Please write down all the resources you use to design the technical portion of training the discus throws (this may include but not limited to: other coaches, DVD’s, podcasts, coaching journals, research journals, magazine articles, etc. Mentoring with other elite coaches, competitors, experience as an athlete in the past, Feedback from their athletes, Articles, abstracts, training clinics, and coaching journals”.

## CHAPTER 3

### RESULTS

#### Data Analysis

For the first two questions, descriptive statistics were calculated for the sample. The remaining, open-ended questions were analyzed individually. The open-ended responses were read by the researcher and faculty advisor and analyzed inductively.

#### Coaching Experience Demographics

In response to the first question, “how long have you been coaching discus throw”, the average reported experience was 10.88 years. In the response to the second question “list the years of experience you have coaching different levels athletes”. All of the coaches reported that they had collegiate experience, 9 out of 10 (90%) had coached in high school and 7 out of 10 (70%) coached post collegiate or professional athletes.

The demographics for the third question revealed that this sample included various types of training that these coaches had for the throws events such as high school certifications, USA track and field (USATF) Level I, II, III certifications, mentorship with Olympians, International Athletic Association Federation (IAAF) certifications, various international training camps, U.S. track and field and cross country coaches association (USTFCCCA) certifications and personal experience as a former thrower. 5 out of 10 (50%) had USATF I certification or higher, additionally two of them (20%) had USTFCCCA certifications. 8 out of 10 (80%) been involved in the training camps, or clinics, where 1 out of 10 (10%) had participated at the international clinics and camps and holds a IAAF certification. 7 out of 10 (70%) have had a mentor in college or worked under a highly elite coach.

Table 1, questions 4-6 provide open-ended responses from the coaches regarding what they tell their athletes to focus on during practice, why those cues are optimal, and when feedback is provided to their athletes.

**Table 1. Responses to Questions 4,5,6**

<p><b>What do you tell you athletes to focus/concentrate on the most when they are practicing their discus throw technique?</b></p>	<ul style="list-style-type: none"> <li>• <i>“Rhythm</i></li> <li>• <i>Hitting their positions correctly slowing down and feeling positions</i></li> <li>• <i>Balance, rhythm, patience, block left side at delivery are main cues</i></li> <li>• This is a tricky question. The answer is honestly "depends". It depends on what the athlete's skill level is, where their deficiencies are, what their common mistakes are, and what time of year it is. There are also several other mitigating factors. I could never answer this question!</li> <li>• <i>Set up correctly out of the back</i></li> <li>• <i>Staying long Back on the right Relaxed <b>Visual cues down the sector and focal point</b></i></li> <li>• <b>Working the ground continuously while staying patient</b></li> <li>• I have my throwing try to develop the whip filling or Slinging of the discus. We do this in a majority of ways from full tech to basic stand throws. The goal is to have them <i>feel how to sling</i> it because it's a totally different event. The release is the problem because if <i>they don't do the whip or sling then the discus loses speed</i> where with these 2 elements the discus increases in speed.</li> <li>• It depends on the athlete. All of my athletes have different foci. Common ground would be <b>getting left from the back</b> of the ring (RH thrower)</li> </ul>
<p><b>Why you think these particular instructions are optimal?</b></p>	<ul style="list-style-type: none"> <li>• <i>Proper Acceleration.</i></li> <li>• Of all the different aspects of a throw, <i>if the correct positions</i> are not attained, the throw will be sub-par</li> <li>• I believe that the athletes need <i>to be able to feel and understand</i> what they are doing in order to throw far and progress the technique</li> <li>• <b>Keeps focus global, focus is on the whole throw not</b></li> </ul>

