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SCHOOL OF GRADUATE STUDIES

Imagery, Video Feedback
Figure Skating Performance.

by

Shawna Lee Palmer
B.P.E., University of British Columbia, 1991.

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MASTER OF ARTS

in the Department of Physical Education

We accept this thesis as conforming
to the required standard

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Dear Ms. Palmer:

You have permission to include the Self-Perception Profile for Children questionnaire in your dissertation. If you have any questions, please feel free to call me at the number below.

Sincerely,



Susan Harter, Professor and
Developmental Area Head

Supervisor: Dr. Bruce Howe

Abstract

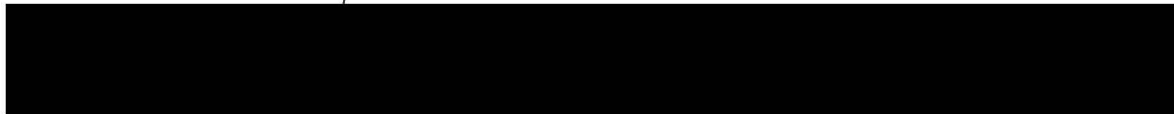
The purpose of this study was to investigate the effects of imagery and video feedback as performance enhancement interventions and to examine the effects of this study on the self-confidence of the subjects. A single subject design with multiple baseline procedures was employed. The technical performance within the freeskate program of four Juvenile level competitive figure skaters was assessed on a daily basis using the Technical Performance Evaluation Form specifically developed for this study. Following baseline measures, Skaters 1 and 2 employed imagery in a relaxed state as an intervention technique used in conjunction with their physical practice. Both skaters showed improvement in their freeskate performance. Following the imagery intervention phase, Skaters 1 and 2 then utilized imagery with video feedback as an intervention, again in conjunction with their physical practice, which required the skaters to view their videotaped performance on a daily basis. Skater 1 showed a substantial improvement in performance while the intervention proved ineffective for skater 2. Skaters 3 and 4 also used imagery with video feedback as an intervention used in conjunction with physical practice but the intervention was applied immediately following baseline measures. The performance change of skater 4 indicated that the intervention was effective in her case, but the intervention proved ineffective for skater 3. The results indicate that imagery used is an effective technique for enhancing performance. The effects of using imagery with video feedback are questionable as only two of the four skaters showed marked increases in performance while using this intervention. Using the Competitive State Anxiety Inventory - 2, the Self-Perception Profile for Children, as well as

personal interviews, the self-confidence of the skaters was measured before and after the study period. Increases in self-confidence were evident for all four skaters.

Examiners:



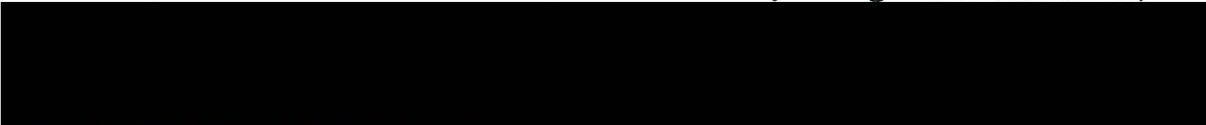
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CHAPTER I

Introduction

The potential of mental strategies to enhance performance has long been recognized within the field of sport psychology. Many athletes, coaches and sport psychology professionals have claimed improved performance as a result of employing various cognitive strategies. However, the results of empirical research have not been as decisive. For example, some studies have shown mental practice to be a facilitator of performance (Feltz, Landers & Becker, 1988; Howe, 1991; Weinberg, 1982) whereas others have failed to demonstrate significant effects (Epstein, 1980; Mumford & Hall, 1985). Many researchers agree that the inconsistent research results may be due to the variety of mental strategies that have been used, difference in the athlete groups, and the assortment of performance tasks that have been employed (Feltz & Landers, 1983; Hall, 1985; Greenspan & Feltz, 1989).

Although the association between mental strategies and physical practice was once a dominant concern, recent efforts have attempted to distinguish between the effects of various types of mental skill techniques and programs (Greenspan & Feltz, 1989; Weinberg, 1982; Weinberg, Seabourne, & Jackson, 1981). This interest in determining the effects of mental skill techniques has been derived from the need of athletes for applied and practical mental skills. Orlick and Partington (1987) found that Canadian Olympic athletes expressed the need for personally relevant skills.

Imagery, relaxation, and the use of video feedback are three elements which are often included as part of an intervention package but each show a different degree of influence on performance. Research on imagery as an isolated technique has demonstrated equivocal results. Lee and Hewitt (1987) presented partial support for the use of imagery when they found gymnasts using imagery in a flotation tank performed better than gymnasts using imagery in a group setting and gymnasts using no imagery (control). In contrast to Lee and Hewitt, Mumford and Hall (1985), Eby (1986), and McIntyre (1987) showed no significant performance differences between imagery and control groups.

Although the majority of research on the use of imagery as a separate intervention suggests it is relatively ineffective, research using imagery in combination with other techniques has found significant results. Weinberg et al. (1981) compared the effects of imagery, relaxation, and a combination of the two on karate performance. They found that imagery and relaxation combined enhanced karate performance more than the imagery or relaxation techniques used alone.

The use of videotape replay as a visual feedback technique has been suggested as a way to maximize the effects of imagery (Denis, 1985). Further, Orlick (1986) proposed that videotape replay may be beneficial in developing constructive images. However, research is equivocal in this area. Examination of a videotape feedback package for competitive swimmers

showed the intervention as a positive influence on freestyle and backstroke turns and freestyle stroke execution (Hazen, Johnstone, Martin, & Srikameswaran, 1990). In contrast, Van Wieringen, Emmen, Bootsma, Hoogesteger, and Whiting (1988) found video feedback to be ineffective at enhancing tennis skills. Finally, when video feedback was used in conjunction with imagery and relaxation, basketball skill performance was enhanced (Hall & Erffmeyer, 1983).

There is a need to identify the elements of mental strategies that affect the performance of specific sporting activities. It is not sufficient or legitimate to generalize findings from one athletic activity to another as each activity has its own physical and psychological demands (Taylor, 1987).

Purpose of the Study

The purpose of this study was to examine the effects of imagery, and a combination of imagery with video feedback on the technical components of freeskate performance in the sport of figure skating. Technical components include jumps, spins and footwork. It is of interest to establish whether using video feedback will enhance the effects of imagery.

A secondary purpose of the study was to examine the effects of the mental skill interventions on the skaters' self-confidence to perform their freeskate program.

To accomplish the purposes of the study, the following directional hypotheses were tested:

Hypothesis 1 Imagery as an intervention, used in a relaxed state and in conjunction with physical practice, will improve the performance of the technical components within the freeskate program.

Hypothesis 2 Imagery (as above) and video feedback used together as an intervention package will improve the performance of the technical components within the freeskate program.

Hypothesis 3 Imagery (as above) with video feedback will improve the performance of the technical components within the freeskate program to a greater degree than imagery used alone.

Hypothesis 4 The self-confidence of the skaters to perform their freeskate program will increase over the course of the study period.

Definition of Terms

Imagery - the ability to create images with the brain in a clear and controlled manner (Orlick, 1986).

Video feedback - presentation and viewing of the most recent taped performance of the freeskate performance.

Technical components of performance - described as the jumps, spins, and connecting footwork steps that compose the freeskate program. The difficulty, variety, cleanness, and sureness of these elements are considered in evaluating technical merit.

Freeskate Performance - Freeskate performance is a component of figure skating which includes the execution of jumps, spins, and footwork

within a freeskate program. The freeskate program is a one of specified length determined by the rules of the Canadian Figure Skating Association (CFSA) and the level of competition at which the skater is competing. The program is skated to music of the skater's choice, and the skater is free to choose the number and type of elements to be included (subject to CFSA rules 3321 and 3322).

Self-confidence - the belief or degree of certainty the skaters possess about their ability to be successful at performing their freeskate program.

CHAPTER II

Review of the Literature

This chapter provides a current review of the literature on mental practice techniques used to enhance performance. The topics which are discussed include mental practice within the field of sport psychology, mental practice as a multidimensional phenomenon, imagery and performance, imagery and relaxation, imagery and video feedback, characteristics of imagery, and methodological concerns for researching the effects of mental practice and imagery.

Mental Practice Within the Field of Sport Psychology

Sport psychology is the application of psychological principles to physical activity and sport. Though its content began with a behavioral emphasis (Browne & Mahoney, 1984), a strong interest in the more applied aspects of sport psychology has now emerged (Taylor, 1991). Services supplied by sport psychologists who have an applied focus include:

1. Providing information relevant to the role of psychological factors in exercise, physical activity, and sport to individuals, groups, and organizations.
2. Teaching participants specific cognitive, behavioral, psychosocial, and affective skills for application in exercise, physical activity, and sport contexts. Such instruction or intervention could focus, for example, on relaxation, concentration, imagery,

or moral reasoning.

3. Within exercise, physical activity, and sport settings, helping participants to understand, measure, and control relevant psychological factors, such as arousal, anxiety, audience effects, and coping skills.

4. Educating organizations and groups in areas such as improvement of adherence to exercise regimens, communication, team cohesion, and program development and evaluation (Association for the Advancement of Applied Sport Psychology, 1989).

With the current trend toward applied work, many sport psychologists are finding themselves in practical settings working directly with athletes and coaches. Since improved performance is an important motive for participation in competitive sports (Rushall, 1989) many athletes are challenging sport psychology professionals to provide them with pertinent skills in order to enhance performance. Intensive interviews with Canadian Olympic athletes revealed that athletes expect a sport psychology consultant to have the knowledge and ability to develop applied skills that are of direct use. (Orlick & Partington, 1987). The skills taught should be attractive to the consumer and easy to use.

Review Articles: Mental Strategy Literature

The term psychological skills training was created to describe the

process of improving mental strategies that promote enhanced performance (Vealy, 1988). Other terms such as mental practice and mental rehearsal were used more frequently in the late seventies and early eighties. These terms referred to mental strategies in a general sense and were used to describe a variety of techniques, such as imagery and self-talk, directed at facilitating performance. This literature review will use the terms and their meaning as utilized by the authors of the articles being described.

Research in the field of sport psychology has generally examined the effectiveness of mental strategies in acquiring or developing motor skills. The results of such research has been equivocal and does not decisively support the relationship between mental strategies and improved performance. An explanation as to why the results of the research has been found to be equivocal may be found in the fact that it has been common practice to test several mental strategies at one time. This mental strategy "package" approach may cause the effects of one strategy to be neutralized by another, less effective, strategy. More controlled studies, which examine the effectiveness of each strategy, are needed (Greenspan & Feltz, 1989). The equivocal results may also be related to the fact that the mental strategy training procedures in the various research have differed. The disparate training may influence the effectiveness of the specific intervention strategy. Explicit explanation of training procedures should be included in the description of the research in order to facilitate replication

of the study (Howe, 1991). The athlete's ability to conceptualize, previous experience of the subjects, the type of task utilized in the study, and the length of the practice sessions, are all further explanations of the equivocal research results provided by Weinberg (1982).

Extensive reviews on the effects of mental practice on motor performance have been completed by Richardson (1967), Feltz and Landers (1983), and Weinberg (1982). Reviews of more recent literature have also been completed by Feltz, Landers and Becker (1988), and by Howe (1991).

Richardson (1967) cited a total of 21 studies, 18 of which declared mental practice as a productive technique to enhance performance, and three which revealed contrary results. Richardson stated that although the majority of studies tend to show mental practice as having a positive effect on performance, they do not identify the best type of mental practice.

Feltz and Landers (1983) examined several aspects of over 60 published and unpublished studies to complete a meta-analysis of the effects of mental practice on motor skill learning and performance. Studies (n=98) using mental practice were identified. Only accessible studies which included a control group, or pretest scores of the mental practice group, were actually included in the meta-analysis (N=60). Those 60 remaining studies were coded into categories under three main areas: subject characteristics, type of task, and design characteristics. Results suggested that mental practice influenced performance somewhat better than no

practice at all, cognitive tasks such as maze learning or card sorting had a larger effect size than motor or strength tasks, and the average effect size in published studies was more than double the average effect size in unpublished studies. In their concluding statements, Feltz and Landers suggested that there is a need to confirm the elements of mental practice which produce the suggested relationship between mental practice and improved performance.

In their more recent review of the mental practice literature, Feltz, Landers and Becker (1988) examined learning effects and the effects of mental practice compared to no practice, physical practice, and mental and physical practice combined within studies (n=48) having pre-test/post-test comparisons. Their review revealed that physical practice had the largest effect size followed by combined practice, mental practice, and no practice (or control) conditions. Feltz, Landers and Becker also concluded that mental practice does facilitate learning.

Howe (1991) also felt that the issue of using mental skills as a facilitator to learning is a legitimate research area. In his article, Howe wrote more specifically about imagery and cautions that while it is possible to hypothesize that there would be no immediate performance enhancement following imagery intervention, there may be meaningful learning occurring subsequently. Howe also pointed out that it is difficult to compare the results of imagery because of different imagery training procedures and the

lack of description of the procedures in the literature.

Weinberg (1982) reviewed both early (pre 1940), and more recent (post 1940), mental practice research. Results from nine early studies provided Weinberg with initial evidence that thinking about a subsequent performance would help facilitate the actual performance on various motor tasks. In reviewing the literature, Weinberg indicated some of the more consistent findings:

1. Mental practice was more effective when used in conjunction with physical practice and should not be used as a substitute for physical practice.
2. Mental practice is more effective during the earlier and later stages of learning. This finding seemed to be related to the athlete's ability to concentrate on the appropriate movement responses.
3. There may be an optimal interval or session length for mental practice.
4. Mental practice seemed to be connected with electromyograph (EMG) responses in the muscles that would have actually performed the response.

While Weinberg acknowledged the role and effect of cognitive processes on athletic performance, he moved on from the effects of mental practice in general, to focus on the effects of specific mental preparation strategies.

Psyching-up, imagery, attention and focus, self-efficacy statements, relaxation, biofeedback, stress inoculation training, and visual-motor behaviour rehearsal were identified as strategies that were frequently used as components of mental practice programs and yielded specific effects on performance. The implications of these strategies were described as:

1. Psyching-up appears to be more effective on strength and endurance oriented tasks.
2. Strength performance enhancement occurred with preparatory arousal and imagery.
3. Educators need to direct the attention of their athletes to relevant task cues.
4. Narrowing and loss of attention and focus can occur under high levels of anxiety.
5. Self efficacy seemed to be related to performance quality.
6. Relaxation may help the athlete decrease anxiety that may interfere with achievement of the task.

