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THE CHARACTERISTICS OF COGNITIVE GENERAL IMAGERY USE IN CURLING

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***Abstract*:** The purpose of this study was to examine the characteristics of cognitive general (CG) imagery use in curling. Participants were 14 curlers, competing at both recreational and competitive levels and predominantly playing the skip position. Three focus groups were conducted, and asked participants questions regarding the characteristics of skips' CG imagery use and how the characteristics differ across various situations, based on Munroe, Giacobbi, Hall, and Weinberg's (2000) conceptual framework and the revised applied model of deliberate imagery use (Cumming & Williams, 2013). Two themes emerged from the focus groups: characteristics and situations. The results supported the interaction between characteristics and situations of CG imagery use and revealed unique findings regarding the situation and the perspective of CG images.

***Key words*:** Cognitive general imagery use, Curling, Focus groups

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INTRODUCTION

Imagery use in sport has been broadly investigated, with research supporting its effectiveness and usefulness among athletes in a variety of sports (e.g., Weinberg, 2008). Athletes use imagery for a variety of functions, broken down into cognitive and motivational categories (Paivio, 1985). Hall, Mack, Paivio, and Hausenblas (1998) described five functions of imagery use: cognitive specific (CS; imagery of sport-specific skills), cognitive general (CG; imagery of sport strategies), motivational specific (MS; goal-related imagery), motivational general-arousal (MG-A; imagery related to regulating arousal and emotions), and motivational general-mastery (MG-M; imagery related to confidence and focus).

A conceptual framework describing the four Ws of imagery use was developed by Munroe et al. (2000) and describes *where*, *when*, *what*, and *why* athletes use imagery. Athletes tend to use imagery in a number of locations (i.e., where), at different times (i.e., when), and the content of their images (i.e., what) includes various characteristics. In terms of the *why* component athletes use imagery for the five cognitive and motivational functions (described above). Using the four Ws of imagery use as a basis, Martin, Moritz, and Hall (1999) developed the applied model of imagery use, which describes how athletes can benefit from imagery use. The applied model of imagery use states that the sport situation (i.e., where and when), the type of imagery (i.e., what), and imagery ability influence cognitive, affective, and behavioral performance outcomes. The model proposed that athletes should employ the type or function of imagery that closely matches their desired outcome. For instance, if an athlete's intention is to improve a strategy in competition, CG imagery should be used. Despite the fact that research has supported this proposition (e.g., Guillot, Nadrowska, & Collet, 2009), there is also evidence that has questioned it. More specifically, research has shown that more than one outcome may result from the use of one imagery type (e.g., Callow & Hardy, 2001; Nordin & Cumming, 2008).

In an effort to build upon both the applied model and the recent imagery research, Cumming and Williams (2013) developed the revised applied model of deliberate imagery use for sport, dance, exercise, and rehabilitation. The components of *where, when,* and *why* individuals use imagery remained and, *who, what,* and *how* components were also added. Notably, the importance of personal meaning for each athlete regarding images was highlighted as a bridge between why and what is imaged. The *who* component refers to the characteristics of the athlete that will have an influence on the imagery function employed (i.e., *why*).

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Where, When, and Who

In regards to *where* athletes use imagery (i.e., location), imagery is used in both training and competition, but more often in conjunction with the latter (e.g., Hall, Rodgers, & Barr, 1990). Additionally, athletes report imaging outside of practice and competition (e.g., at work or at home; Munroe et al., 2000). With respect to *when* athletes use imagery (i.e., situation), the athletes were found to use imagery before, during, and after competition, as well as both during and outside practice (e.g., Munroe et al., 2000). However, athletes use imagery most often prior to competition, less often during competition, and least often after competition (e.g., Hall et al., 1990). In addition to the *where* and *when* components, Cumming and Williams (2013) suggested that the characteristics of the individual (i.e., who), such as the athlete's age, gender, competitive level, and experience may influence imagery use. For instance, research has shown that elite athletes use more imagery than novice athletes both in training and competition (e.g., Callow & Hardy, 2001).

