Virtual Visualization: Preparation for the Olympic Games Long-Track Speed Skating

Ruth Morey Sorrentino, Richard Levy, Larry Katz & Xiufeng Peng

The Sports Technology Research Laboratory, Faculty of Kinesiology, University of Calgary

Abstract

Visualization is a known preparation tool for athletic competition. This study used a virtual environment of the Salt Lake City Olympic Oval as a tool to support visualization to help athletes prepare for the 2002 Winter Olympic Games. Five long-track speed skaters from the Canadian Olympic Team used the virtual environment with their sport psychology consultant to prepare for the Olympics prior to leaving for Salt Lake City. All five skaters had previously visited the competition venue and found the virtual environment to be very realistic. In addition, skaters commented that they had struggled with visualization and, consequently, they thought that having the virtual venue provided for them was very useful. After using the environment, athletes indicated that they felt less anxious about going to the Olympics. Experiencing the virtual environment allowed them to focus on their race, how they would prepare for the race, their race plan, and what they would think about while competing in the race. The results of this study promote the use of virtual environments for enhancing athlete visualization. Moreover, the study identifies four ways in which virtual environments can be used by athletes in preparation for competition, as well as part of their regular training program.

KEY WORDS: VIRTUAL ENVIRONMENTS, ATHLETE, TECHNOLOGY, ATTITUDES, VISUALIZATION

Introduction

"Visualization, can…help athletes conquer fears, build confidence and expand their limits" (Telch, 1990, p.71). Visualization (also referred to as mental imagery) is conducted by imagining the performance environment, creating a mental picture of it, and imagining what it is like to perform in that environment (Hall, 1998; Martin, Moritz & Hall, 1999; Sugarman, 1999; Wann, 1997). While a sport psychologist or sport psychology consultant often aids the athlete in visualizing their performance, many accomplished and experienced athletes are able to visualize successfully on their own. Research has found that athletes tend to visualize more in preparation for competition than for training (Barr & Hall, 1992; Hall, Rodgers & Barr, 1990; Salmon, Hall & Haslam, 1994). When preparing for a specific competition, the athlete will attempt to visualize the unique factors that he or she will face during a successful performance in the competition venue. Some of those unique elements within the speed skating competition environment such as, the colour of the bumpers, the position of the timing clock, the crowd placement, and the acoustics, are difficult to visualize successfully even if the athlete has performed in the venue on many occasions. Practicing in a virtual environment of the competition venue enables the athletes to familiarize themselves with those unique aspects. Much anecdotal evidence supports the theory that previously having

viewed and performed in a venue reduces anxiety when competing in that same venue (Martin et al., 1999; Sugarman, 1999). Sugarman describes how the Russian coaches used photographs of the venues at the 1976 Montreal Olympics to acclimatize their athletes prior to the Olympics. The athletes felt more comfortable, and were able to focus solely on their performance, because they knew what to expect.

Research has found that visualization techniques enhance performance in a number of different sports, from team sports such as, basketball and soccer, to individual sports such as, track and field and figure skating (Rogers, Hall & Buckolz, 1991; Salmon et al., 1994; Templin & Vernacchia, 1995; Ungerleider & Golding, 1991). Although speed skaters have reported finding visualization useful, there is no empirical evidence to support this. Some studies have found that although visualization focuses on the mental aspects of performance, there is also a physical training component (Jacobsen, 1930; Vealy & Walter, 1993). Vividly imagined events have been shown to produce innervations in muscles similar to those produced during the actual physical activity (Jacobsen, 1930) that can, in turn, strengthen muscle memory (Vealy & Walter).

To maximize the effects of visualization, Templin and Vernacchia (1995) recommend combining self-modeling with visualization, where the athlete uses video of a performance to aid in creating a positive mental image of a successful performance. In other activities where there are physical dangers in learning to perform a skill such as, landing an airplane, driving a car, or operating an army tank, computer simulations and virtual environments have been used to help train the individual to cope with the performance environment (Phillips Mahoney, 1995). Computer simulations are often referred to as virtual reality (VR); an alternate world filled with computer-generated images that respond to human movements (Broida & Clark, 1999).

The purpose of this study was to examine the use of a virtual environment as a tool to help prepare athletes for long-track speed skating at the Salt Lake City Winter Olympic competitions. Specific research questions included:

1. How is the environment used?
2. How does the environment aid preparation? and
3. How would athletes envision using the environment for future training and competition preparation based on their experience in the environment?

A computer generated virtual speed skating oval was created by the researchers using Sense8 WorldUp R5 software (http://sense8.sierraweb.net/) based on photos and a structural drawing from the Salt Lake City Olympic Oval project. This virtual environment was then made available to athletes through their sport psychology consultant as an optional part of their visualization training in preparation for the 2002 Winter Olympics. This research highlights ways in which athletes can use such a tool and how it can be beneficial in mentally preparing athletes in conjunction with a sport psychologist.

Real Environment   Virtual Environment

Figure 1. Figure to show the real environment compared to the virtual environment of the Salt Lake City Olympic Oval

Methods

All athletes on the Canadian National Long-Track Speed Skating Team (like most elite athletes) have access to a sport psychology consultant. As part of the research, the sport psychology consultant offered the athletes the option of using the virtual environment of the Salt Lake City Olympic Oval in conjunction with their visualization training. There were no preconditions for participation, and choosing not to participate had no impact on an athlete's access to the sport psychologist.

Five athletes chose to view the virtual environment and each met with the sport psychologist in the Virtual Reality Lab. In order to maintain the integrity and confidentiality of the session, only the athlete and the sport psychology consultant were present for the appointment. During the session, no restrictions were placed on the athlete in the VR environment. The athletes were free to decide if they wished to view or enter the virtual environment, what they did within the environment, and how long they spent in there. In addition, they could choose to stop participation at any time.