There is a need to study the strategies as separate entities and document their effects relative to specific motor skills. As Weinberg (1982) stated, "the degree of effectiveness of mental strategies depends on a number of variables" (p.195) and more controlled studies are needed in order to determine the effectiveness of these variables in facilitating performance. The beneficial effect of one of these strategies may be

neutralized by the insignificant effect of another. Inconsistent research findings may be the result of each study engaging in different types and degrees of cognitive interventions (Hall,1985). A variety of approaches may be involved (Denis, 1985) and "more studies are needed in which the separate components of an intervention package are compared in order to determine the most efficient intervention procedures" (Greenspan & Feltz, 1989).

Various types of mental strategies such as imagery, relaxation, and visual feedback can all be included as part of a mental practice program. These techniques are examined further in the following segments.

Imagery: A Mental Strategy

Imagery has been defined as "a psychological activity which evokes the physical characteristics of an absent object (either permanently or temporarily absent from our perceptual field)" (Denis, 1985, p. 4s). It is agreed that imagery is a distinct cognitive process (Richardson, 1967; Paivio, 1985). Imagery is not confined to recall of stable objects but can be applied to moving or transforming objects. Imagery may also be of events that may or may not have already taken place (Denis, 1985). Imagery proficiency has been described as the ability to create images with the brain in a clear and controlled manner while experiencing the feelings related to the image (Orlick, 1986).

The Use and Purpose of Imagery

The use of imagery as part of the training process has served several general purposes such as competition preparation, skill enhancement, reduction of anxiety, and maintenance of commitment to goal directed behaviour. Motivational and cognitive functions of imagery have also been discussed (Paivio, 1985). More specific uses of imagery have been examined by Hall, Rodgers and Barr (1990), Hall and Rodgers (1989), Orlick (1986), and Haslam (1990).

Although the overall use of imagery by athletes has been reported to be quite extensive, Hall et al. (1990) stated that recreational and locally competitive athletes reported using imagery significantly less than athletes on the provincial, national or international level. Provincial, national and international level competitors were also identified as using imagery in a more structured manner and used imagery with increased frequency closer to competition (Hall et al. 1990). In examination of subject responses to a variety of mental techniques, Hall and Rodgers (1989) indicated that coaches employed imagery more frequently than other mental techniques such as task focusing, cue words or relaxation, and perceived imagery as being the most useful.

Orlick (1986) stated imagery can serve a variety of valuable purposes such as to imagine success, motivate, refine skills, familiarize the individual with the competition site or complex play pattern, and help maintain or

retain performance focus. Haslam (1990) and Orlick (1986) believed that in order to become competent at mental imagery it must be practised. Orlick and Haslam also agreed that the process should be integrated with physical training and should be practised according to the personal characteristics and needs of the athlete.

Imagery and Performance

Although many researchers and practitioners provide anecdotal evidence on imagery as a performance enhancement technique (Orlick, 1986; Orlick & Partington, 1987; and Vealy, 1986), there is little research evidence to substantiate their comments. The lack of support for the effectiveness of imagery does not necessarily indicate that the use of imagery is futile, but is more likely related to the lack of research on imagery as an isolated technique. In a review of 19 published studies covering 23 various mental practice strategies (Greenspan & Feltz, 1989), imagery was only examined as a separate treatment in 3 studies and the results of those studies were equivocal in regard to the influence of imagery on performance.

Lee and Hewitt (1987) compared the effects of imagery taking place in a flotation tank, visualization in a group setting (no flotation tank), and no visualization (control group). They found that the group that completed visualization in the flotation tank had significantly higher mean scores than the visualization or control subjects. In contrast to Lee and Hewitt,

Mumford and Hall (1985) found no significant performance differences between visualization and control groups. However, the non-significant findings of Mumford and Hall may have more to do with their methodology than the ineffectiveness of imagery as a performance enhancement intervention. Mumford and Hall compared the effects of internal imagery with that of external imagery, and a control group, on figure skating performance. A number of weaknesses existed in this study, the most drastic being the choice of task relevant to the skating level of their subjects. The skaters ranged in competitive level from Novice and Junior, to Senior and the task was a modified senior level figure made up of components from standard compulsory figures of the International Skating Union. These components are paragraph pattern (skating two consecutive circles from one push), bracket turn (a type of turn that is placed on top of each circle where the skater will both turn from forwards to backwards or vice versa, and change the edge on which she/he is skating), and a rocker turn (a turn which is placed at the converging point of the two circles and is skated without change of edge from forward to backward or vice versa). Since the competitive level at which a skater is performing determines what figures the skaters are practicing, each skater involved had a different level of experience, if any, with the components of the figure task. Each of these elements in the modified figure would be very familiar to the Senior level skaters. The Junior skaters would be familiar with the elements as well but

they would never have skated the brackets in a paragraph pattern. The Novice skaters would have previously performed bracket turns and a simple paragraph pattern but would not have skated paragraph brackets or rocker turns. The authors deceived any reader who was not familiar with the sport of figure skating in saying that all aspects of the figure were familiar to the skaters. Another critical error which may have contributed to the non-significant results, was that the skaters only observed a senior skater performing the task. No opportunity for physical practice of the task was mentioned so it is assumed that the skaters learned the performance task by observation only. As previously stated, mental practice was more effective when used in conjunction with physical practice and should not be used as a substitute for physical practice (Weinberg, 1982). Mumford and Hall (1985) gave the skaters only 4 imagery sessions, each one hour in length. The lack of time alone could have made it impossible for any performance enhancement to occur.

Although some research on imagery alone suggests it is ineffective, research using imagery in conjunction with other techniques such as relaxation, and videotape feedback, has found it to be an effective intervention. Hall & Erffmeyer (1983) found significant improvement in basketball performance by subjects who used videotaped modelling in combination with imagery. Palmer (1992) showed significant performance improvements by figure skaters using imagery in combination with simple

sketching of the figures to be performed. The skaters drew out their compulsory figures as they wished them to appear on the ice (optimal performance). While drawing, the skaters visualized themselves skating the figure, and strived to integrate the "feeling" of their responses.

To address these equivocal research results, Paivio (1985) encouraged researchers to pursue the problem of identifying when and why imagery is and is not effective. The following sections discuss imagery in combination with relaxation and imagery in conjunction with video feedback.

Imagery and Relaxation

Studies utilizing imagery and relaxation together typically start with an education session followed by relaxation and then imagery training. As part of an examination of intervention strategies, Greenspan and Feltz (1989) reviewed several studies, six of which employed imagery and relaxation as a treatment. Of these six studies, four revealed the intervention as a performance enhancing technique. Specific results by Weinberg et al. (1981), as well as Kendall, Hrycaiko, Martin, and Kendall (1990), support the influence of imagery and relaxation on performance.

Weinberg et al. (1981) found imagery and relaxation produced greater performance in reactive karate sparring skills than either relaxation or imagery used alone. More recently, Kendall et al. (1990) compared the effects of a relaxation, self-talk, and imagery package on basketball skills during game situations. They concluded that the intervention was clearly

effective showing nearly a 20% average improvement of correct performance between the pre-treatment and post-treatment phases. The intervention showed an immediate effect upon implementation and was strong enough to outweigh the varying skill level of the opposition from game to game.

Hall and Effmeyer (1983) had contrary results to Weinberg et al. (1981), and Kendall et al. (1990). Hall and Effmeyer compared the free-throw accuracy of a group of basketball players using relaxation and imagery to the performance of a group using relaxation, imagery, and modelling. They found that the imagery and relaxation intervention was ineffective while the modelling group showed significant performance improvement.

While acknowledging there are occasional studies that showed imagery and relaxation to be relatively ineffective (ie. Hall & Erffmeyer, 1983), in light of the majority of cases (ie. Weinberg et al., 1981; Kendall et al, 1990; Noel 1980; Suinn 1972), imagery while in a relaxed state does seem to be effective at enhancing performance.

Imagery and Video Feedback

In order to maximize the effects of imagery on performance, Denis (1985) suggested shaping the athlete's image as accurately as possible. He stated that this may be done through direct exposure to a model and with the appropriate use of video feedback, the athletes may act as their own model. Orlick (1986) believed that videotapes can be beneficial in developing

constructive images if used in a positive manner. He described negative use of video as when a coach may single out a player from the team and emphasize the player's errors, or when multiple replays are completed on incorrect performance. Orlick suggested that video can show incorrect performance but should be followed by an image of correction. The athlete may then employ imagery techniques using images of correct performance. While not always practical, the use of video feedback may have merit in the field. Recent research by Zhang, Ma, Orlick, and Zitzelsberger (1992) suggested that skill improvements observed when using imagery with children may be greater when the imagery technique is integrated with the viewing of videotaped images.

A summary on the effective use of videotape feedback stated that advanced and intermediate level performers respond best, repetitive viewing of correct performance is helpful, and verbal cues are necessary (Rothstein, 1981). Hazen et al. (1990) incorporated these suggestions into their two studies which examined the effects of a videotape feedback package for competitive youth swimmers. Using a multiple-baseline across subjects design, Hazen et al. (1990) implemented a videotaping package which consisted of modelling and role-playing during initial sessions (coach demonstrating correct positioning for the performance task, the backstroke spin turn), and symbolic modelling (watching model correctly perform the turn on videotape), instruction (highlighting relevant information),

videotaped feedback (swimmer viewed their own performance on videotape immediately following execution of the skill), and verbal feedback (positive and corrective feedback during videotaped feedback) during initial and subsequent sessions. Once a learning criterion was achieved a maintenance phase was implemented during the regular practice which consisted of the subject being reminded to perform his or her turns correctly. These researchers found that the intervention was effective at producing improvements in freestyle and backstroke turns, and freestyle stroke performance. However, the second half of the study by Hazen et al. which examined the effects of group videotaping procedures (feedback was given in group situation), found no improvement.

Results of studies examining the effects of video feedback on tennis performance have not been as supportive. While Cooper and Rothstein (1981) found that video feedback facilitated performance of the tennis ground strokes and serve, Van Wieringen, Emmen, Bootsma, Hoogesteger and Whiting (1988) found no significant differences between tennis subjects using video feedback in combination with traditional training and the study group who were just using traditional training (no videotape). Although not absolutely clear in the methods sections of these studies, it seems that Cooper and Rothstein (1981) carried out their video feedback on an individual basis, while Van Wieringen et al. (1988) completed videotape feedback in a group setting. Given the results of Hazen et al. (1990) which

were previously described, the group setting may have contributed to the non-significant results found by Van Wieringen et al. (1988).

The effects of combining video feedback, imagery and relaxation on basketball foul shot performance were studied by Hall and Erffmeyer (1983). Subjects in the imagery and relaxation group viewed a videotape of accurate foul shot performance, employed relaxation techniques, followed by imaging themselves making the successful shot. The subjects in the imagery and relaxation condition did not view the videotape but employed relaxation and imagery techniques. Results revealed significant differences between the two conditions with the imagery and relaxation (modelling) group showing significant performance improvements. As Hazen et al. (1990) stated, additional research is needed to test the ability to generalize about the effects across skills or sporting activities.

Imagery Characteristics

Several characteristics of imagery have been identified as mediating factors in the effectiveness of imagery practice. Characteristics such as imagery ability, internal and external perspectives, kinaesthetic orientation, vividness and control, and the attitude towards imagery, are discussed in the following segments.

Ability. Imagery ability has been shown to be an important variable in improving performance (Hall, 1985; Mumford & Hall, 1985; Denis, 1985). While Housner and Hoffman (1981) found those with high ability to image

to be more accurate at reproducing movement location than those with low ability, this positive relationship between imagery ability and performance has not always been supported (Ryan & Simons, 1981). These equivocal findings in the literature may be a function of how each researcher has defined imagery ability.

Imagery ability has also been described as the ability to employ predominantly internal imagery as opposed to external imagery (described below). Smith (1987) cited several studies that have supported this position. Kinaesthesia, or the skill of being able to "feel" your responses, has also been described as an element contributing to the identification of imagery ability (Orlick, 1986). While it is important to consider ability in any study employing imagery as a treatment, imagery ability must be carefully and clearly defined. Denis (1985) suggested the definition should correspond to the performance task.

Internal and External Imagery Perspectives. The two classifications of imagery have been typically described as internal and external (Danish & Hale, 1983). Internal imagery is taken from the first person phenomenological perspective (Mumford & Hall, 1985) as the athlete experiences the image as if actually performing the movement. External imagery is taken from the third person perspective. An individual views the movement as if watching the performance on a video, or as if they were an observer. Some studies have found that more successful athletes usually

employ internal imagery more often than external imagery (Mahoney & Avener, 1977), while others have found no support for this premise (Epstein, 1980). Hall, Rodgers and Barr (1990) found that athletes reported equal use of internal and external imagery. The athletes also described alternating between internal and external imagery during the practice sessions.

It has been recently proposed that some tasks may benefit more from external imagery than internal, or vice versa (Smith, 1987). Closed skills, such as gymnastics or swimming, may respond better to internal imagery while open or reactive skills, such as hockey or basketball, may respond better to external imagery. Since closed skills do not require the athlete to respond to environmental cues, but rather focus on internal cues from within the body (positioning, form) the internal perspective of imagery would simulate the actual performance more closely. However, Mumford and Hall (1985) compared the effects of internal and external imagery on a closed skill and found no significant differences. Open skills, which require the athlete to respond or react to environmental stimuli such as another player, the ball or puck, may be affected more dramatically by employing external imagery because external imagery would allow the athlete to see his or her position in relation to the environmental stimuli. Contrary to this belief, Smith (1987) stated, athletes may benefit from the perspective of imagery with which they feel most at ease or have the least amount of difficulty producing. The researcher is inclined to agree with Smith (1987).

Closely related to internal imagery is the issue of kinaesthetic orientation, or the emphasis on the perception of movement while imaging or the ability to "feel" your responses (Orlick, 1986) without actually physically moving. Kinaesthetic orientation is believed to be more predominant when employing internal imagery. Hall, Rodgers and Barr (1990) found that athletes performing closed skills (figure skaters and gymnasts) indicated feeling their images more than athletes performing open skills (football, soccer and squash). "Feeling" their responses during mental imagery may be more important for these closed skills that "focus on perfecting skills that are to be done exactly the same way each time an athlete performs," (Hall et al., 1990, p.8). Since feeling their responses may be more important, the figure skaters and gymnasts may have exerted more effort to incorporate those feelings into their imagery.