What and How athletes use imagery

The question concerning *what* athletes are imaging pertains to the content of the images. Imagery content was originally broken down into six categories: sessions (i.e., frequency and duration), effectiveness, nature (i.e., positive, negative, and accuracy), surroundings, type (i.e., modalities, such as visual or kinesthetic), and controllability (Munroe et al., 2000; Munroe-Chandler, Hall, Fishburne, O, & Hall, 2007). In the revised applied model of deliberate imagery use, Cumming and Williams (2013) suggested that *what* athletes image reflects the different types of imagery content (e.g., performance of a routine in a competition venue), whereas imagery characteristics pertain to *how* athletes are imaging the content (i.e., what was previously described as *what* athletes were imaging; Munroe et al., 2000). It is proposed that imagery ability (e.g., effectiveness and controllability of the images) influences the content and characteristics of imagery, as well as the relationship between imagery use and the desired outcomes (Cumming & Williams, 2013).

Research suggests that there are a number of characteristics associated with imagery use, including: frequency and duration, spontaneous and planned images, colors, speed, the nature of imagery (i.e., positive or negative), modalities (i.e., senses), perspective, agency, and angle (Cumming & Williams, 2012). In regards to the frequency and duration of imagery use, adult athletes reported using imagery more frequently during practice in which the duration of imaging was longer than in competition (Munroe et al., 2000). Additionally, the use of spontaneous and planned

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images was reported by young athletes in both practice and competition (Munroe-Chandler, Hall, Fishburne, O, et al., 2007). Color has been reported by elite skydivers (Fournier, Deremaux, & Bernier, 2008) and expert golfers (Bernier & Fournier, 2010) who see images in black and white or in color during practice and competition.

In terms of the speed of images, golfers reported modifying the speed of their image (i.e., in real time, in slow motion or fast forward) depending on their situation (Bernier & Fournier, 2010). Further, athletes in Munroe et al.'s (2000) study indicated using all three image speeds outside training but also before and during competition. A more recent qualitative study by O and Hall (2013) showed that fast motion images can be employed for planning strategies before or during competition.

Another imagery characteristic is the nature of the images (i.e., positive or negative). Positive images are mostly reported during practice and before competition while negative images are reported most often used during competition (Munroe et al., 2000). The imagery process is also characterized by different modalities since it is well known that imagery is an experience in that all the senses can be involved (White & Hardy, 1998). For instance, athletes described using visual imagery mostly during practice, auditory and kinesthetic imagery most often during practice and before competition, and olfactory imagery mostly before and during competition (Munroe et al., 2000). Further, research has found that athletes use both internal (first-person) and external (third-person) perspectives (Bernier & Fournier, 2010), especially during training (Munroe et al., 2000).

Interaction between components of imagery use

Fournier et al. (2008) and Bernier and Fournier (2010) observed that content, characteristics, and functions of visual imagery vary depending on the situation in elite skydivers and elite golfers. They reported in some detail the interactions between situation and function, situation and content, and function and content. While the interaction between situation and characteristics was not considered to the same extent, they did conclude that the characteristics of mental images varied depending on the situation of the player. Certainly in both their studies (Bernier & Fournier, 2010; Fournier et al., 2008) the influence of situation was highlighted as a key element, supporting applied models of imagery use (e.g., Martin et al., 1999).

CG imagery

The majority of imagery studies have targeted the CS and MG-M imagery (see Morris, Spittle, & Watt, 2005). Considerably less research has examined the effects

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of CG imagery use on athletes' performance, presumably because of the difficulty in measuring strategy performance (Westlund, Pope, & Tobin, 2012). The findings of Munroe et al.'s (2000) study revealed that adult athletes use CG imagery for strategy development and execution. It was later found that youth athletes also use CG imagery for strategy prediction (Munroe-Chandler, Hall, Fishburne, & Strachan, 2007). Imagery interventions, however, have found mixed results regarding the effects of CG imagery on strategy performance. For example, Munroe-Chandler, Hall, Fishburne, and Shannon (2005) attempted to increase a youth soccer team's performance three distinct strategies, but did not see significant changes. Guillot et al. (2009) found that the combination of CG imagery use with physical practice was more effective when learning a new basketball strategy than physical practice alone.

In qualitative studies, canoe slalomists described using CG imagery to learn a course, for pre-competition routines, to review performances, to stimulate creativity in navigating a course, and to model other athletes' performances (MacIntyre & Moran, 2007). Field interviews conducted with professional golfers revealed that CG imagery was used to prepare strategic and tactical aspects of their play (Bernier & Fournier, 2010). This included planning what strategies to employ in an upcoming round, choosing what shot to play, and choosing which golf club to use. In addition, various studies have shown that CG imagery can serve other functions as well (e.g., confidence, staying focused; Nordin & Cumming, 2008).