During the session, the consultant, a trained researcher in qualitative methodology, made detailed written observations (standard practice during a sport psychology appointment). The observations were focused on five specific elements of the session.

These included:
1. How the athlete felt at the beginning of the session.
2. How the athlete chose to use the virtual environment.
3. How the athlete reacted to the environment.
4. How the athlete felt during their time in the virtual environment.
5. How the athlete felt at the end of the session.

On return from the Olympics, those athletes who had used the virtual environment were asked if they would attend a debriefing session. The debriefing session was conducted by the sport psychology consultant who asked specific questions about how the athlete now felt about being able to prepare in the virtual environment, how this opportunity had impacted their performance at the competition, what improvements could be made to the environment, and other ways in which, in retrospect, they felt the virtual environment could be used.

Results

In total, five athletes (male=3, female=2, mean age= 25) chose to view the virtual environment as part of their psychological preparation for the Salt Lake City Olympic Games. Unfortunately, due to competition schedules, some athletes were only able to view the environment once, whereas other athletes viewed the environment up to three times prior to leaving for the Olympics. All five athletes participated in the debriefing after the Olympics.

Overall Impression

All of the athletes felt that the virtual oval was a very realistic representation of the competition venue. All the skaters had been to the venue at least once for a training camp and, therefore, they had some experience skating on the oval in Salt Lake City. Many of the skaters also commented on the difficulty that they have with visualizing themselves competing in the venue. One skater commented that using the virtual oval was like visualizing with his eyes open. A number of the skaters found the virtual oval helped them with their visualization as they no longer had to rely on their ability to create the images in their head. Consequently, they were less distracted and better able to focus on visualizing the race.

Utilization Pre-Olympics

Four out of five of the skaters asked the sport psychology consultant to control the mouse and their movement through the environment. This enabled the athlete to focus on the image on the screen and the race, rather than on navigating through the environment. The one skater who controlled the environment himself commented that it was difficult to use as a preparation tool because much of his attention was taken simply by navigating, which reduced his ability to focus on preparing for the race.

Perceived Impact

Three of the athletes stated that they felt less anxious about the Olympics after being in the virtual environment. The environment allowed them to concentrate on their race plan, how they would prepare for the race, and what they would focus on while competing in the race.

At the Olympics

Only one of the skaters commented that her impression of the virtual oval changed once she got to the Olympics. She found that the venue looked very different during the Olympics because of a number of coloured banners that had been erected and the increased number of stands that had been placed around the track. She noted that when she first walked into the oval, she did not recognize the place even though she had been in the building before. However, all of the other skaters still agreed that the virtual oval was a very realistic representation of the venue. One athlete, a first time Olympian, added that the virtual reality gave him a realistic idea of what the atmosphere would be like at the Olympics. He also felt that having used the virtual oval, he and the other Canadian athletes had somewhat of an advantage over the athletes who had not used it.

Improvements

All the skaters commented on the static pictures of skaters in the warm-up lane and noted that these images were distracting because they did not move and, from some angles, appeared to be facing the wrong direction (which is unrealistic). Some of the skaters commented that it would be helpful and it would add to the reality of the environment, to hear comments from

their coach, and to hear the commentator call out lap times, as they skated round. These events occur during a real race and athletes sometimes use them to modify their performance, especially in longer distance races.

A number of the skaters also commented that they would find the virtual environment more useful if it was automatic, so that navigating through the space once the race started was unnecessary. This would allow the skaters to concentrate fully on the race. However, for performing their pre-race routine, they liked the fact that they had full control over the environment. Two of the skaters also commented that it was useful to be able to stop while in the middle of the race to discuss focusing with their sport psychology consultant and strategy and technique with their coach.

Other Potential Uses

Visualization and venue familiarization were the two main uses of the program. In addition, three of the athletes commented that they felt that they were not very good at visualizing their races, and that using this tool enabled them to visualize more successfully. Although not all of the athletes found the virtual environment useful for familiarization with the competition venue, they did comment that this would be especially useful for athletes performing in a particular venue for the first time.

Other potential uses were noted by a couple of the athletes. One was that they could use this tool in collaboration with their coach to provide simulations of their race when making a race plan, or when discussing race strategy such as, at what point on the track they should start building for the turns. Another athlete commented that it would be a useful tool for enhancing ones ability to visualize alone. This athlete thought that after using the virtual reality on a regular basis for visualization, it would enable him to visualize alone more successfully without distracting images appearing in his mind.

Conclusions

 This preliminary case study provides support for the use of virtual environments as a potential visualization tool in training and preparing athletes for competition. Given the small sample size and anecdotal, observational nature of the data, it is not possible to make definitive statements. Clearly, more research into the effectiveness of these environments is required. The athletes interviewed for this study used the virtual environment in two main ways: firstly, to familiarize themselves with the competition venue; and, secondly, to rehearse and mentally prepare for their race (with their sport psychology consultant). Both uses were reported to be advantageous by all of the athletes to varying degrees.

This study has also highlighted two other areas that warrant further investigation:

1. The potential use of virtual reality to train athletes in effective visualization techniques so that ultimately, the athlete would have the ability to independently visualize without an artificial environment and without being prone to distracting images.
2. Using virtual reality as a regular training tool where athletes working with their coach to discuss race strategy and specific technical elements of the race such as, when to "change up" the pace of the race, or what position to take within the lane to maximize performance.

Designing effective virtual environments requires resources and research.   Moreover, performance can be impacted by factors such as, athlete experience, preparation style, imagination, proneness to motion sickness, and comfort with technology. It would appear that

virtual environments have great potential for enhancing athlete performance, but this area of research is relatively untapped.

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