Vividness and Control of Images. Vivid images are colourful and realistic. They may even involve corresponding emotional reactions (Smith, 1987). The ability to implement a vivid image of success would have a great impact on maintaining motivation towards that goal.

Control is the ability of the individual to generate images that are both persistent and interruptible on request (Denis, 1985). The ability to control the outcome of images (such as imaging only correct performance) would help in constructing relevant references to and confidence in physical performance.

Both vividness and control of images are seen as being relevant to the potential effectiveness of imagery. Smith (1987) believed that like most imagery characteristics, vividness and control may be developed through systematic practice.

Attitude Towards Imagery. The attitude toward a specific situation may affect the way an individual experiences that situation. This may also apply to imagery training. Athletes who believe in imagery and see it as a potential opportunity to improve their performance, may benefit most from the imagery training session (Smith, 1987). The effects of attitude toward imagery and how it relates to the influence that imagery has on performance needs to be examined in future research.

Methodological Concerns

Within this review of the literature it has been made apparent that research of mental practice, and specific mental strategies such as imagery, have resulted in equivocal findings. These inconsistent results have made it impossible to guarantee the success of any study employing mental strategies as an intervention, or the success of any practical use of these techniques by athletes (Wollman, 1986). However, there is a vast amount of anecdotal evidence to suggest that mental strategies are indeed effective in enhancing performance. It is therefore necessary to address methodological concerns of the previous research which has been completed in the area. The issues of single subject design and validity are discussed.

Single Subject Design

Research has typically been completed with a group design and using a variety of statistical techniques that analyze group norm or averages. In averaging results, the impact of the technique on the individual is lost and in fact may be misrepresented (Bryan, 1987). Supplementing group research with single-subject design research provides the field of sport psychology with several advantages. Among these advantages is the ability to detect small but significant changes in performance over time, to identify individual subject characteristics that may be influencing the results, to confirm the effect of the intervention, and to develop personal mental training programs (Bryan, 1987; Greenspan & Feltz, 1989; Wollman, 1986). Since in figure skating the concern is with the performance of the individual athlete, rather than a team, a single subject research design seems particularly relevant. When a researcher is more concerned with the effectiveness of a given intervention on a group or team, rather than the individual, a between-group design would seem more appropriate.

Several single-subject design options are available and each addresses a different type of research question. Choosing the appropriate single-subject design directly affects the internal validity of the study. In multiple-baseline designs, the effects are shown by introducing the intervention at different points in time for each subject. If the baseline changes when the intervention is introduced, and at no other point in the study, the

researcher can be more confident in saying the effects can be attributed to the intervention rather than to extraneous events such as training effects. Once the intervention is implemented to alter a behaviour, it does not need to be withdrawn and therefore does not have the ethical concerns associated with removing the intervention (Kazdin, 1982). Since the interventions employed within the current study had the potential for positively influencing the skaters' performances, and there was a need to apply the intervention at different times over the study period to rule out potential training effects, the multiple-baseline design was chosen.

As with any research design, single-subject and multiple-baseline research is not without its limitations. An often cited limitation of using single-subject design is that the results may not be generalizable to persons other than those included in the study (Kazdin, 1982). To overcome this confine, it is necessary to produce strong effects which are evident upon visual inspection of the data. Perceiving an effect of the treatment intervention upon visual inspection does not rely on statistical evidence to prove effectiveness. Therefore, "interventions that produce dramatic effects are likely to be more generalizable across individuals than are effects that meet the relatively weaker criterion of statistical significance" (Kazdin, 1982, p.283).

Validity

A comprehensive review of validity issues in sport psychology

research was completed by Taylor (1987). Taylor believed that if the validity issues were resolved the value of future research would be expanded. Three types of validity are described and discussed; internal, construct, and external.

Internal Validity. In selecting the multiple-baseline design the issue of internal validity of the study had been addressed. Internal validity is defined by Thomas and Nelson (1985) as being the extent to which the results may be ascribed to the treatment variables rather than to extraneous factors.

Construct Validity. Construct validity is the degree to which a test measures a supposed construct, usually confirmed by relating the test results to some behaviour (Thomas & Nelson, 1985). Construct validity of the performance measure should be considered. Most researchers only take one measure of performance whereas multiple measures of performance should probably be employed (Taylor, 1987). To strengthen the construct validity of the performance as well as the self-confidence measures, the study included both quantitative and qualitative assessment procedures.

The extent to which the research environment reflects the actual environment in which the athlete usually performs is referred to as construct validity of the setting (Taylor, 1987). In order to generalize findings of the research from one setting to another, the research environment was considered and was strongly validated as the study took

place in the ice arena where the skaters usually train and prepare for competition.

External Validity. External validity refers to the generalizability of the results to populations that differ from the research population (Thomas & Nelson, 1985). Sport enhancement research has typically been carried out on specific sporting groups and with athletes of different levels of involvement or ability. The sporting activities and the level of skill the athlete creates, hold unique physical demands, individual psychological aspects, and characteristic qualities. "As a result, direct generalization across sports is virtually impossible" (Taylor, 1987, p.11) and to "generalize findings obtained from novices to elite athletes" would be inappropriate (Taylor, 1987, p.12). A researcher must be careful in applying the results beyond suitable limits and the limitation of single-subject design to generalize beyond the study subjects has previously been discussed. Although the results of the current research are attributable only to those subjects involved, effective results would give the researcher justification for further research using larger population samples. Since one type of methodology cannot address all of the research questions, it seems that complementary use of both single-subject and between-group designs, would further "the understanding of psychological processes that govern human behaviour" (McKenzie, 1991).

CHAPTER III

Methods

Subjects

The subjects were four Juvenile competitive level figure skaters from the Kerrisdale Figure Skating club in Vancouver. A Juvenile skater is one who has passed the Senior Bronze freeskate test and 2nd Figure test, but no higher. The skaters were coached by the same highly qualified professional and were attending the 1992 Kerrisdale Summer Skating School held at the Sunset Arena in Vancouver. Written informed consent was obtained from the skaters' parent or legal guardian (Appendix A). All skaters skated the same amount of hours per week and received the same amount of instruction time. (Appendix B). To ensure that the subject's rights and privacy were protected, the research data collected were anonymously coded and remained confidential to the researcher. The subjects were free to withdraw from the study without consequence during any phase of the research. Results were made known to the subjects upon request and a summary of the results was given following the study period.

Measures

Technical Performance. Each skater performed her freeskate program, which is two minutes in length, during each training session. From this execution of their program, a measure of technical performance was taken using the measurement instrument that was developed to

evaluate the technical components of the freeskate performance; jumps, spins, and footwork (Appendix C). This was a measure of the number of freeskate elements missed, attempted, and completed. The quality of the technical components was assessed and given a numerical score using a sport rating scale which included precise definitions of each component. The technical measures were completed by the researcher after sufficient interobserver reliability had been established (see Appendix D). Three interobserver reliability checks were also completed during the study period.

Self-Confidence. The skaters' confidence to perform the freeskate program task was monitored before and during treatment to assess whether any change had taken place over the study period. Self-confidence was measured using the Competitive State Anxiety Inventory-2 (CSAI-2) developed by Martens, Burton, Vealy, Bump, and Smith (1983) (Appendix E) and the Self-Perception Profile for Children developed by Harter (1985) (Appendix F).

While there are few measures identifying self-confidence prior to competing, one exception is the CSAI-2. It was developed to measure three dimensions of pre-competition anxiety; cognitive state anxiety, somatic state anxiety and self-confidence. Cognitive state anxiety is evident when an athlete loses concentration, has self-doubts, or is burdened with concerns surrounding the competition. Somatic state anxiety is related to how the athlete's body feels. Evidence of somatic state anxiety includes, muscle

tension, feeling jittery, or stomach "butterflies". Self-confidence would be feeling secure, relaxed and focussed on performance. Self-confidence is considered to be negatively correlated with cognitive state anxiety. The CSAI-2 consists of 27 items, measured using a 4 point Likert scale. Scores may range from a low of 9 to a high of 36 on each subscale.

The Self-Perception Profile for Children represents a revision of the Perceived Competence Scale for Children (Harter 1979, 1982). The revised instrument includes six subscales which tap five specific domains of scholastic competence, social acceptance, athletic competence, physical appearance, behavioral conduct as well as one's sense of global self-worth. Each of the six subscales contains six items constituting a total of 36 items. The items are scored from 1 to 4 where a score of 1 indicates low perceived competence and a score of 4 reflects high perceived competence. The scores for each subscale item are averaged giving a score that may range from 1 to 4 for each subscale.

A subjective measure of the skaters' confidence to perform their program was completed through personal interviews. On an individual basis the researcher asked each skater six questions regarding her feelings and thoughts towards performing her freeskate program (Appendix G). There were two interviews completed, the first before any baseline measures were taken, and the second following the study period. These interviews were conducted immediately after each skater performed her program in a

competition which occurred prior to and immediately following the treatment phase of the study.

Treatments

Imagery. Prior to taking the ice to skate the regular freeskate training session, the skater utilized relaxation skills for a short period of time (approximately 1 minute). Once in a relaxed state the skater then imaged the optimal performance of the freeskate program. Imaging the freeskate program in a relaxed state constituted the imagery intervention. Following the imagery, the skater then practised on the ice. During the practice the skater performed her freeskate program as the performance task. Immediately after the practice the skater again followed the imagery procedures. The performance was videotaped in order for accurate evaluation to be completed, but the skater did not view the video.

Imagery with Video Feedback. This treatment was a combination of the imagery intervention with the use of video feedback. The sequence of intervention was as follows:

- i) Viewed video of performance (from previous day)
- ii) Imagery of optimal performance of the freeskate program, while in a relaxed state (intervention as described above)
- iii) Performed freeskate program during practice session
- iv) Viewed video of most current performance
- v) Imagery of optimal performance of the freeskate program,

while in a relaxed state (intervention as described above)

Procedures

The skaters each took part in a competition prior to the commencement of the study. Immediately following their performance in the competition, the skaters individually participated in a personal interview to assess their thoughts and feelings about performing their program as a subjective assessment of their self-confidence. Prior to the treatment phase the skaters also completed the Self-Perception Profile for Children as an additional measure of self-confidence.

An overview of the study design and intervention assignments, using the multiple-baseline single subject design, is provided in Figure 1. Prior to any experimental manipulation, multiple baseline measures were taken on the skaters' technical component performance using the sport rating scale measurement instrument (Appendix C and D). Immediately before her first baseline performance evaluation, each skater completed the CSAI-2 form to again assess her level of confidence to perform her freeskate program.

After subject 1 and 2 completed the baseline measures (note: each skater entered the first intervention phase at a different time due to multiple baseline procedure), they were taught imagery skills. A complete description of the imagery training procedures is provided in Appendix I. With the help of the researcher, the skaters developed quality images with sound, colour, appropriate speed, and clarity. Imagery constituted the first

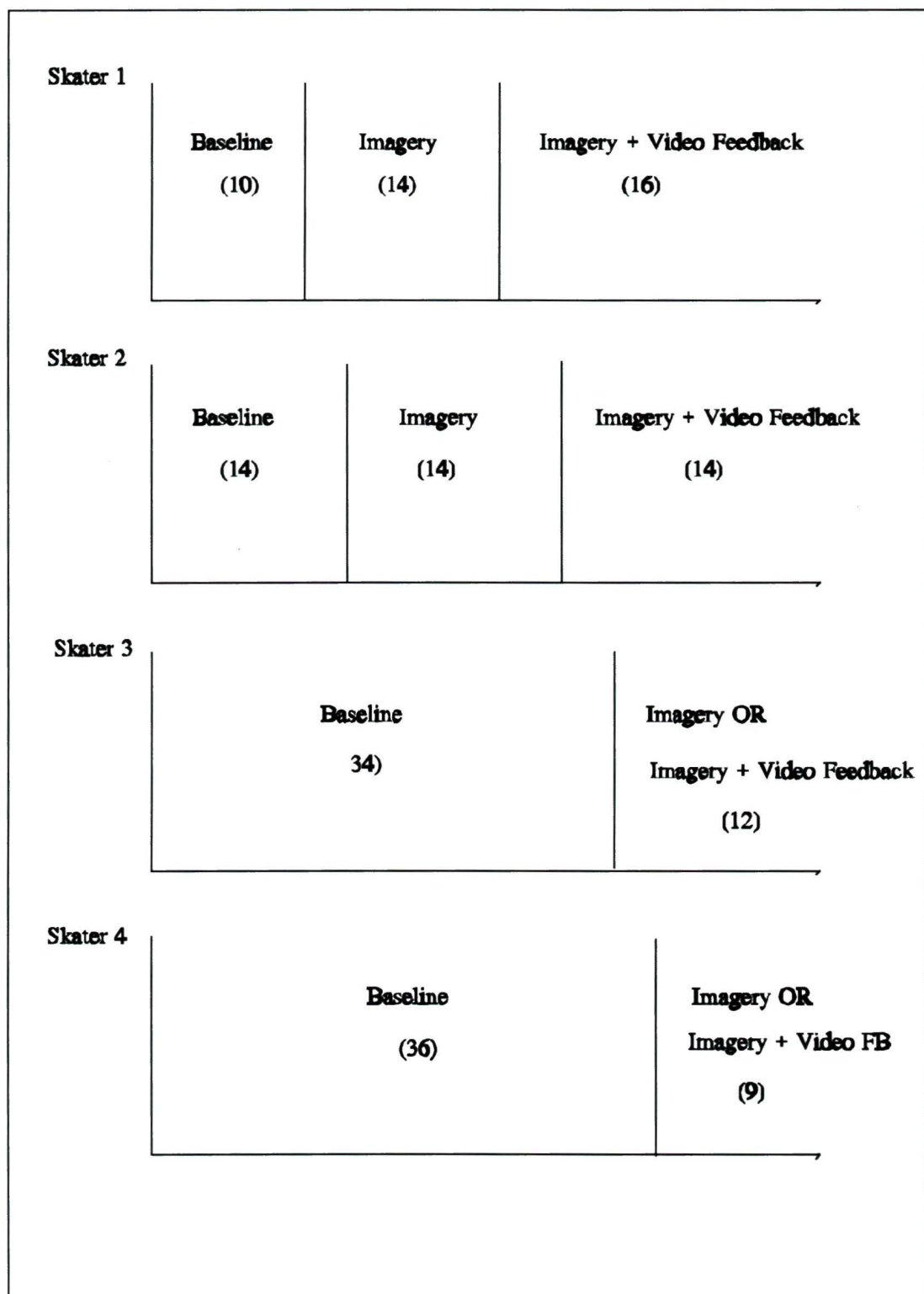


Figure 1 Study Design, Intervention Assignment, and Number of Evaluations

intervention procedure. Performance measures continued with a frequency of 5 times per week for approximately three weeks.