Despite the results from the aforementioned studies regarding the effectiveness of CG imagery use on athletes' performance, there are still questions to be answered (e.g., antecedents and consequences of CG imagery, effective ways to improve athletes' strategy-related skills; Westlund et al., 2012). Moreover, Bernier and Fournier (2010) pointed out the need of examining imagery use in various sports, skill levels, and situations, and in developing the revised applied model of deliberate imagery use, Cumming and Williams (2013) called for researchers to examine the interaction of various components of the model. Given CG imagery has not been examined employing the revised applied model of deliberate imagery use (Cumming & Williams, 2013) as the theoretical basis, the purpose of the present study was to examine the use of CG imagery in curling, a sport that is highly strategic, yet has received little attention by researchers. CG imagery was examined because it is likely that this type of imagery plays a key role in curling, especially for curlers who play the skip position as they are responsible for directing the strategy of the game. Additionally, there is limited research examining the influence of the situation on imagery characteristics, and this research was conducted primarily with elite athletes engaged in an individual sport (e.g., golf; Bernier & Fournier, 2010). Accordingly, the focus of the present study was to examine the characteristics of both competitive

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and recreational skips' CG imagery use and examine how these characteristics differ across various situations.

METHOD

Participants

Fourteen female and male curlers (M_{age} = 57.57, *SD* = 19.94) participated in the study. All the curlers primarily played the skip position, which is the player who provides direction of the game strategy. The participants were both competitive and recreational curlers and their years of experience playing the sport ranged from 7 to 61 years (*M* = 30.86, *SD* = 16.53). The range of experience playing the position of skip was 1 to 50 years (*M* = 16.86, *SD* = 15.30). Fifteen skips were recruited for the study but only 14 participated.

Design

Three focus groups were conducted with four or five participants per group. Researchers tried to ensure there was homogeneity within groups regarding the age, gender, and years of experience in curling, however the groups were assembled based mainly on participants' availability.

Procedure

Once approval was granted by the institutional research ethics board, participant recruitment began. Managers at local curling clubs were contacted in early spring and asked to distribute the study information to their members, inviting interested individuals to contact the researchers. Individuals who agreed to participate in the study set up a time to attend a focus group, which was held at a local curling club. Once they arrived at the curling club, skips provided written consent prior to participating in the focus group. For each focus group one moderator (i.e., the first researcher) ran the interviews and a second moderator (i.e., the second researcher) took notes. The second researcher was a competitive curler with over 20 years of experience, who clarified any of the questions and responses when needed.

The focus groups lasted 40 to 65 minutes, depending on how much information the skips shared. The focus groups followed guidelines by Krueger and Casey (2009). First, the participants were asked to give their own definition of imagery. Next,

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following the lead of other qualitative researchers examining imagery (Giacobbi, Hausenblas, Fallon, & Hall, 2003; Munroe-Chandler, Hall, Fishburne, & Strachan, 2007; Tobin, Nadalin, Munroe-Chandler, & Hall, 2013) the definition of imagery developed by White and Hardy (1998) was read to make sure that all participants understood clearly what imagery is. After the general definition of imagery was given, CG imagery was described to the participants. It was explained to the participants that the focus group questions would focus only on this type of imagery. The main questions were based on Munroe and colleagues' (2000) conceptual framework and Cumming and Williams' (2013) revised applied model of deliberate imagery use to determine the characteristics of skips' CG imagery use. Probes were used in any case that was necessary, to obtain a better understanding and more detailed responses from participants (Patton, 2002).

Data analysis

Each focus group was audio-recorded and transcribed verbatim by the two moderators. NVivo10 (QSR International, 2012) was used to help analyze the data. The researchers independently analyzed participants' responses, after removing identifying information. While analyzing the data, both deductive (i.e., top-down approach) and inductive (i.e., bottom-up approach) reasoning processes were used (Patton, 2002). Categories were developed based on Munroe et al. (2000)'s framework and the revised applied model of deliberate imagery use (Cumming & Williams, 2013) using the deductive approach. Additionally, new categories emerged from participants' responses as a result of using the inductive analysis. Since the inter-coder agreement reached 93% for all coded data, the coding process was considered to have good reliability (MacQueen, McLellan-Lemal, Bartholow, & Milstein, 2008).