<p><b>When do you typically (more often) provide feedback to your athletes during practice?</b></p>	<p><i>parts, sense of acceleration</i></p> <ul style="list-style-type: none"> <li>• It is important to be fluid as a coach, try to identify the need and adapt to it, to produce the best result.</li> <li>• If you <i>set up correctly out of the back</i>, everything should and will fall into place on its own.</li> <li>• Easy to relate and optimizes power potential</li> <li>• <b>Working the ground continuously to develop power and momentum and staying patient to stay long, which</b> creates better results for discus at the finish</li> <li>• Again we are trying to build max velocity in the implement. <i>The hips are important</i> yes because getting <b>the athlete to have the proper release mechanics</b> is just as important.</li> <li>• <i>Creation of a powerful moment arm early in the throw</i></li> </ul> <ul style="list-style-type: none"> <li>• After each throw</li> <li>• Depends on the athlete; but most times immediately after the throw.</li> <li>• After the throw sometimes after a couple throws but once they have completed the exercise</li> <li>• The beginning to set tone, after each throw to keep focus. Same cues for whole training block</li> <li>• Depending on the day, after every set of throws. On some days, a specific task is given, and once achieved feedback is given.</li> <li>• right after they throw</li> <li>• Every 1-3 throws</li> <li>• For a beginner, every throw to every other throw. To reinforce the good habits, I want them to get in. After two years, it depends on the athlete, the time of the year, and they type of practice. But in general, I'd say every 3-4th throw in drills and probably every other throw to every 3rd throw in full throws</li> <li>• After every couple of throws, sometimes it's hardly any feedback unless it's something we are working on. Then there is a lot of feedback keeping the athlete encouraged not discouraged."</li> </ul>
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*Note.* Responses in *italics* were categorized as “internal focus”; responses in **bold** categorized as “external focus”; responses in underlined categorized as “needs more details.”

In response to question seven, “are you aware of scientific research addressing external focus of attention and cues”, 4 out of 10 (40%) responded that they are aware of the research in motor learning, 4 out of 10 (40%) responded that they are not aware, 1 out of 10 (10%) pointed out that is aware of some research, and another coach (1 out of 10) mentioned that is aware of a little bit of research.

In response to question eight, coaches gather information regarding discus throw through various resources such as: The Throws Manual, YouTube videos with elite throwers, Internet, DVD, mentoring with other elite coaches, Competitors, Experience as an athlete in the past, Feedback from their athletes, Articles, abstracts, Training clinics, and coaching journals. The table below provides open-ended question responses regarding focus of attention, cues, and augmented feedback that used by coaches during practice.

## CHAPTER 4

### DISCUSSION

The purpose of this study was to determine what verbal instructions coaches use during practice, and where they gather this information from. What kind of augmented feedback is used by coaches at practice. Moreover, we investigated if the coaches are aware of motor learning research.

#### **Technique approach**

According to responses provided to question number 4 (refer to table 1), coaches reported that they are focusing on several technical aspects in discus throw such as: “rhythm, hitting positions correctly, balance, patience, block left side, set up correctly, focusing on focal point, working on the ground, developing whip and sling the discus”. Other coaches mentioned that they have to concentrate the most depending on the athlete’s skill level and all athletes have different levels. There were various technical terminologies used in describing discus throw technique. Coaches used widely different approaches regarding technical approach. For instance, focusing on rhythm is more internal focus of attention rather than external. How exactly individuals concentrate on rhythm using external focus of attention is unknown. Rhythm is a (KP) feedback which concentrates on joint angles, movement speed, and body limb (Porter et al., 2010, p. 205).

Question number 5 asked (refer to table 1), “why do you think these cues are optimal”? The interpretation of these question was difficult. The responses from the coaches were “if proper acceleration is not achieved then throw would be below average”. In this context, it is confusing what is the proper acceleration in discus throw and how to achieve it. Is there a thing as a proper acceleration? This answer requires a detailed follow up. Other coaches pointed out

that “athletes need to feel and understand their position”, what a coach meant by “feeling” is confusing because feelings are different from acting. Does it mean that the athlete has to perform discus throw using proper technique? If it is relating to feelings, it relies on internal focus of attention, but it was difficult for us to determine this from the responses given.

Another optimal cue mentioned by one of the coaches was that athletes have to focus on the whole throw, not just parts. This response can be interpreted differently with regards to what and how can you do it? On the other hand, one of the coaches tells his athletes to concentrate on the out of the back because it will set up the throw at the beginning. The responses to these questions are very unique. The example of a good optimal cue was used by coach that it is important to be adaptable to every athlete. One of the coaches pointed out that using grounds will optimize power and momentum, which will bring the best results to the performance. This is an example of the external cues in discus throw, using the ground and not focusing on your legs or feet. The optimal cue that one of the coaches used saying “creation of a power moment arm early in the throw.” This cue is optimal to that coach because it is focusing on the arm which relies on internal focus of attention and will constrain the motor learning system. Most of the cues were focusing internally either on feelings of an athlete or some parts of the body. In our hypothesis, it was predicted that majority of coaches would use internal focus of attention during practice because they are not aware of the current research in motor learning and would provide feedback regarding the KP that implements internal focus of attention and cues. A majority of existing literature focuses on novice participants, where participants perform better under external focus of attention. The literature is limited among elite coaches and athletes. Therefore, this study is beneficial to the field of motor learning. These support existing literature (Porter, et al., 2010), where 84.6% of participants reported that instructions and feedback provided to them during