Intervention 2, consisting of imagery and video feedback, followed Intervention 1. Measurement of performance continued as in Intervention 1. During intervention phases 1 and 2, baseline measures were continued for subject 3 and 4 in order to view any practice or training effects. During the final phase of the study the researcher had the option of having the third and/or fourth subject utilize an intervention, either imagery or imagery with video feedback, dependent on the effects seen with subject 1 and/or subject 2 while employing intervention 1 or 2. Both subjects 3 and 4 used intervention 2, imagery and video feedback, during the final phase of the study. Prior to skating her last program for evaluation purposes, each skater completed the CSAI-2 to assess whether any change had occurred over the study period regarding her confidence to perform.

After conclusion of the performance measures the subjects completed the post-study questionnaire to determine their evaluation of the treatments employed and their experience of participating in the study (Appendix J). To assess whether any change had occurred over the study period in the skaters' confidence to perform, the skaters once again completed the Self-Perception Profile for Children as they did prior to the study. The skaters then competed in the "Summer Skate" competition, following which they then participated in the personal interview to subjectively assess their

confidence to perform. The skaters answered the same questions as in the original interview prior to the study.

To give further clarity to the seemingly complex assessment methods and schedule, the following diagram is provided. It is based on a time-line from the start of the study period and follows through to the end of the study period for each skater.

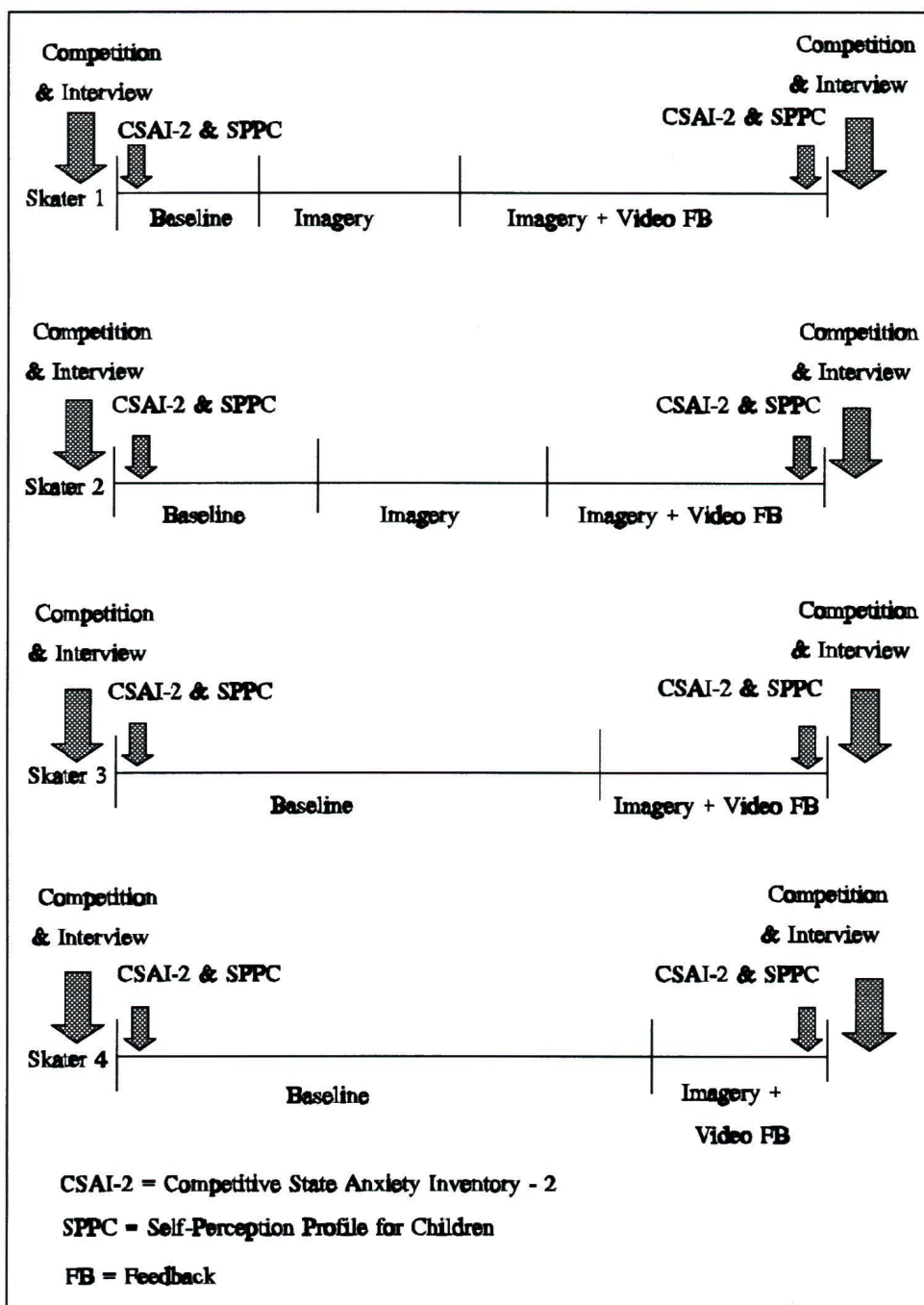


Figure 2. Assessment Methods and Schedule Summary

CHAPTER IV

Results & Analysis

Interobserver Reliability

Periodic analyses of interobserver reliability between the researcher and a Gold Test figure skating judge were conducted to ensure that reliable measures of performance were maintained throughout the study period.

In each of the three study phases, an interobserver reliability check was completed using the Technical Performance Evaluation forms (Appendix C). The researcher and the figure skating judge observed a randomly selected performance which was taped on video. There was no discussion of the performance and the corresponding score until the evaluation was completed. To test the level of agreement between the total scores assigned by the two evaluators while observing the performances independently, a frequency ratio was established. To assess whether there was agreement between evaluators on each element of the freeskate performance, the point by point agreement test was employed. Agreement across all occasions in which reliability was checked by deriving a Pearson product-moment correlation coefficient (see Appendix L for data).

Phase 1. The figure skating judge and the researcher each assigned a score of 45 for the observed performance resulting in a frequency ratio of 100%. Point-by point agreement was established at 83.33% as there were ten agreements and two disagreements on scores assigned to the twelve

elements within the performance.

Phase 2. The researcher assigned the observed performance a score of 69 while the figure skating judge assigned a score of 71 to the same performance. The resulting frequency ratio was 97.18% while the point by point agreement was 84.62%. The point by point agreement was based on the fact that there were eleven point agreements and two point disagreements.

Phase 3. The researcher assigned a score of 72 while the figure skating judge assigned a score of 71 to the observed freeskate performance. The resulting frequency ratio was 98.61%. The point by point agreement was 93.33% as there were fourteen agreements and one disagreement on the scores assigned to each of the fifteen elements contained within the freeskate performance.

The Pearson product-moment correlation provides an estimate of agreement across all occasions in which reliability was checked rather than an estimate of agreement on any particular occasion (Kazdin, 1982). Therefore the correlation was conducted on the data obtained from all three interobserver reliability checks that were completed throughout the study period (see Appendix L for data). Scores assigned by the figure skating judge were correlated with scores assigned by the researcher resulting in a correlation coefficient of $r = .98$.

Technical Performance

The technical figure skating performance scores for each skater were graphically displayed (Figure 2) over the course of the baseline and intervention phases. Recommended by Kazdin (1982, p. 266), the appearance of day-to-day variability was reduced by plotting the data in 3-day blocks of time rather than on a daily basis. This eased the interpretation and clarified the results as changes in means, levels, and trends across phases, were easier to detect. Visual inspection was completed on the graphed data (see Appendix M for daily numerical data).

A detailed visual analysis of the performance data for each skater was completed using the four criteria of visual inspection recommended by Kazdin (1982). These four criteria are changes in means, changes in level, changes in trends, and latency of change.

Skater 1. An increase in mean performance took place from baseline to imagery and from imagery to using imagery with video feedback. The mean performance score during the baseline phase was 50.1, while the mean performance scores for imagery intervention phase and the imagery plus video feedback intervention phase were 59.64 and 67.25 respectively. These changes in mean suggest the interventions were effective in improving the figure skating performance of skater 1. The change in level from the end of one phase to the beginning of the next phase was also examined. The change in level increased from 48.6 to 58.6 when the