RESULTS

Two themes that emerged from the data analysis regarding the use of CG imagery in curling will be discussed: characteristics (i.e., how; see Figure 1) and situation (i.e., where and when; see Figure 2). The characteristics of skips' CG imagery use were divided into eight categories: agency, color, environment, modality, nature, perspective, sessions, and speed. Three situations emerged describing where CG imagery is used in curling: competition, practice, and spectating. These categories were further broken down into six subcategories: before competition, during competition, after competition, during practice, outside practice, and during

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spectating. The characteristics of skips' CG imagery use are examined across these various situations.

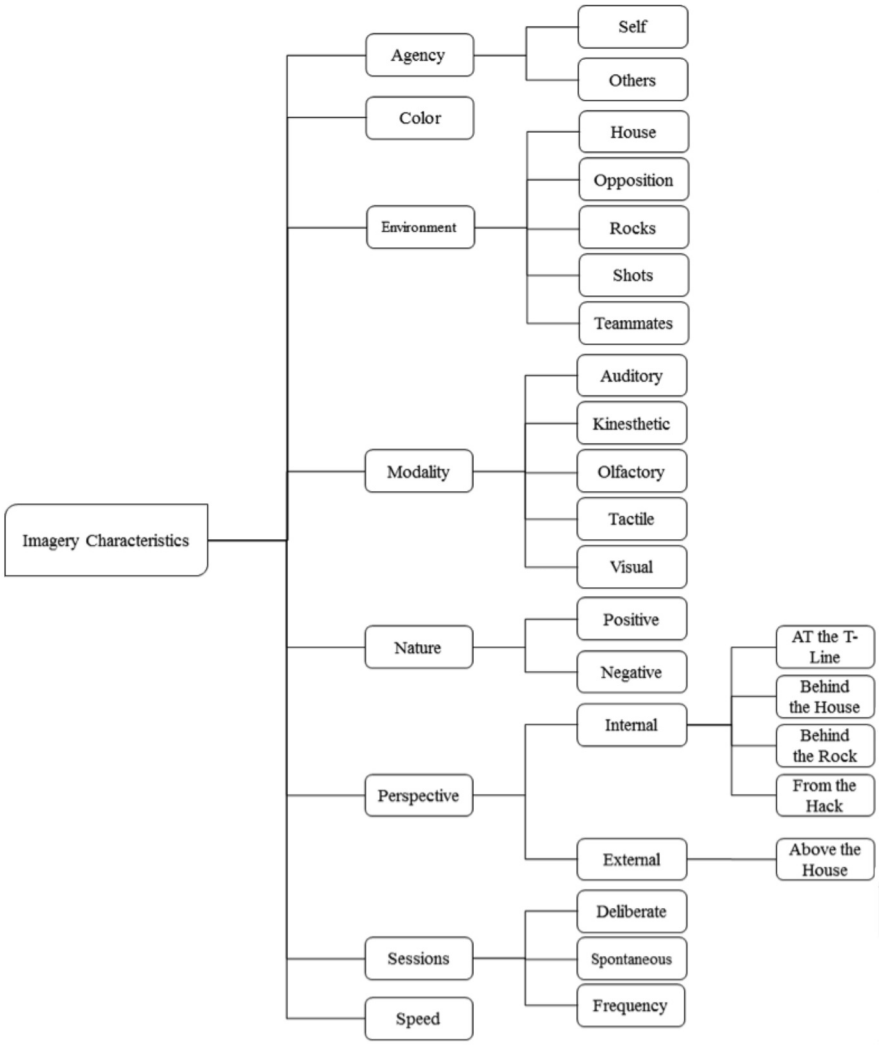

Figure 1. Characteristics of cognitive general imagery use by skips in curling.

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Figure 2. Situations of cognitive general imagery use by skips in curling.

Agency

Agency refers to the participant engaging in the behavior being imaged (Cumming & Williams, 2012). In regards to agency, two sub-categories emerged: self and others. The notion of imaging the self was mentioned during competition and outside practice. For instance, during competition, Participant M stated, "I see myself doing [throwing] the last rock because that's what you're planning for the whole end, right?" Outside practice, Participant I shared, "At home for sure. You're thinking if I'm going to play G tomorrow then I'll spend the night [laughs] thinking of how I'm gonna beat this guy". Skips reported imaging others that making a decision or executing a shot before and during competition: "I might visualize the other team throwing in anticipation of what kind of game I think they're going to play" (Participant F).