practice focusing on internal focus of attention and 69% utilize the same attentional focus during competition. This is inconsistent with motor learning research because focus of attention aids to enhance performance.

### **Receiving feedback**

Question 6 asked, “when do you provide feedback to your athletes during practice?”, and all of the coaches (100%) indicated that they do provide feedback to their athletes. A majority of the coaches (6 out of 10 = 60%) reported providing feedback to their athletes after each throw. Only 3 out of 10 (30%) coaches provide feedback after a couple throws or after set of throws. One coached mentioned that it depends on the day and the task, if “a specific task is given, and once achieved feedback is given”. Two coaches (20%) pointed out that it depends on the athlete and skill level, for a beginner feedback would be given more frequently than intermediate athlete. “Rhythm is a (KP) feedback which concentrates on joint angles, movement speed, and body limb” (Porter et al., 2010, p. 205). Another example of internal focus is slowing down and feeling body positions during the throw. On the other hand, working the ground continuously is an external focus of attention. According to Porter et al., (2010), there are several ways to provide feedback and one of them is knowledge of performance, another is knowledge of result. “KP is providing information about kinetics of their movement. This may include body/limb position, velocity, or acceleration....KR provides coaches means of conveying outcome related information to athletes” (Porter et al., 2010, p. 201). For instance, the example of KR is the distance thrown, or a mark that has to be hit.

### **Knowledge of research**

In response to the Question 7, “are you aware of scientific research addressing external focus of attention and cues?”, some coaches reported that they are aware of scientific research

addressing external focus of attention (4 out of 10 = 40%), three (30%) reported that are unaware of the research regarding focus of attention, and three (30 %) reported that they have heard about this somewhere. Previous research (Porter & Sims, 2013), suggested that there is a large gap between the practitioners and researchers specially in motor learning. Four out of 10 coaches reported they are aware but how much do they actually know about this area and utilize these strategies in practice is unknown. We state that he majority of the coaches are not familiar with the research. One of the reason could be that motor learning research don't get published or presented at the track and field magazines or conference.

We examined what coaches tell their athletes to concentrate during discus throw practice and why they believe that these instructions are optimal. We were also interested to learn if this research consistent with the previous research in track and field and motor learning. Specifically, a previous study by Williams and Porter (2009) found that elite coaches do not apply motor learning research into their coaching. This study partially supports this previous research, as some coaches reported that they are aware of the research and used it while coaching discus throw, while others did not. For instance, 4 out of 10 coaches are aware of the research in focus of attention, and their responses on what they focus during discus throw. When coaches were asked, “what do you tell your athletes to focus on the most when they are practicing discus throw?” Majority of the coaches answered that the instructions they give focuses athlete's attention internally. For instance, focusing on rhythm, slowing down, balance, and patience are an example of internal focus of attention. All of these cues are related to feedback and knowledge of performance. “KP is information the athlete receives about their performance that is specifically related to their movements while KR (knowledge of results) is information the athlete receives about the performance outcome” (Sunaryadi, 2016 p. 271).

Additionally, knowledge of performance includes movement of the body, velocity, and acceleration. In our study, coaches responded that proper acceleration and proper positions are important which focuses on knowledge of performance. Our study shows that majority of the coaches are unaware of the current research in motor learning and prefer to use internal focus of attention, and feedback that related to knowledge of performance which relies on internal focus of attention. This study supported by other studies that involved elite athletes. Elite athletes are different population that might not benefit external focus of attention.