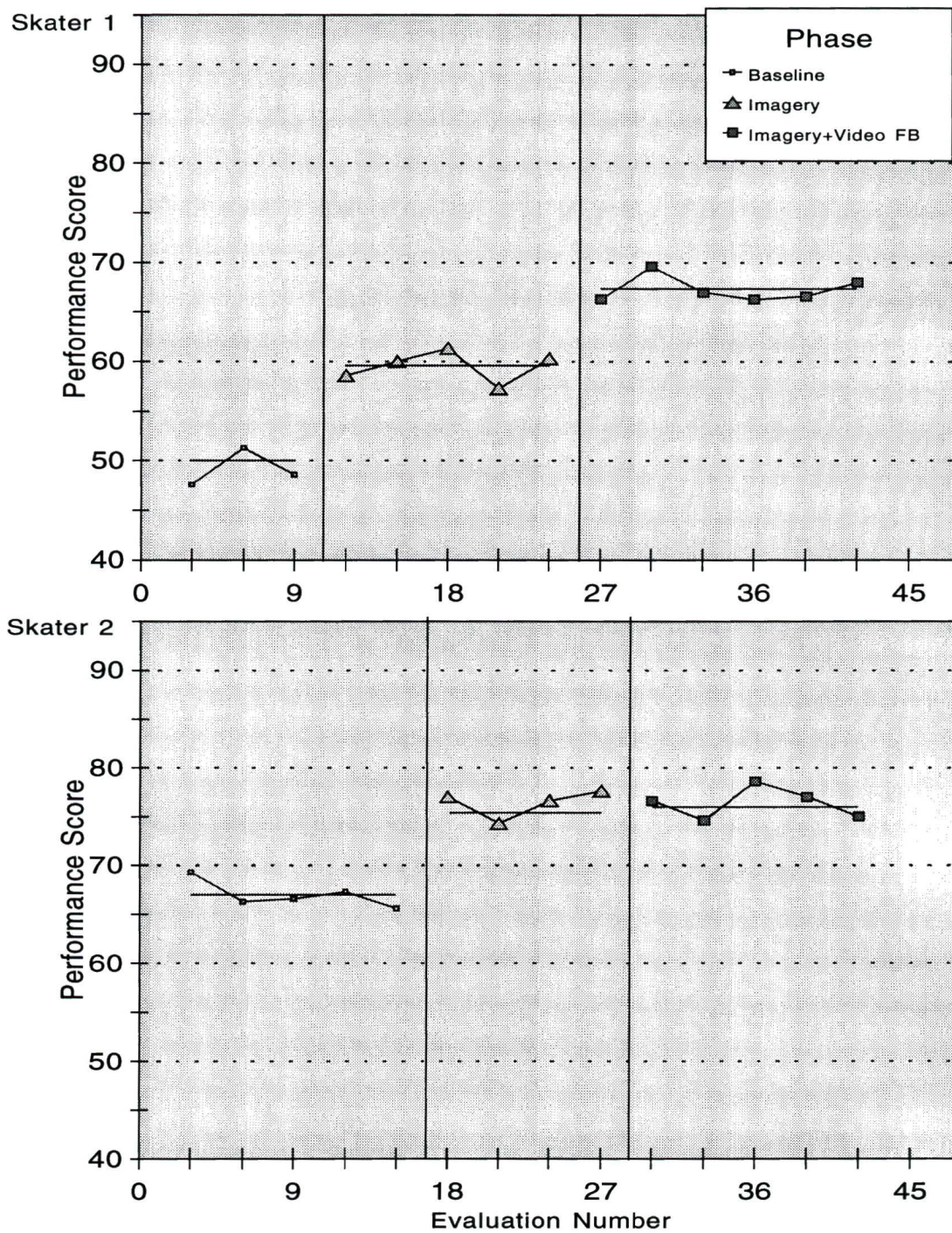


Figure 3. Effects of Interventions on Figure Skating Performance

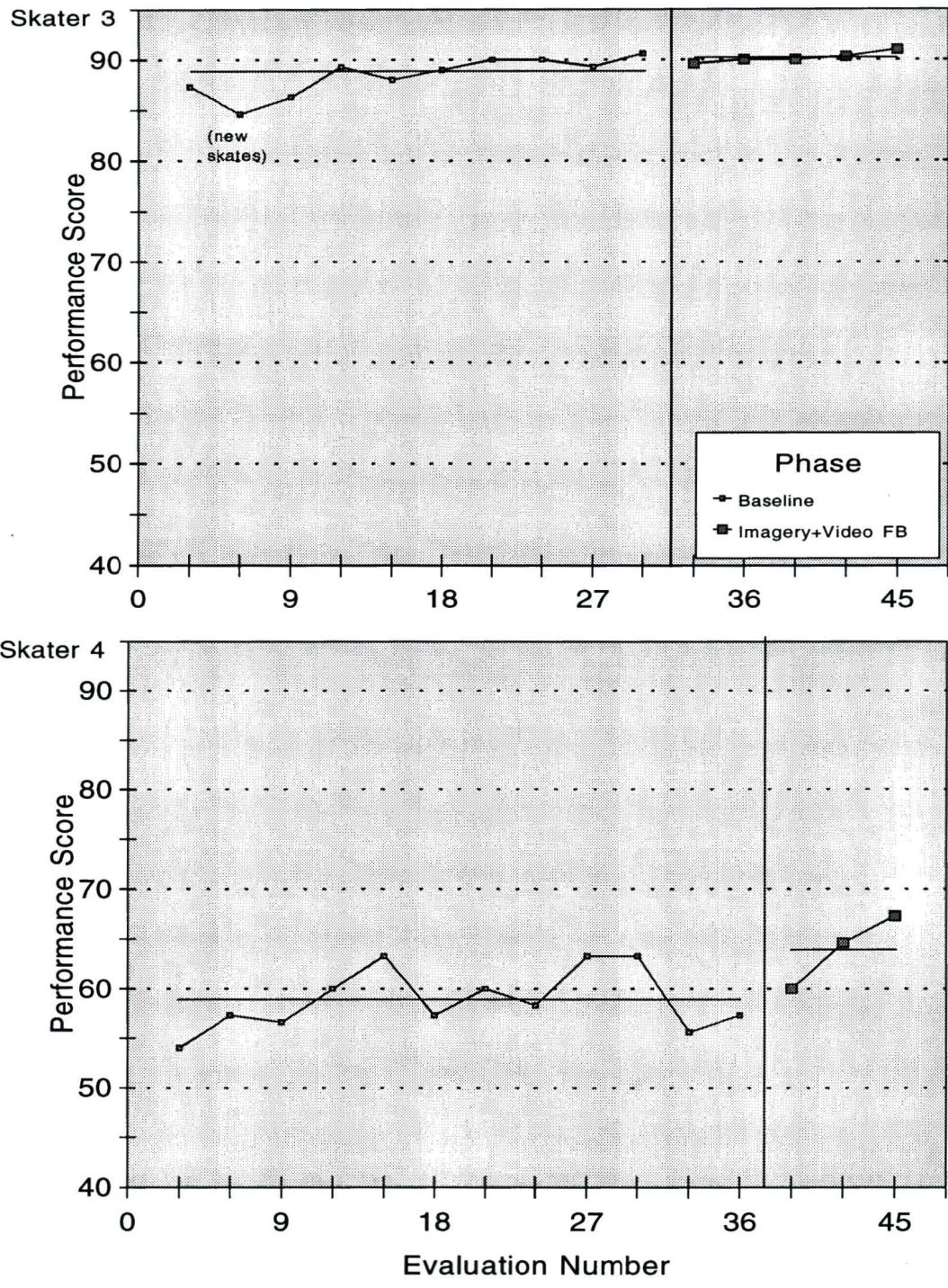


Figure 3. (Cont.) Effects of Interventions on Figure Skating Performance

imagery intervention was implemented. There was also an increase in level from 60.3 to 66.3 when the imagery with video feedback was utilized. The change in trend examines the changes in direction of behaviour as each intervention is applied. There was no obvious change in trend as each intervention was applied (performance stayed relatively stable about the mean), but since this was coupled with distinct increases in levels and means, indication of performance improvement still exists. Latency of change, which refers to the period between the onset of one intervention and changes in performance, were examined. Immediate improvement (within the 3-day block) in performance was seen when changing from baseline to imagery and from using imagery alone to using it along with video feedback. Since the more closely in time that change occurs after the conditions have been altered, the clearer the intervention effect (Kazdin, 1982), the results suggest apparent effective interventions for this skater.

Skater 2. Examining the change in means for skater 2, a pronounced increase is seen from average baseline performance measures ($\underline{M} = 66.93$) to average performance measures during the imagery intervention phase ($\underline{M} = 76.00$). This pattern of improvement is similar to that of skater 1. A very slight increase in means also took place between the imagery intervention phase to the intervention phase using imagery plus video feedback ($\underline{M} = 76.29$). Change in levels were evident between the baseline and imagery intervention phases as an increase from a score of

65.6 to a score of 77 took place. An immediate decrease took place between the imagery intervention phase (score = 77.6) and the imagery plus video feedback intervention phase (score = 76.6). The trends were examined for the baseline and each intervention phase. There was an apparent decreasing trend for the baseline measures as the performance scores were slowly declining. This slowly declining trend changed upon implementation of the imagery intervention to a slight increasing trend. Since the skater's performance was erratic during the imagery plus video feedback intervention phase, there was no apparent trend. Therefore the increasing change seen in the imagery phase ceased to continue. The latency of change with the implementation of the imagery intervention after baseline was immediate and associated with an improvement in performance. Implementing the imagery plus video feedback intervention did not lead to substantial performance improvement nor a more consistent pattern of performing and was therefore considered to be relatively ineffective for this skater.

Since the researcher was satisfied that imagery was an effective intervention for enhancing technical freeskate performance when used in conjunction with physical practice, and felt that the effects of the imagery plus video feedback needed to be clarified, skater 3 was assigned to use the imagery plus video feedback intervention.

Skater 3. Throughout the study period, skater 3 demonstrated

uncommonly high and relatively consistent performance with the only exception being on the second data point. This data point was brought down due to the fourth evaluation when skater 3 demonstrated a relatively low performance score. This relatively poor performance occurred when the skater received new skates and was "breaking them in", a potentially painful process of moulding the leather to the skater's foot. In concurrence with the design of the study, baseline measures were extended for 34 evaluations resulting in a mean performance score of 88.58 over this period (possible maximum score equal to 91). Clearly there was little room for improvement in performance. There was a small increase in the mean during the imagery plus video feedback intervention phase indicated by a mean performance score for this period of 90.08. A change in level occurred with a slight decrease from a score of 90.6 to a score of 89.6 when the imagery plus video feedback intervention was applied. Over the baseline period a trend of rapid improvement was seen followed by steady and consistently high performance scores. There was no distinct change in trend during the intervention phase. Performance scores continued to be high and consistent.

The effect of the imagery and video feedback intervention remained unclear. Therefore, the researcher assigned skater 4 to also use the imagery plus video feedback intervention.

Skater 4. Skater 4 improved from an average baseline performance

score of 58.88 to an average performance score of 64 when the intervention using imagery plus video feedback was applied. An immediate and slight increase in level of performance (from 57.3 to 60) resulted when the intervention was applied. There was no consistent trend in performance during the baseline phase with both high and low scores being evident. Despite the unstable baseline measures, a clear and important change to an accelerating trend was evident upon implementation of the imagery plus video feedback intervention. An implication of having an unstable baseline, is that stronger changes in trends are needed to make conclusions about the effectiveness about a given intervention. The distinct increasing trend upon implementing the intervention, which was coupled with increases in both levels and means, is indicative of an effective technique for this skater.

Self-confidence

Two objective measures of self-confidence were used before and after the study period. These were the Self-confidence subscale of the Competitive State Anxiety Inventory - 2 (CSAI-2; Appendix E) and the Self-Perception Profile for Children (Appendix F). Each skater completed the Self-Perception Profile for Children before skating her first session of the study period and following her final skating session for the study period. The skaters completed the CSAI-2 immediately prior to skating their freeskate program both on the first and last days of the study. Scores were derived for the three sub-scales included in the CSAI-2 and the six sub-scales included

in the Self-Perception Profile for Children. The skaters also took part in personal interviews with the researcher to evaluate their feelings following the performance of their freeskate program. During the interview, each skater was asked to respond to six questions (Appendix G). These interviews, which took place both before and after the study period, served as the basis for a subjective evaluation of the skaters self-confidence.

As indicated in the research methods section, the CSAI-2 measures three components; cognitive anxiety, somatic anxiety and self-confidence. Scores can range from a low of 9 to a high of 36 in each of the subscales. Changes in the scores of the four skaters on these sub-scales that occurred between the pre-study and the post-study measures were examined (Table 1). No consistent pattern of change occurred with the scores from the somatic anxiety subscale. Skater 3 showed no change at all, skater 1 showed a slight increase, while skaters 2 and 4 showed substantial decreases. Each of the four skaters showed decreases in cognitive anxiety subscale scores. Most importantly to the study, are the changes which occurred in the scores of the self-confidence subscale. All four skaters showed increases in self-confidence scores from pre to post study.

The six sub-scales included in the Self-Perception Profile for Children are scholastic competence, social acceptance, athletic competence, physical appearance, behavioral conduct, and global self-worth. The scores of the four skaters on these six sub-scales were examined (Table 2). No consistent

Table 1 CSAI-2 Scores

CSAI-2	Skater 1		Skater 2		Skater 3		Skater 4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Cognitive Anxiety	22	17	23	14	19	16	24	11
Somatic Anxiety	14	16	25	11	13	13	19	11
Self-Confidence	28	32	13	28	24	33	20	35

Table 2 Scores from the Self-Perception Profile for Children

Self-Perception Profile for Children Sub-scale		Skater			
		1	2	3	4
Scholastic Competence	Pre	4.0	3.5	3.2	3.0
	Post	4.0	3.3	3.3	3.0
Social Acceptance	Pre	3.5	2.5	3.7	3.0
	Post	3.5	2.8	3.5	3.2
Athletic Competence	Pre	3.5	2.0	3.3	3.5
	Post	3.0	2.3	4.0	3.8
Physical Appearance	Pre	1.7	3.5	3.8	3.2
	Post	2.0	3.5	3.8	3.5
Behavioral Conduct	Pre	4.0	3.0	3.5	3.2
	Post	3.5	3.0	3.7	3.5
Global Self Worth	Pre	3.5	3.0	4.0	3.2
	Post	3.8	3.2	4.0	3.8

pattern emerged with regard to the scholastic competence sub-scale. Skaters 1 and 4 showed no change while skater 2 decreased in her perceived scholastic competence and skater 3 increased. Skaters 2 and 4 showed an increase in their perception of social acceptance while skater 1 expressed no change and skater 3 showed a decrease.

Three of the four skaters (skaters 2, 3, and 4) showed increases in their self-perceptions of athletic competence while skater 1 showed a decrease. On the sub-scale of physical appearance, skaters 1 and 4 showed increases over the study period while skaters 2 and 3 displayed no change. Behavioral conduct scores were increased by skaters 3 and 4. Skater 1 showed a decrease while there were no changes for skater 2.

The sixth sub-scale measured global self worth. Three skaters, skaters 1, 2 and 4, showed increases and skater 3 showed no change.

Of the six sub-scales, athletic competence and global self worth seemed most relevant to this study. It is these two sub-scales that showed the most consistent pattern of changes. Three of the four skaters showed increases over the study period.

A subjective evaluation of the skaters' confidence to perform their programs was completed through personal interviews with each skater. These interviews took place immediately after each skater performed her freeskate program in a competition. There was a competition both before and immediately after the study period. The skater's responses to all

interview questions were recorded (Appendix H). Changes in the skaters' feelings and thoughts toward performing their freeskate program over the study period were apparent. These changes are summarized as follows:

1. The skaters' statements regarding how they felt about performing their programs became more positive in nature.
2. The skaters indicated decreases in their levels of anxiety or nervousness.
3. Their thought content and self-talk occurring before they skated in the competition became more positive and specific to performance.
4. Increases in levels of concentration while skating their program were evident.
5. Concerns about competing against other skaters were reduced.
6. When asked to describe any changes that had occurred over the study period, each skater indicated she felt her level of confidence had increased.

The skaters' responses to the interview questions clearly indicate a decrease in cognitive anxiety (decreased worries or concerns, increased concentration, increased positivity). Since this outcome was coupled with statements of increased self-confidence, their experience of participating in the study seemed to be positive.

Post-Study Questionnaire

Following the completion of the study, each skater filled out the post-study questionnaire (Appendix J). This questionnaire was used to determine the skaters' evaluation of the interventions employed and the skaters' experiences of participating in the study. The responses to the questionnaire were recorded (Appendix K) and the following is a summary:

1. Both skaters who used imagery and the imagery with video feedback interventions, preferred using the imagery with video.
2. Of the two interventions, preference was given to using imagery with video because the skaters liked being able to see what they actually looked like and they were able to clearly see what they needed to improve on. Skater 2 stated she felt that the video helped her create the "pictures" for doing the imagery.
3. When asked to comment on what they liked about imagery as an intervention, the skaters liked the imagery intervention because they could "do it anywhere" and they did not need assistance with it.
4. The skaters commented that they liked video feedback because it let them know "truthfully" how they skated, helped improve their skating, and it was fun.
5. Suggestions for improving the study included getting more

skaters involved, and showing their performance marks to them everyday.

6. All the skaters would recommend both the imagery and imagery with video feedback interventions as a way to improve freeski performance.
7. All skaters reported feeling more comfortable and confident in performing their freeski program than they did at the beginning of the study period.

CHAPTER V

Discussion

This study examined the effects of imagery and a combination of imagery with video feedback on the technical components of freeskate performance in the sport of figure skating. There were four experimental hypotheses, all of which were supported.

The first hypothesis stated that conducting imagery in a relaxed state, as an intervention in conjunction with physical practice, will improve the performance of the technical components within the freeskate program of the skaters. The improvement in technical performance experienced by the skaters using imagery as an intervention (skaters 1 and 2) clearly indicated that the use of mental imagery while in a relaxed state can result in enhanced performance. Since the performance task consisted of their competition program, using imagery to prepare themselves for competition may help these skaters keep focussed on their event, self-confident about their upcoming performance, and in control of their arousal level. The skaters themselves, made similar statements during their last personal interview which followed an actual competition.

The effects shown by using imagery in a relaxed state support the work of other researchers (Weinberg et al., 1981; Zhang, Ma, Orlick and Zitzelberger, 1992). The results also provide justification for the use of imagery as a performance enhancement technique when working with these

figure skaters in a consultation situation. It also indicates the possible value of conducting imagery research with a larger population to examine the generalizability of the finding.

The second hypothesis stated that imagery and video feedback used together as an intervention package would improve the performance of the technical components within the freeskate program. Skaters 3 and 4 both showed improvements in their average technical performance upon using the imagery plus video feedback intervention. While the improvement shown by skater 3 was marginal, skater 4 showed a more obvious improvement indicated by an increase in level and mean performance, and a change from no apparent trend during baseline to an increasing trend during the imagery with video feedback intervention phase. There was evidence that the performance of skater 4 was still on the rise at the completion of the study, however, the conclusions made from the results of skater 4 could have been given more strength if evaluations were continued for a longer period of time.

As stated, skater 3 also showed an improvement, but her improvement was far less prominent because of the high and consistent technical performance that she exhibited. The maximum performance score that skater 3 could achieve, based on the number of elements choreographed into her freeskate program, was a total of 91 on the Technical Performance Evaluation Form and her average performance score over the baseline

readings was 88.58. This caused a ceiling effect and there was little room for improvement to take place within the confines of the performance task. This result has several practical implications regarding the optimal time to apply the intervention for peak effectiveness. There seems to be an relationship between the skater's level of consistency and potential effect of the intervention. It may be of more value to apply the intervention to those skills that are less consistent or when the skater is at the beginning stages of performance development. In the case of skater 3, the intervention did not have much impact on improving her already high and consistent performance as it appeared within her program. However, skater 3 was working on additional elements. She did not need these elements to successfully compete at her current level, and the elements were viewed as inconsistent, rough in technique and weak in form. Given these circumstances, the elements were not yet included in her program. It would been of interest to examine the effect of this intervention applied to the elements which she was still working on outside of her program.