Color

Skips indicated imaging different colors, before and during competition, as well as during practice. During competition, Participant C said, "If we go to a bonspiel and the handles are black and red, or different colors, I just visualize what the colors of the stones are in that [curling club]." In response, Participant B shared, "To me it's

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kind of black and white, or grey, or whatever, because the colors are distracting." During practice, Participant N stated, "I see the green and yellow rings and like the, the, the same color of the rocks".

Environment

A number of characteristics emerged when skips discussed the environment in which their images take place. These characteristics were arranged into five sub-categories: house, opposition, rocks, shots, and teammates. Images of the house came up during practice, and before and during competition. An example of imaging the house during practice is: "I see the green and yellow rings" (Participant N). Imaging the opposition was mentioned before and during competition: "You also imagine what your opponent is like and you imagine, how can I defeat my [opponent]?" (Participant J). Before, during, and after competition, images of the rocks were mentioned. Participant L reported imaging rocks during competition: "Your concentration is [on] what the rocks are doing", while before and after competition, Participant F stated, "I see rocks. I just see where the rocks go and where they went, after the game, replaying it." Skips also mentioned imaging shots before, during and, after competition as well as during spectating. For instance, Participant N reported, "Sometimes I recall some of the shots and different angles," before competition. Participant L stated, "Oh I see the best shot in the world", during competition, while Participant I mentioned, "I vividly remember a shot right out here. We lost a game cause [sic] I blew it", after competition. An example of imaging shots during spectating is: "You need a guard in order to, you're thinking three shots ahead" (Participant M).

Finally, teammates seemed to be an important characteristic of CG imagery, before and during competition, and also during spectating. Participant L reported imaging the teammates before competition: "So my imagery is what the lead will do and usually determines what the outcome of the end will be". Additionally, Participant C stated, "I have to see what will happen to that rock if he's [my teammate] wide of the broom, or on the broom", during competition.

Modality

Skips described five different modalities while using CG imagery: auditory, kinesthetic, olfactory, tactile, and visual. Auditory imagery was mentioned during competition, practice, and spectating. During competition, Participant D stated, "You get this sense of hearing the thrower as he's going away from you, going, 'you know,

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if I'm wide a little bit, then we can do this [play a different shot]." While spectating, Participant B mentioned, "So you can hear what they're saying and it helps imagine the shot." Kinesthetic and olfactory modalities were described during competition in the following way: "I think I'm in my body. I'm feeling the shot," as well as not using olfactory imagery: "I don't invoke the sense of smell" (Participant K).

The tactile modality was deemed an important characteristic by skips during practice, before competition, and during competition. This modality was described by Participant M before competition, "When you get on the ice, you always get that cool little breeze". An example of using tactile imagery during competition is, "It's also tactile. Cause you're feeling the rock as you're delivering, you're feeling the broom as you're sweeping" (Participant E).

Another modality that was described by skips was visual, during spectating, and before and during competition. An example of the use of the visual modality during spectating is: "They'll call a shot and make the shot and I think, 'jeez, I didn't even see that" (Participant A). Participant N explained using the visual sense both before and during competition in the following way: "I use a lot of planning before the game, and visualizing for that, and during the game as well."

Nature

The nature of CG imagery was composed of two sub-categories: positive images and negative images. Skips reported using positive images before, during, and after competition. Before competition, Participant K focused on positive images, "I think it's important to visualize success." During competition, Participant A stated, "You can have an image of how you would like to see a game progress." Finally, after competition, "I concentrate more on the good ones [shots] that I make" (Participant G). Positive images were also described during spectating in the following way, "...remembering scenarios and replaying those scenarios in my head and saying, 'kay next time I get to this shot here, I'm going to peel,' or 'I' m going to play the tap'" (Participant M). One example of negative CG imagery that occurs before competition is: "I think it's also important to visualize disaster" (Participant K), while a negative image during competition was described as: "I don't trust that they [my team] can come through and make the shot. And that makes it really hard to skip" (Participant K). After competition, skips discussed a tendency to focus on what did not work out for them during the game: "Usually there is always those shots that stick with you after the game where you feel like you need to replay over and over again" (Participant F).