### **Limitations**

This study does have some limitations. One limitation of the study was that participants answered the survey online and thus, the researcher was not able to follow up on the responses. The interpretation of the answers was challenging because some coaches only provided one response and the researcher had to attempt to determine the meaning of it without being able to ask the coach directly. Future research in motor learning needs to focus on building the bridge between the practitioners and researchers. We would recommend a follow up study with the athletes who are coached by the coaches in this study. Furthermore, other individual sports within track and field which include many technical disciplines: long jump, triple jump, pole vault, high jumps, and throwing events should also be conducted. Another possible future study would be to speak directly to the same coaches over the phone, or in person to verify the data and see if it contradicts or expands the current results. We only focused on discus throw, most of the throws coaches coach discus throw, shot put, weight throw, hammer, and javelin. We can hypothesize if cues that they use for discus are more internally then the cues for other evets would be focusing on internal cues as well. Another limitation that interpretation of the responses was limited to one

answer; the follow up study with a more detailed questions or interviews would be beneficial to gather more information regarding this topic.

In conclusion this study supports the previous studies among elite athletes and coaches. The study contributes to this field because it bridges the gap between throws coaches and motor learning research. It would be interesting to examine if throws coaches use similar focus of attention and cues when coaching other throwing events.

## REFERENCES

- Asadi, A., Abdoli, B., Farsi, E., & Saemi, E. (2014). Effect of various attentional focus instructions on novice javelin throwing skill performance. *Medicina Dello Sport*, *67*, 1-9.
- Beilock, S. L., Carr, T. H., MacMahon, C., & Starkes, J. L. (2002). When paying attention becomes counterproductive: Impact of divided versus skill-focused attention on novice and experienced performance of sensorimotor skills. *Journal of Experimental Psychology: Applied*, *8*, 6-16.
- Brady, F. (1998). A theoretical and empirical review of the contextual interference effect and the learning of motor skills, *Quest*, *50*, 266-293.
- Carr, G. (1999). *Fundamentals of track and field*. Champaign: Human Kinetics.
- Castandeda, B., & Gray, R. (2007). Effects of focus of attention on baseball batting performance in players of different skill levels. *Journal of Sport & Exercise Psychology*, *29*, 59-76.
- Gray, R. (2004). Attending to the execution of a complex sensorimotor skill. Expertise differences, choking, and slumps. *Journal of Experimental Psychology*, *10*, 42-54.
- Hossner, E.J., & Wenderoth, N. (2007). eds. Gabriele Wulf on attentional focus and learning [Special issue], *Bewegung und Training*, *1*. Retrieved August 13, 2008, from [http://ejournal-but.de/Journal/reader.asp?Doc=wulf\\_2007.pdf](http://ejournal-but.de/Journal/reader.asp?Doc=wulf_2007.pdf)
- Jackson, R.C., Ashford, K.J., & Norsworthy, G. (2006). Attentional focus, dispositional reinvestment, and skilled motor performance under pressure. *Journal of Sport & Exercise Psychology*, *2006*, 1-20.
- Magill, R.A. (2001). Augmented feedback in motor skill acquisition. In R.N. Singer, H.A. Hausenblas, & C.M. Janelle (Eds.), *Handbook of Sport Psychology*, 2nd ed., pp. 86-114). New York: John Wiley & Sons.

- Magill, R. A. (2004) *Motor learning and control*, 7th ed. Mc Graw Hill, New York.
- Magill, R.A., & Hall, K.G. (1990). A review of contextual interference effect in motor skill acquisition, *Human Movement Science*, 9, 241-289.
- Makaruk, H., Porter, J. P., & Makaruk, B. (2013). Acute effects of attentional focus on shot put performance in elite athletes. *Kinesiology*, 45, 55-62.
- Makaruk, H., & Porter, J. P. (2014). Focus of attention for strength and conditioning training. *National Strength and Conditioning Association*, 36, 16-22.
- Marchant, D. C., Greig, M., Bullough, J., & Hitchen, D. (2011). Instructions to adopt an external focus enhance muscular endurance. *Research Quarterly for Exercise and Sport*, 82, 466-473.
- Marchant, D., Greig, M., & Scott, C. (2009). Attentional focus instructions influence force production and muscular activity during isokinetic elbow flexions. *Journal of Strength and Conditioning Research*, 23, 2358-2366.
- McKay & Wulf (2012). A distal external focus enhances dart throwing performance. *Internal Journal of Sport and Exercise Psychology*. Retrieved from <http://dx.doi.org/10.1080/1612197X.2012.682356>.
- Playfer, J.R. (2001). Falls and Parkinson's disease. *Age Ageing*, 30, 3-4.
- Porter, J. M., & Anton, P.A. (2011). Directing attention externally improves continuous visiomotor skill performance in older adults who have undergone cancer chemotherapy. *Journal of the American Geriatrics Society*, 59, 369-370.
- Porter, J. M., Anton, P. M., Wikoff, N. M., & Ostrowski, J. B. (2013). Instructions skilled athletes to focus their attention externally at greater distances enhances jumping performance. *Journal of Strength and Conditioning Research*, 27, 2073-2078.