An additional purpose of the study was to examine the effects of using video feedback together with imagery as an intervention following the effects of imagery used alone as an intervention. The third hypothesis postulated that imagery and video feedback used together would demonstrate additional enhancement of performance over and above the improvement resulting from the use of imagery alone. Skater 1 showed

distinct and immediate improvement in performance upon the application of imagery and video feedback as an intervention and because this improvement was observed following the imagery intervention phase, the hypothesis was supported in her case. Skater 2 also showed improvement, although slight, in mean performance while using imagery and video feedback over and above performance levels shown while using imagery alone. However, the change was not immediate and was less noticeable than the change observed in the performance of skater 1. Although results partially support the hypothesis, the effects were much more distinct with skater 1 and the effects for skater 2 were minimal. Further clarification with additional subjects is necessary to give strength to the conclusions regarding the effect of the imagery plus video feedback intervention.

The hypothesis that imagery with video feedback would be an effective intervention received partial support in the cases of skater 1 and skater 4. It is possible to maintain that the conditions were not optimal for obtaining the potential effect of video feedback in the cases of skater 2 and skater 3. Several reasons as to the equivocal results are worth exploring. It may be that video feedback may have been more effective if performers were prompted about specific relevant cues to attend to while observing the videotape. Although the researcher viewed the videotape with the skaters, no verbal feedback was given regarding relevant performance cues to attend. It may have been that skaters 1 and 4 had the ability to pick out

the relevant cues in their performance without assistance. This ability could have facilitated the effectiveness that this intervention apparently had for them. Rothstein (1981) believed that verbal cues are necessary for the effectiveness of the videotape replay and this may have held true in the case of skater 2. Skater 2 may not have had the ability to detect relevant information from the videotape without receiving assistance. As already discussed, the ceiling effect of skater 3's performance may have stopped any potential intervention effect from existing for her. It would be of interest to compare the effects of the imagery with video feedback intervention, both with and without relevant cue information being provided. It would also be of value for the consultant and others practising within the field of sport psychology to examine the relationship of athletes' characteristics with the effectiveness of performance enhancement interventions.

The fourth hypothesis, derived from the secondary purpose of the study, was the self-confidence of the skaters to perform their freeskate program would increase over the course of the study period. This hypothesis was confirmed when measuring self-confidence prior to performance with the CSAI-2. Each of the four skaters showed increases in her self-confidence over the study period as shown by the scores on the self-confidence subscale of the CSAI-2. An additional objective measure of self-confidence was also taken using the Self-Perception Profile for Children where a similar pattern appeared to emerge with three of the four skaters showing increases in

athletic competence and global self-worth. During a subjective evaluation of the skaters' self-confidence, evidence further supporting the hypothesis was found to exist. During personal interviews, all four skaters made statements with regard to feeling more confident when performing their freeskate program and showed evidence of a decrease in cognitive anxiety.

Although the hypothesis that the skaters' self-confidence was going to increase over the study period was supported, it is unclear to the researcher as to the reason for this change. Inferences were taken from the positive pattern of the treatment results and it was assumed that self-confidence increased along with performance. Measures of self-confidence were taken on only two occasions, pre-study and post-study. Therefore one can only speculate as to whether the increase in self-confidence was due to the interventions or whether it was due to the requirement of performing the freeskate program on a daily basis. As well, questions regarding latency and consistency of the change cannot be answered. A more suitable research design that takes an increased number of regular measures of self-confidence should be included in further research on this topic. The inter-relationship between the benefits of imagery and the seemingly corresponding increases in self-confidence is an interesting topic. Changes in self-confidence as a result of employing performance enhancement interventions is an area for future research.

The appropriateness of the self-confidence measurement instruments

used for this study, as well as others, may also be questioned. While the CSAI-2 is sport related and specific to confidence to performing in athletic situations, it is only a state measure which provides a subscale measure of self-confidence immediately before performing for one particular instance. It does not give any indication of lasting or more consistent changes in self-confidence but is nevertheless a valuable research tool when examining athlete's responses to competition. It is the only instrument known available that could even somewhat contribute to this study. Perhaps using this instrument with repeated measures would give an indication as to changes over time. The Self-Perception Profile for Children gives a measure on more stable levels of self-confidence and was developed for children. However, while the information provided was of interest, it is not considered to be sport specific nor does it address the nature of competition within sport. Development of a new instrument that addresses these problems would benefit sport psychology research on self-confidence of athletes.

Following the study the skaters filled out a post-study questionnaire which asked them to comment on their experience and the interventions they had used during the study. It was clear that the skaters found both interventions, imagery alone and imagery with video feedback, to be of use to them and enjoyable. The skaters made reference to how watching the video tape of their performances made it easier to form the images in their minds. This has several implications to the value of using video as an

adjunct to imagery. The skaters were not simply watching a video but through their self-reports, it seems that they were incorporating that visual information into their imagery. The use of video with imagery has great potential for making the necessary connection between watching and executing. "It is not enough to view a video. One needs an effective method of absorbing that information and integrating it into one's actions" (Zhang, et.al., 1992, p.239). For some, video may provide the relevant cues and feedback. Imagery can serve as a method for absorbing the relevant information and provide a base from which to develop the actual motor patterns. From the images, the athlete can then move to improving the actual physical execution of the skills.

Although the effectiveness of using imagery and video feedback remains unclear as a result of the present study, there was important information gained about the intervention from the post-study questionnaire. In addition, there was also valuable information gained relevant to changes in the skaters' self-confidence through the personal interviews. This provides support for supplementing traditional quantitative research with qualitative analysis. Qualitative methods can provide insight for further research as well as provide validation of study results.

To summarize, the areas of future research which would be of value to the field of sport psychology are to clarify the effects of using video feedback in combination with imagery, examine the changes in an athlete's

confidence to perform in relation to the intervention procedures being utilized, and move towards developing a new instrument that addresses the problem of measuring enduring changes in an athlete's confidence to perform.

Skating the freeskate program is the essence of figure skating and the foundation for competition. If the use of imagery, or video feedback in combination with mental imagery, can enhance the performance of the freeskate program it will provide the means to increasing the opportunity for success and developing a positive experience within the sport.

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Appendix A

Subject Consent Form

LETTER OF CONSENT

**Shawna L. Palmer, B.P.E.
Researcher, University of Victoria
121-3255 Cook Street
Victoria, B.C. V8X 1A4
Telephone 381-0005**

I would like permission for you daughter _____ to take part in a study of sport psychology skills and interventions as applied to the developing competitive figure skater. In this project we propose to study the benefits of imagery or visualization, and videotape feedback on the performance of your daughter's freeskate program.

Your daughter will be skate each freeskate session as regularly scheduled. During each session she will be required to perform her program once. This "run-through" will be videotaped and later evaluated on the technical components of the performance by the researcher, qualified figure skating judges. All evaluation results will be kept strictly confidential. The skater, coach, and researcher will be the only people to have access to the data.

The sport psychology skills or intervention will be taught during an education session which the coach and parents are very welcome to attend. Once the skills or interventions are understood the skater will asked to utilize them prior to the freeskate session and immediately following. The researcher will be present at all times and will help the skater with any questions regarding the use of the skills. In summary the procedure will be as follows:

- i) Intervention (imagery or imagery with video viewing)
- ii) Skate freeskate program during practice session (will be videotaped)
- iii) Intervention

Intervention and Procedure:

Imagery. Prior to getting on the ice to skate the regular freeskate training session, the skater will utilize relaxation skills for a short period of time (approx. 1 minute). Once in a relaxed state the skater will then visualize the optimal performance of the freeskate program. The relaxation followed by imagery constitutes the imagery intervention. Following the imagery, the skater will then practice on the ice. During the practice the skater will skate her freeskate program. Immediately after the practice the skater will again follow the imagery procedures.

Note, the performance will be videotaped in order for accurate evaluation may be completed, but the skater will not view the video.

Imagery and Video feedback. This treatment will be a combination of the imagery and video feedback interventions. The sequence of intervention will be as follows:

- i) View video of performance (from previous day)
- ii) Imagery (image optimal performance)
- iii) Skate practice and perform freeskate program during session
- iv) After session, view video of performance (from recent session)
- v) Imagery (image optimal performance)

There are no charges of any sort to take part in this study and participation in the study may be terminated at any time without consequence. Your child's participation would be greatly appreciated as well as provide an opportunity for valuable feedback. Results of evaluations will be made available immediately upon request. If there are any questions or concerns please do not hesitate to contact me at the above address or phone number. In signing below I consent to my child's participation in this study of sport psychology skills and interventions.

Signature

Date

Phone number

Appendix B
Skater Information Sheet

Skater Information Sheet

Skater's Name: _____

Parent's Name(s): _____

Skater's Age: _____ **Phone Number:** _____

Address: _____

Test Levels: _____

Expected Holidays: _____

Summer Skating School Schedule

Mondays: _____

Tuesdays: _____

Wednesdays: _____

Thursdays: _____

Fridays: _____

Saturday/Sunday: _____

Appendix C
Technical Performance Evaluation Form

DEFINITIONS OF EVALUATION SCORES

JUMPS:

- 6 Clean one foot landing. Very steady and sure.
- 5 One foot landing with under or over rotation &/or struggle.
- 4 One foot landing with touch down with free foot or hand.
- 3 Two foot landing.
- 2 Two foot landing with touch down of hand.
- 1 Fall. Attempted, but not completed.
- 0 Not attempted. Omitted from program.

SPINS:

- 6 3 rotations completed without error.
- 5 3 rotations completed with error (ie. travelling, unbalanced, or touch down).
- 4 2 rotations completed without error.
- 3 2 rotations completed with error.
- 2 1 rotation with out error.
- 1 1 rotation with error. Fall.
- 0 Not attempted. Omitted from program.

FOOTWORK:

- 6 Complete pattern without error.
- 5 Complete pattern with error (ie. missing steps).
- 4 Completed half of pattern without error.
- 3 Completed half of pattern with error.
- 2 Less than half of pattern with no error.
- 1 Less than half of pattern with error.
- 0 Not attempted. Omitted from program.

Appendix D
Rationale and Establishing Interobserver Reliability
for the Technical Performance Evaluation Form.

The quality and consistency of the judging in figure skating has always been a source of controversy within the sport. There has never been a competition or test day that I have attended or viewed where there was no discussion about the judging.

In some sports nonperformance factors have influenced evaluations made by judges and officials. Rains (1984) showed that the officials in professional hockey are less concerned about the correctness of specific calls than they are about sustaining an overall pattern of judicious calls. In a review of the literature on gymnastic events, Landers (1970) demonstrated that influences such as judges' expectations of the performers' abilities, the judges institutional or national political affiliation, personal beliefs and attitudes, and personal characteristics of the performers, played a role in the performance rating the gymnast received. Also in the sport of gymnastics, Scheer, Ansorge, and Howard (1983) showed that the score the gymnast received was influenced by factors unrelated to the routines they actually evaluated.

The nature of judging in the sport of figure skating is also highly subjective and personal. As a skater, this aspect of judging has at times worked in my favour while at other times has not. Sometimes I was given support from the judges, while at other times I was judged somewhat severely in relation to my performance. Knowing that this was part of the sport, and choosing to participate, I was always told to either accept it as

"part of the territory" or not take part at all. I appreciate that this type of thinking taught me as it made me focus even more on performance and learning and less on the outcome, but I also recognize the need for more stable measures of performance within the sport.

A prominent international skating judge once commented that "it is possible to judge subjectivity and yet with objectivity if you know the rules, if you know the sport, if you rely on your senses and put aside chauvinism, sympathies and antipathies, and emotional reactions" (Roukhadze, 1987). I have to respond by questioning whether her latter criteria for fair and impartial judging are realistic or possible. Wanderer (1987) showed that figure skating judges have the tendency to bring their ratings of figure skaters closer to the group of judges' overall rating after they have had the opportunity to see the posted ratings of an earlier event. This shows their desire for consistency and congruity.

For the purposes of my research, and due to the biases and subjectivity that exists with the current system of evaluation employed by the Canadian Figure Skating Association, it was my desire to develop a more objective measure of technical freeskate performance of figure skating. I also wanted the instrument to be one that would allow me to carry out the evaluations myself and in order to do this it was my desire and responsibility to test this instrument for interobserver reliability.

To increase the understanding of the nature and aspects of the sport

of figure skating the following definitions are included:

Freeskate performance - figure skating is typically divided into three types of on-ice training or emphasis; figures, freeskate, and dance. Freeskate is usually the most familiar to the general public as it is the part of competition most widely televised. Freeskate is jumps, spins, footwork blended in with artistic and creative movement all skated together to music of the skater's choice. The freeskate program is what the skaters will execute as the basis for evaluation in competition, test days, and in my research project. The freeskate program is of specified length determined by the rules of the Canadian Figure Skating Association (CFSA). The length of the program depends on the level of competition in which the skater is competing and the skater is free to choose the number and type of elements to be included in the program (subject to CFSA rules 3321 and 3322).

Technical Performance - described as the jumps, spins, and connecting footwork steps that compose the freeskate program. The variety, cleanness, and sureness (quality of execution) of these elements are considered in evaluating the technical performance.

Juvenile level skater - is one who has passed the Senior Bronze freeskate test, and the second figure test, but no higher. The juvenile level skater skates a freeskate program that is 2 minutes in length. The evaluation instrument will be developed relevant to the Juvenile level skater since the subjects in the research project are at this level.

Method and Results

Definitions. I felt that my first and most important step in developing the instrument was to establish validity and to identify clear and precise definitions of quality of performance. In order to accomplish this I used my own knowledge of the sport, referred to the official figure skating rule book, discussed the importance of specific strengths and weaknesses with expert judges, and with a national level coach. I also discussed the aspects of performance that are most emphasized to the skaters. In bringing the information and suggestions together, negative aspects of technical performance such as falls, over and under rotations, omitting elements from programs, touchdowns, and cheated landings were considered with regard to their relative severity. Positive aspects of performance were also discussed and defined for the Juvenile level figure skater. For example it is expected that a Juvenile level skater hold each spin position for at least 3 full revolutions, and perform at least one footwork sequence in their freeskate program. Combining and weighing all aspects of technical performance discussed, relevant to the Juvenile level skater, precise and accurate definitions were derived. Numerical scores, ranging from zero through six, were assigned to each definition with six indicating higher quality of technical performance. These ratings and definitions were shown and discussed with the judges and coach and all were in favour of them. The following are the definitions and their corresponding ratings for the three

aspects of technical performance (jumps, spins, and footwork) at the Juvenile level:

JUMPS:

- 6 Clean one foot landing. Very steady and sure.
- 5 One foot landing with under or over rotation &/or struggle.
- 4 One foot landing with touch down with free foot or hand.
- 3 Two foot landing.
- 2 Two foot landing with touch down of hand.
- 1 Fall.
- 0 Not attempted. Omitted from program.