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Perspective

In terms of the perspective, two sub-categories emerged: internal imagery and external imagery. Internal imagery was further broken down into four different viewing angles: at the T-line, behind the house, behind the rock, and from the hack. This perspective was described as occurring during competition and spectating. For example, during spectating Participant C stated imaging at the T-line: "I can't understand how the guy throwing the rock can see past that rock and see his broom, which is hidden in behind it, 'cause they usually put it right on the centre of the rock." During competition, Participant A reported viewing images behind the house: "You're watching rocks in motion coming to you from behind [the house] so that's really your only vantage point." Participant D indicated viewing images behind the rock during competition in the following way: "I got to the point where I was just, I could just say, 'okay, it's, it's gotta hit that piece and stay up front." An example of imaging from the hack during competition was described by Participant E as followed: "So, it all depends, the imagery I find, whether you're down in the house is different than when you're down, uh ready to shoot the uh rock, so um that, that's my understanding of imagery." For external imagery, one category emerged (i.e., above the house) which was described as being important while spectating: "I never imagine from above the ice, the only time you see it from above is periodically on TV" (Participant A). Viewing images above the house was also reported during competition: "But in your mind, you've got to think, 'okay, if we hit there, we're going over here' so you've gotta see what's going to happen from above, to know which way to move" (Participant E).

Sessions

Sessions consists of three subcategories: deliberate (i.e., whether CG imagery use is structured), spontaneous (i.e., whether CG imagery use is unstructured), and frequency (i.e., how often skips use CG imagery). Deliberate CG imagery sessions were discussed as taking place before, during, and after competition, and during practice: "I'd say that I probably use it [CG imagery] most to plan the game... I'll think back to previous games I'd have against them [opposition] and what was their game style [sic]" (Participant N). Moreover, skips described their CG imagery sessions as being spontaneous and occurring before, during, and after competition: "I can't even imagine skipping your first game and not having that whole image thing, whether you're conscious or unconscious of it, come into play for you" (Participant A). They also mentioned using unstructured imagery during spectating: "So before um they

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make their shot, I enjoy the game more if I imagine, this is what's going to happen".

In terms of the frequency of CG imagery, skips described using it before, during, and after competition, and while spectating: "We've curled in a number of [curling] clubs and sometimes there will be the little pads on the table that you can resurrect an end on paper, or you often see people moving cups and saucers around [after a game]" (Participant A).

Speed

The speed of images was mentioned during competition: "I mean, you're looking at it [the house] in real-time from behind, just coming to you." (Participant E).

DISCUSSION

The present study explored the where, when, and how components of CG imagery use in curling, based on Munroe et al.'s (2000) conceptual framework and the revised applied model of deliberate imagery use (Cumming & Williams, 2013). Specifically, the characteristics of CG imagery as well as the interaction between the characteristics (i.e., how) and the situation (i.e., where and when) of CG imagery use in curlers were examined. The results of the focus groups supported previous research on CG imagery use in sport and enhanced our knowledge of both characteristics and situations of this type of imagery use.

In terms of where and when skips use CG imagery, many categories that emerged from participants' responses were in line with previous findings (e.g., Munroe et al., 2000). Skips reported using CG imagery before, during, and after competition, as well as both during and outside practice. In addition, athletes indicated using CG imagery during spectating, a result not found in previous research. This new finding suggests that skips incorporate various characteristics in their images even when they watch a game on television.

The characteristics of skips' CG imagery use followed the majority of the categories described by Munroe et al. (2000) and the revised applied model of imagery use (Cumming & Williams, 2013). Regarding agency, participants indicated imaging both themselves and others in decision making or shot execution. Similar to previous research (Bernier & Fournier, 2010; Fournier et al., 2008), the skip's images were colorful, or black and white.

The present study extends previous findings regarding the imaging of the environment (Munroe et al., 2000; Munroe-Chandler, Hall, Fishburne, O et al., 2007).

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Skips tended to image a number of characteristics (i.e., house, opposition, rocks, shots, and teammates). Due to the nature of curling as well as the requirements of the skip position, sport surroundings can be very useful for the curlers when using CG imagery.