- Porter, J. M., Ostrowski, E. J., Nolan, R. P., & Wu, W. F. (2010). Standing long-jump performance is enhanced when using external focus of attention. *Journal of Strength and Conditioning Research*, *24*, 1746-1750.
- Porter, J. M., & Sims, B. (2013). Altering focus of attention influenced elite athletes sprinting performance. *International Journal of Coaching Science*, *7*, 41-51.
- Porter, J. M., Wu, W. F. W., & Partridge, J. A. (2010). Focus of attention and verbal instructions: Strategies of elite track and field coaches and athletes. *Sport Science Review*, *19*, 199-211.
- Porter, J. M., Wulf, G., Nolan, R., & Ostrowski, E. (2010). Instructions that promote an external focus of attention benefit agility performance. *Journal of Sport and Exercise Psychology*, *32*, S119-120.
- Radlo, S. J., Steinberg, G. M., Singer, R. N., Barba, D. A. & Melnikov, A. (2002). The influence of an attentional focus strategy on alpha brain wave activity, heart rate, and dart throwing performance. *International Journal of Sport Psychology*, *33*, 205-217.
- Raisbeck, L., Yamada, M., & Diekfuss, J. A. (2018). Focus of attention in trained distance runners. *International Journal of Sports Science and Coaching*, *0*, 1-7.
- Schüker L., Hagemann N., Strauss B., & Völker K. (2009). The effect of attentional focus on running economy. *Journal of Sports Science*, *27*(12), 1241-1248.
- Sunaryadi, Y. (2016). The role of augmented feedback on motor skill learning. *Advances in Economics, Business and Management Research*, *14*, 271-275.
- Vance, J., Wulf, G., Tollner, T., McNevin, N., & Mercer, J. (2004). EMG activity as a function of the performer's focus of attention. *Journal of Motor Behavior*, *36*, 450-459.

- Wu, W. F. W., Porter, J. M., Partridge, J. A., Young, M. A., & Newman, N. (2012). Practice variability and training design: Strategies of elite horizontal jump coaches. *Sport Science Review, 5-6*, 113-127.
- Wulf, G. (2008). Attentional focus effects in balance acrobats. *Research Quarterly for Exercise and Sport, 79*, 319-325.
- Wulf, G. (2007). Attentional focus and motor learning: A review of 10 years of research. In E.-J. Hossner & N. Wederoth (Eds.), Gabriele Wulf on attentional focus and motor learning [target article]. *E-Journal Bewegung und Training, 1*, 4-14. Retrieved from <http://ejournal-but.de>.
- Wulf, G., & Dufek, J. S. (2009). Increased jump height with an external focus is due to enhanced lower extremity joint kinetics. *Journal of Motor Behavior, 41*, 401-409.
- Wulf, G., Hob, M., & Prinz, W. (1998). Instructions for motor learning: Differential effects of internal versus external focus of attention. *Journal of Motor Behavior, 30*, 169-179.
- Wulf, G., McNevin, N.H., & Shea, C.H. (2001). The automaticity of complex motor skill learning as a function of attentional focus. *Quarterly Journal of Experimental Psychology, 54 A*, 1143-1154.
- Yogev-Seligmann, G., Sprecher, E., & Kodesh, E. (2016). The effect of external and internal focus of attention on gait variability in older adults. *Journal of Motor Behavior, 49*, 1-6.
- Zachry, T., Wulf, G., Mercer, J., & Bexodis, N. (2005). Increased movement accuracy and reduced EMG activity as the result of adopting an external focus of attention. *Brain Research Bulletin, 67*, 304-309.
- Zarghami, M., Saemi, E., & Fathi, I. (2012). External focus of attention enhances discus throwing performance. *Kinesiology, 44*, 47-51.

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