SPINS:

- 6 3 rotations completed without error.
- 5 3 rotations completed with error (ie. travelling, unbalanced, or touch down).
- 4 2 rotations completed without error.
- 3 2 rotations completed with error.
- 2 1 rotation with out error.
- 1 1 rotation with error. Fall.
- 0 Not attempted. Omitted from program.

FOOTWORK:

- 6 Complete pattern without error.
- 5 Complete pattern with error (ie. missing steps, trip, or fall).

- 4 Completed half of pattern without error.
- 3 Completed half of pattern with error.
- 2 Less than half of pattern with no error.
- 1 Less than half of pattern with error.
- 0 Not attempted. Omitted from program.

Technical Performance Evaluation Form. To facilitate the ease of evaluation a specific form was developed (Appendix C). Several columns were provided on the form. The first column was to list all the elements of the program the skater is to perform, and the remaining columns were for the score received for each element and the total score for the program.

Interobserver Evaluation. Two video segments showing different freeskate performances were evaluated using the Technical Performance Evaluation forms, the corresponding definitions and the rating scale described above. The evaluators were myself and a highly qualified Gold Test level judge from the Vancouver area. Each evaluator judged the two video performances independently. Once we had finished evaluating the two performances we discussed our rationale for each score.

For the first video performance we had assigned identical scores for each element with the exception of one. On the exception, the judge felt the skater struggled with the landing therefore assigned a 5 as the score for that element and I had assigned the element a 6, indicating I had not felt the skater struggled with the landing to such a degree that I felt it

necessary to mark it down.

The level of agreement on scores for the second video performance was high, with the important exception of two elements. On each of these elements (jumps) the skater attempted but pulled out of the jump. I had marked according to the definitions and assigned a 0 (omitted from program). The judge however, pointed out that the skater did deserve credit for attempting the jump and although it was not provided for by the definitions, she had gave the skater 1 for each of these elements. With further discussion, it was decided to provide for this situation in the definitions and we added "attempted, but not completed" for the score of 1 on the jump elements (see Appendix C for current evaluation forms and definitions).

Interobserver Reliability. Three different measures of interobserver reliability were employed, each on a different aspect of the evaluation scores. The tests of frequency ratio, point by point agreement, and Pearson product-moment correlation are described.

Frequency ratio is a method used to determine the agreement between the total scores that two observers assign while evaluating performance independently (Kazdan, 1982). The following is the formula used to compute the frequency ratio:

$$\text{Frequency Ratio} = (\text{smaller total/larger total}) \times 100$$

The scores assigned to the first video performance derived a frequency ratio

of 97.87%, while the second video performance scores derived a frequency ratio of 98.59% (before definition change) and 100% (after definition change).

Point by point agreement assesses whether there is agreement between observers on each instance of the observed behaviour (Kazdan, 1982). Using the following formula,

$$\frac{\text{Number of agreements}}{\text{number of agreements} + \text{number of disagreements}}$$
a point by point agreement rate of 87.5% was derived for the first video performance and 93.75% for the second video performance.

The Pearson product-moment correlation provides an estimate of agreement across all occasions in which reliability was checked rather than an estimate of agreement on any particular occasion (Kazdan, 1982). All scores assigned by the skating judge were correlated with all scores assigned by myself and a correlation coefficient equalling to .99 was derived.

Each test employed showed that a high level of interobserver reliability exists using the technical performance evaluation forms, definitions and corresponding rating system (Table 1).

Discussion

Non-performance and subjective factors influence the evaluations made by judges and officials in several sports and figure skating is no exception. In order to minimize this bias that seems to exist an attempt was

Table I Results of Interobserver Reliability Tests

Test	First Performance	Second Performance
Frequency Ratio	97.87%	100%*
Point by Point	87.5 %	93.75%*
Pearson Correlation	r=.99**	
*Score derived following definition alteration		
**Score derived using scores from both performances		

made to develop a more objective measure of technical components of figure skating freeskate performance. Technical performance was broken down into 3 specific aspects; jumps, spins, and footwork. Precise and accurate definitions of performance quality were established for each of these aspects and a corresponding rating system was assigned. Interobserver reliability was tested demonstrating strong agreement between evaluators on total scores, individual scores, and overall ratings.

The technical performance evaluation forms developed appear to be a competent measure of figure skating freeskate performance. The instrument's established value has been noted for use in the proposed thesis research. During the research several additional interobserver reliability checks will be completed to ensure that the measures of performance are reliable.

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Appendix E
Competitive State Anxiety Inventory - 2
(CSAI-2)

DIRECTIONS: A number of statements which athletes have used to describe their feelings before competition are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel right now - at this moment. There are no right or wrong answers. Do not spend too much time on any one statement, but choose your answer which describes your feelings right now.

		Not at all	Somewhat	Moderately so	Very Much so
(c)	1. I am concerned about this competition	1	2	3	4
(s)	2. I feel nervous	1	2	3	4
(sc)	3. I feel at ease	1	2	3	4
(c)	4. I have self-doubts	1	2	3	4
(s)	5. I feel jittery	1	2	3	4
(sc)	6. I feel comfortable	1	2	3	4
(c)	7. I am concerned that I may not do as well in this competition as I could	1	2	3	4
(s)	8. My body feels tense	1	2	3	4
(sc)	9. I feel self-confident	1	2	3	4
(c)	10. I am concerned about losing	1	2	3	4
(s)	11. I feel tense in my stomach	1	2	3	4
(sc)	12. I feel secure	1	2	3	4
(c)	13. I am concerned about choking under pressure	1	2	3	4
(s)	14. My body feels relaxed	1	2	3	4

		Not at all	Somewhat	Moderately so	Very Much so	
(sc)	15.	I am confident I can meet the challenge	1	2	3	4
(c)	16.	I am concerned about performing poorly	1	2	3	4
(s)	17.	My heart is racing	1	2	3	4
(sc)	18.	I am confident about performing well	1	2	3	4
(c)	19.	I am worried about reaching my goal	1	2	3	4
(s)	20.	I feel my stomach sinking	1	2	3	4
(sc)	21.	I feel mentally relaxed	1	2	3	4
(c)	22.	I am concerned that others will be disappointed with my performance	1	2	3	4
(s)	23.	My hands are clammy	1	2	3	4
(sc)	24.	I am confident because I mentally picture myself reaching my goal	1	2	3	4
(c)	25.	I am concerned I won't be able to concentrate	1	2	3	4
(s)	26.	My body feels tight	1	2	3	4
(sc)	27.	I am confident about coming through under pressure	1	2	3	4

Appendix F
Self-Perception Profile for Children

What I Am Like

Name _____ Age _____ Birthday _____ Group _____
Month Day

Boy or Girl (circle which)

SAMPLE SENTENCE

	Really True for me	Sort of True for me		BUT		Sort of True for me	Really True for me
(a)	<input type="checkbox"/>	<input type="checkbox"/>	Some kids would rather play outdoors in their spare time		Other kids would rather watch T.V.	<input type="checkbox"/>	<input type="checkbox"/>
1.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids feel that they are very <i>good</i> at their school work		Other kids <i>worry</i> about whether they can do the school work assigned to them.	<input type="checkbox"/>	<input type="checkbox"/>
2.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids find it <i>hard</i> to make friends		Other kids find it's pretty <i>easy</i> to make friends.	<input type="checkbox"/>	<input type="checkbox"/>
3.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids do very <i>well</i> at all kinds of sports		Other kids <i>don't</i> feel that they are very good when it comes to sports.	<input type="checkbox"/>	<input type="checkbox"/>
4.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids are <i>happy</i> with the way they look		Other kids are <i>not</i> happy with the way they look.	<input type="checkbox"/>	<input type="checkbox"/>
5.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids often do <i>not</i> like the way they <i>behave</i>		Other kids usually <i>like</i> the way they behave.	<input type="checkbox"/>	<input type="checkbox"/>
6.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids are often <i>unhappy</i> with themselves		Other kids are pretty <i>pleased</i> with themselves.	<input type="checkbox"/>	<input type="checkbox"/>
7.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids feel like they are <i>just as smart</i> as other kids their age		Other kids aren't so sure and <i>wonder</i> if they are as smart.	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	Some kids have <i>alot</i> of friends		Other kids <i>don't</i> have very many friends.	<input type="checkbox"/>	<input type="checkbox"/>

	True for me	True for me			True for me	True for me	
9.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids wish they could be alot better at sports	BUT	Other kids feel they are good enough at sports.	<input type="checkbox"/>	<input type="checkbox"/>
10.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids are <i>happy</i> with their height and weight	BUT	Other kids wish their height or weight were <i>different</i> .	<input type="checkbox"/>	<input type="checkbox"/>
11.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids usually do the <i>right</i> thing	BUT	Other kids often <i>don't</i> do the right thing.	<input type="checkbox"/>	<input type="checkbox"/>
12.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids <i>don't</i> like the way they are leading their life	BUT	Other kids <i>do</i> like the way they are leading their life.	<input type="checkbox"/>	<input type="checkbox"/>
13.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids are pretty <i>slow</i> in finishing their school work	BUT	Other kids can do their school work <i>quickly</i> .	<input type="checkbox"/>	<input type="checkbox"/>
14.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids would like to have alot more friends	BUT	Other kids have as many friends as they want.	<input type="checkbox"/>	<input type="checkbox"/>
15.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids think they could do well at just about any new sports activity they haven't tried before	BUT	Other kids are afraid they might <i>not</i> do well at sports they haven't ever tried.	<input type="checkbox"/>	<input type="checkbox"/>
16.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids wish their body was <i>different</i>	BUT	Other kids <i>like</i> their body the way it is.	<input type="checkbox"/>	<input type="checkbox"/>
17.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids usually <i>act</i> the way they know they are <i>supposed</i> to	BUT	Other kids often <i>don't</i> act the way they are supposed to.	<input type="checkbox"/>	<input type="checkbox"/>
18.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids are <i>happy</i> with themselves as a person	BUT	Other kids are often <i>not</i> happy with themselves.	<input type="checkbox"/>	<input type="checkbox"/>
19.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids often <i>forget</i> what they learn	BUT	Other kids can remember things <i>easily</i> .	<input type="checkbox"/>	<input type="checkbox"/>
20.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids are always doing things with <i>alot</i> of kids	BUT	Other kids usually do things <i>by themselves</i> .	<input type="checkbox"/>	<input type="checkbox"/>

	True for me	True for me		BUT		Sort of True for me	Really True for me
21.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids feel that they are <i>better</i> than others their age at sports	BUT	Other kids <i>don't</i> feel they can play as well.	<input type="checkbox"/>	<input type="checkbox"/>
22.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids wish their physical appearance (how they look) was <i>different</i>	BUT	Other kids <i>like</i> their physical appearance the way it is.	<input type="checkbox"/>	<input type="checkbox"/>
23.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids usually get in <i>trouble</i> because of things they do	BUT	Other kids usually <i>don't</i> do things that get them in trouble.	<input type="checkbox"/>	<input type="checkbox"/>
24.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids <i>like</i> the kind of <i>person</i> they are	BUT	Other kids often wish they were someone else.	<input type="checkbox"/>	<input type="checkbox"/>
25.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids do <i>very well</i> at their classwork	BUT	Other kids <i>don't</i> do very well at their classwork.	<input type="checkbox"/>	<input type="checkbox"/>
26.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids wish that more people their age liked them	BUT	Other kids feel that most people their age <i>do</i> like them.	<input type="checkbox"/>	<input type="checkbox"/>
27.	<input type="checkbox"/>	<input type="checkbox"/>	In games and sports some kids usually <i>watch</i> instead of play	BUT	Other kids usually <i>play</i> rather than just watch.	<input type="checkbox"/>	<input type="checkbox"/>
28.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids wish something about their face or hair looked <i>different</i>	BUT	Other kids <i>like</i> their face and hair the way they are.	<input type="checkbox"/>	<input type="checkbox"/>
29.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids do things they know they <i>shouldn't</i> do	BUT	Other kids <i>hardly ever</i> do things they know they shouldn't do.	<input type="checkbox"/>	<input type="checkbox"/>
30.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids are very <i>happy</i> being the way they are	BUT	Other kids wish they were <i>different</i> .	<input type="checkbox"/>	<input type="checkbox"/>
31.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids have <i>trouble</i> figuring out the answers in school	BUT	Other kids almost <i>always</i> can figure out the answers.	<input type="checkbox"/>	<input type="checkbox"/>
32.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids are <i>popular</i> with others their age	BUT	Other kids are <i>not</i> very popular.	<input type="checkbox"/>	<input type="checkbox"/>

	True for me	True for me			True for me	True for me	
33.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids <i>don't</i> do well at new outdoor games	BUT	Other kids are <i>good</i> at new games right away	<input type="checkbox"/>	<input type="checkbox"/>
34.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids think that they are good looking	BUT	Other kids think that they are not very good looking.	<input type="checkbox"/>	<input type="checkbox"/>
35.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids behave themselves very well	BUT	Other kids often find it hard to behave themselves.	<input type="checkbox"/>	<input type="checkbox"/>
36.	<input type="checkbox"/>	<input type="checkbox"/>	Some kids <i>are</i> not very happy with the way they do alot of things	BUT	Other kids think the way they do things is <i>fine</i>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix G
Interview Questions

Interview Questions

1. How do you feel just before performing your program?
2. Do you have any concerns about performing your program?
3. What kinds of things did you think about before performing your program?
4. What kinds of things did you think about while performing your program?
5. How do you feel about competing against others, performing your program, as you are now?
6. Please describe any changes you feel that have taken place since we last had this interview.

Appendix H
Personal Interview Transcript

The questions which were asked during the personal interviews, and each skater's response, both before and after the study, are as follows:

1. How did you feel just before performing your program?

Skater 1:

Pre-study: Nervous. If I do badly I would be letting other people down. Like my parents, and Faye [coach] or even me.

Post-study: I feel good. Actually, confident because I knew I could do my jumps. I am not going to let anyone down and I felt like I was going to skate well.

Skater 2:

Pre-study: Pretty nervous.

Post-study: A little nervous.

Skater 3:

Pre-study: Nervous. I wasn't sure how I was going to skate.

Post-study: I felt like I was going to skate good. It [the competition] was just like when we were being [video] taped.

Skater 4:

Pre-study: Don't really care very much. Worried only about my axel [jump].

Post-study: Feel good. Have higher jumps and can do spins and stuff too.

2. Did you have any concerns about performing your program?

Skater 1:

Pre-study: Yeah. I think about my double toe [jump] a lot.

Post-study: No.

Skater 2:

Pre-study: My axel-double toe [jump combination].

Post-study: Landing my jumps standing nice and straight.

Skater 3:

Pre-study: Falling on my jumps.

Post-study: Not skating the best I can.

Skater 4:

Pre-study: Concerned about falling on my axel [jump] and flying camel [spin].

Post-study: My axel [jump] but I didn't give up on myself.

3. What kinds of things did you think about before performing your program?

Skater 1:

Pre-study: I try to think of one thing at a time while I am getting ready. Sometimes I think of what will happen if I don't do well.

Post-study: I think of my program and what I have to

remember.

Skater 2:

Pre-study: Skating well.

Post-study: Going out there and skating. Having fun.

Skater 3:

Pre-study: Skating my best.

Post-study: I thought about my presentation and skating my best. I used imagery.

Skater 4:

Pre-study: I am going to fall and hurt myself.

Post-study: I can do a clean program.

4. What kinds of things did you think about while performing your program?

Skater 1:

Pre-study: My mind started to wander. I worried about my double toe [jump] when I was only at my lutz-loop [jump].

Post-study: I kept my concentration on the next element. When I landed my double toe [jump] I was really excited.

Skater 2:

Pre-study: I thought about my friends and school.

Post-study: I don't really remember. One thing was that I thought about was my ankle on my footwork. I didn't want to

turn it because it makes me trip.

Skater 3:

Pre-study: Skating a clean program.

Post-study: I thought of each element as they came up. I made sure I went into them right.

Skater 4:

Pre-study: My axel [jump] is coming up. I thought about that a lot.

Post-study: Presenting myself. Thought of one element at a time and concentrated on not breaking on my axel.

5. How do you feel about competing against others, performing your program as you are now?

Skater 1:

Pre-study: I know that I have to do well in freeskate.

Sometimes I am afraid that the other skaters will do better. I don't know if I am good enough for Juvenile.

Post-study: I feel like I could do really well and I feel like I can beat the other skaters.

Skater 2:

Pre-study: Tiffany [competitor] in the finals. I didn't know if I could beat her.

Post-study: No concerns. I was fine.

Skater 3:

Pre-study: Fine.

Post-study: Fine.

Skater 4:

Pre-study: I wouldn't do any good. I don't have a chance and I gave up on myself.

Post-study: Good. I know now that I can skate well. I have a good chance of winning.

6. Please describe any changes you feel that have taken place since we last had this interview.

Skater 1:

Pre-study: N/A

Post-study: I think my confidence has improved a lot. I feel better when I have to do my program and my jumps have improved too.

Skater 2:

Pre-study: N/A

Post-study: Little more confident. My jumps are getting better.

Skater 3:

Pre-study: N/A

Post-study: I am more confident. Jumps have improved. My

artistic impression has gone up.

Skater 4:

Pre-study: N/A

Post-study: Improved a lot like my axel [jump] landing and height. Standing up straighter in program. I am much calmer when I do my program and even before I do it.

Appendix I
Imagery Training Procedures

Each skater was given imagery training individually because each skater entered into the imagery or imagery with video feedback intervention phase at different points in time. Together with the researcher, each skater attained the ability to image their freeskate program performance with clear, vivid images that incorporated sound and "feel" and moved at the appropriate speed. The skaters achieved this ability to image through the following training procedures:

1. The researcher asked the skaters if they had ever been taught or had used imagery before. Each skater replied that she had not.
2. The researcher then explained that imagery was the ability to create pictures in the mind.
3. Together the skater and the researcher went over the following characteristics of imagery:
 - internal and external perspectives
 - vividness and colour
 - sound
 - incorporating "feel"
 - speed
4. With the aid of the researcher the skater then completed the following activities:

Activity 1: The arena

- Start by sitting in a comfortable position. Close your eyes

and take a few deep breaths. Each time you exhale, feel yourself becoming more relaxed.

- Imagine you are walking towards the door of the arena. See the colour and shape of the door.
- Now open the door. Feel the weight of the door as you open it. It is very quiet inside and there are not many people around. As you walk inside, feel the temperature change.
- You are now going to walk to the seats and sit down where you can see the ice surface. The ice is empty.
- One at a time pick out the following details and include them in your image:
 - the clock
 - the music room
 - the boards and glass
 - zamboni entrance
 - players boxes for hockey
 - the dressing room doors
 - the red centre line, blue lines, goal lines
 - the colour of the ice
- You are now going to get up and walk towards the dressing room.
- Open the dressing room door and walk in.

- Tell me everything you see in the dressing room.
- You can now open your eyes.

Activity 2: Review Questions

- Did you image from the internal or external perspective, or both?
 - What kinds of things did you hear?
 - Did you feel the sensations of the movements? Did you feel the weight of the door?
 - Did you feel the temperature changes from outside to inside the arena? How about the temperature change from sitting on the bleachers to moving inside the dressing room?
 - Were you able to see colour?
 - Were you able to control your images? Make them do what you wanted them to?
 - Did you imagine yourself moving at the same speed that you actually walk?
5. The researcher was able to confirm the characteristics of imagery the skater was able to incorporate or use in her imagery. It was of interest to note that all four skaters used both the internal and external perspective when imaging and felt that switching back and forth between internal and external was most comfortable for them.

6. The skater then completed a third activity. This activity was to develop the ability to image at the appropriate speed and to introduce the skater to using imagery with her skating.

Activity 3: Your Program

- Obtain a copy of your program music and cue it up to start playing. (Some skaters found it easier to concentrate using a walkman cassette player.)
- Sit or lie in a comfortable position and take a few deep breaths to relax. Close your eyes.
- When your music starts, imagine yourself skating your program. Concentrate on keeping your images in time with the music as you would if you were actually skating the program.
- Review the questions from Activity 2 with the researcher.

In completion of the imagery training, all skaters were able to imagine themselves skating their program with clear and vivid images, incorporating sound and "feel" into them as well as colour. They were also able to move the images at the appropriate speed.

Appendix J
Post Study Questionnaire

SPORTS PSYCHOLOGY STUDY QUESTIONNAIRE

1. Of the interventions you experienced, which one did you find most useful?

Why or for what reasons did you find the above intervention most beneficial?

2. Please comment on what you did and did not like about the following:

Imagery

Video feedback

3. If you were to give advice on how to improve this study, or how to make your participation better, what would you suggest?

4. Would you recommend imagery as a way to improve your freeskate performance?

Would you recommend video feedback?

5. Do you feel more comfortable and confident in performing your program now than you did at the beginning of the study?

Appendix K
Post-Study Questionnaire Data

Following the completion of the study, each skater filled out the post-study questionnaire (Appendix J). This questionnaire was used to determine the skaters' evaluation of the interventions employed and the skaters' experience of participating in the study. The following are the five questions which were included in the questionnaire along with each skaters' response.

1. Of the interventions you experienced, which one did you find most useful?

Skater 1: Imagery with video.

Skater 2: Actually, I found both useful but if I had to choose I would say imagery with video.

Skater 3 & 4: N/A (only used imagery plus video feedback).

Why or for what reasons did you find the above intervention most beneficial?

Skater 1: With using the video I could see the mistakes I made and know how to correct them. With imagery I had to think of the mistakes and then try and correct them in my mind. When I watched my videos I think I skated better.

Skater 2: I could actually see what I looked like and that helped me get better. It showed me where I needed to work. It also helped me make my imagery better because I could get a clearer picture in my head.

2. Please comment on what you did and did not like about the following:

Imagery:

Skater 1: Gives me a picture of what I wanted to do. It helped me to see in my mind that I can do it. I saw images but it took me awhile to get really clear pictures.

Skater 2: I liked seeing myself do my jumps and that I can do it just about anywhere.

Skaters 3: Use it anytime. Know in my mind what I was going to do and how I was going to skate.

Skater 4: It helped me land my axel on one foot. I learned something new that I can use now on my own.

Video Feedback:

Skater 1: I could see my mistakes and how to correct them. It let me know truthfully how I skated.

Skater 2: Could see what I needed to work on. I think it would be better for me to just watch good performances.

Skater 3: I liked everything about watching videos. It is really good to see it right after I skate.

Skater 4: It helped me improve my skating and it was fun.

3. If you were to give advice on how to improve this study, or how to make your participation better, what would you suggest?

Skater 1: Let the skaters see their marks every day. I didn't want to

always ask for them. I liked it when you showed them to us.

Skater 2: Nothing. I liked it.

Skater 3: I don't know because I had fun.

Skater 4: It would be nice to be able to skate you freeskate program with no one else on the ice. I would like it if I could be with you more. Other skaters would like to do this so it would be good to get more skaters involved.

4. Would you recommend imagery as a way to improve your freeskate performance?

Skater 1: Yes. If I can picture it in my mind, I can do it.

Skater 2: Yes because it helped.

Skater 3: Yes it helps my skating.

Skater 4: Yes.

Would you recommend video feedback?

Skater 1: Yes. It really helped correct my skating and gave me confidence.

Skater 2: Yes, it was a lot of fun.

Skater 3: Yes. I liked to see myself on tape. It really helped.

Skater 4: Yes. It showed me what I needed to work on.

5. Do you feel more comfortable and confident in performing your program now than you did at the beginning of the study?

Skater 1: Yes.

Skater 2: Yes. I am a bit more relaxed.

Skater 3: Yes. I am more used to skating my program. When you were here I couldn't stop in the middle and I wanted to put everything in. If I fell I couldn't stop so I kept going.

Skater 4: Yes. I feel better. I don't give up as easily and I feel way more confident.

Appendix L
Data for Interobserver Reliability Checks

Phase 1

Evaluator	Scores Assigned per element	Total
Figure Skating Judge	5 6 1 6 0 4 6 6 5 1 1 4	45
Researcher	4 6 1 6 0 4 6 6 5 1 1 5	45

Test of Interobserver Reliability	Result
Frequency Ratio: $\frac{\text{Smaller Total}}{\text{Larger Total}} \times 100$	100%
Point by Point Agreement: $\frac{A}{A + D} \times 100$ (A= Agreements, D= Disagreements)	83.33%

Phase 2

Evaluator	Scores Assigned per element	Total
Figure Skating Judge	6 6 6 6 6 1 5 6 6 5 6 6 6	71
Researcher	6 6 6 6 5 1 5 6 5 5 6 6 6	69

Test of Interobserver Reliability	Result
Frequency Ratio: $\frac{\text{Smaller Total}}{\text{Larger Total}} \times 100$	97.18%
Point by Point Agreement: $\frac{A}{A + D} \times 100$ (A= Agreements, D= Disagreements)	84.62%

Phase 3

Evaluator	Scores Assigned per element	Total
Figure Skating Judge	4 4 6 6 6 4 4 6 5 6 1 5 6 6 1	72
Researcher	4 4 6 6 6 4 4 5 5 6 1 5 6 6 1	71

Test of Interobserver Reliability	Result
Frequency Ratio: $\frac{\text{Smaller Total}}{\text{Larger Total}} \times 100$	98.61%
Point by Point Agreement: $\frac{A}{A + D} \times 100$ (A= Agreements, D= Disagreements)	93.33%

Appendix M
Technical Performance Scores

Eval. No.	SKATER							
	1		2		3		4	
	Phase	Score	Phase	Score	Phase	Score	Phase	Score
1	B	45	B	61	B	88	B	53
2	B	52	B	71	B	87	B	56
3	B	46	B	76	B	87	B	53
4	B	51	B	61	B	75	B	57
5	B	58	B	63	B	90	B	61
6	B	45	B	75	B	89	B	54
7	B	46	B	62	B	89	B	60
8	B	45	B	68	B	83	B	56
9	B	55	B	70	B	87	B	54
10	B	58	B	64	B	90	B	60
11	I	54	B	66	B	90	B	62
12	I	64	B	72	B	88	B	58
13	I	60	B	62	B	91	B	60
14	I	61	B	66	B	90	B	66
15	I	59	I	69	B	87	B	64
16	I	62	I	75	B	88	B	53
17	I	60	I	77	B	89	B	65
18	I	62	I	79	B	87	B	54
19	I	59	I	71	B	89	B	58
20	I	60	I	76	B	88	B	60
21	I	53	I	76	B	90	B	62
22	I	56	I	81	B	89	B	60
23	I	65	I	71	B	90	B	57
24	I	60	I	78	B	91	B	58
25	IVF	67	I	81	B	89	B	68
26	IVF	65	I	77	B	90	B	60
27	IVF	67	I	75	B	91	B	62

Phase: B=Baseline, I=Imagery, IVF=Imagery + Video Feedback

VITA

Surname: Palmer
Place of Birth: Oliver, B.C.

Given Names: Shawna Lee
Date of Birth: June 29, 1965

Educational Institutions Attended:

University of Victoria	1991 to 1993
University of British Columbia	1988 to 1991
Okanagan College	1985 to 1988

Degrees Awarded:

M.A. (Sport Psychology)	University of Victoria	1993
B.P.E. (Motor Performance / Psychology)	University of B.C.	1991

Honours and Awards:

University of Victoria Graduate Fellowship	1991-1993
Outstanding Academic Achievement Award	May 1991
Mary Isdale Memorial Scholarship	1990-1991
University of British Columbia Scholarship	1990-1991
Walter D. Frith Memorial Scholarship	1990-1991
Canadian Figure Skating Association, Medical Scientific Committee Research Grant	1990-1991

PUBLICATIONS

Palmer, S.L. (1993). Get the Edge: Sport Psychology for Figure Skaters. Vancouver, British Columbia: The Sport Consulting Centre. (printed by The Printing House, and distributed by The Sport Consulting Centre and The Canadian Figure Skating Association).

Howe, B., Beecroft, L., Bock, S. Harle, S., Kruisselbrink, L., McKenzie, A., Mossman, E., Palmer, S.L., & Scott, D. (1992, October). Belief in Imagery: The Essential Component? Proceedings of the 1992 Annual Scientific Conference in Sports Medicine, Perth, Australia.

Palmer, S.L. (1992). A comparison of mental practice techniques as applied to the developing competitive figure skater. The Sport Psychologist, 6 (2), 148-155.

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Title of Thesis:

Imagery, Video Feedback, and Figure Skating Performance

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