Results from the current study also support previous research (Munroe et al., 2000; Munroe-Chandler, Hall, Fishburne, O, et al., 2007) concerning the different modalities skips employ while using CG imagery. Skips reported using auditory, kinesthetic, tactile, and visual imagery. Extending previous research (Hardy & Callow, 1999) indicating that kinesthetic imagery is very beneficial in skill acquisition, it is likely skips can also benefit from feeling the movement of the shots while they are determining game strategy. Additionally, the use of tactile modality in skips' images supports findings from previous research with young athletes (Munroe-Chandler, Hall, Fishburne, O, et al., 2007). With regard to olfactory imagery, skips stated that they do not use this sense in their images, which is in contrast to previous research (Munroe-Chandler, Hall, Fishburne, O, et al., 2007). A partial explanation may be that curlers find it difficult to associate the sense of smell with their sport.

Just as athletes in previous research (e.g., Munroe et al., 2000; Munroe-Chandler, Hall, Fishburne, O, et al., 2007) reported using both negative and positive imagery, so too did the skips in the present study. Skips reported using positive images such as good shots and successful scenarios whereas the negatives images included mostly bad or unsuccessful shots.

With respect to imagery perspective, athletes indicated using both internal and external imagery, which is in accordance with previous research (Bernier & Fournier, 2010; Munroe et al., 2000). Notably, athletes reported using internal imagery and viewing from different angles (i.e., at the T-line, behind the house, behind the rock, and from the hack). This is a unique finding due to the nature of the sport and it is in contrast with previous research (Callow & Roberts, 2010) in which athletes were viewing different angles from an external perspective. In terms of external imagery, skips described viewing images above the house, which further supports the notion that this imagery perspective can be beneficial in learning and predicting strategies.

Regarding sessions, athletes reported using both deliberate and spontaneous CG imagery (Munroe-Chandler, Hall, Fishburne, O, et al., 2007). The frequency of CG imagery sessions was also discussed by the skips as imaging always, many times, and sometimes. The duration category found in Munroe et al.'s (2000, 2007) data did not emerge in the current study. Since skips are often imaging spontaneously, they likely do not pay attention to how long they image for, or are not fully aware of when they are using imagery.

The speed of images was also discussed by the skips. Specifically, the curlers

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reported imaging only in real time. This lends support to the notion that imagery is effective when real-time images are used by athletes (Weinberg, 2008). Nevertheless, Bernier and Fournier (2010), and O and Hall (2013) stated that the speed of images can vary in different circumstances (e.g., use of slow motion imagery to review strategies). In curling, CG imagery use may be most beneficial for skips done in real-time, however, more research is needed to confirm this.

Characteristics X Situation interaction

Previous research has indicated how important the situation is while athletes use imagery (Fournier et al., 2008; Martin et al., 1999). Accordingly, in the present study, characteristics of images used by curlers varied depending on the situation. In terms of agency, skips reported imaging themselves both during competition and outside practice (i.e., at home), whereas they mentioned imaging others before and during competition. Different colors were incorporated in skips' images both in practice and competition. In our sample, the different colored rocks and rings at various curling clubs seemed to stick in skips' minds and help them remember various shots and games.

Different aspects of the environment were described in athletes' images in different situations. In practice only the house was mentioned, whereas in competition skips mentioned imaging all five sport surroundings. It seems that is important for skips to image the house, all the rocks in play, and potential shot options, as well what their teammates and opposition may do, in order to become more familiar with the competitive setting. Moreover, shots and teammates were also described while spectating, which has not been reported in previous studies. When athletes are watching a curling game, their focus on shots and teammates in their images may help them make strategy decisions.

In regards to modalities, skips mentioned using auditory, kinesthetic, tactile, and visual imagery during competition. Auditory imagery was also used during practice and spectating. Auditory images can be presumably useful for skips to imagine the shots during all situations since they often provide strategic direction verbally before, during, and after each shot. Skips using this modality during spectating is again a unique finding; hearing what the players say may help skips image the shots. Tactile imagery was also described as being important by skips during practice and before competition. Curlers may find it helpful incorporating the sense of feeling the rock, the broom, or the breeze from the ice in their images in order to prepare for competition. For skips, visual images were also used during spectating and before competition. Visualizing the next shots may be beneficial for the curlers in order to plan or predict strategies.

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The use of positive imagery before, during, and after competition seems to be an important factor in maintaining a positive attitude and confidence. Additionally, the use of positive images during spectating seemed to be a way for learning or predicting strategies; this finding has not been reported in previous studies. The skips also reported using negative images before or during competition, which can undermine their performance (Taylor & Shaw, 2002). However, their use of negative images after competition may prove helpful for reviewing a strategy that was ineffective and probably requires modification.

Moreover, curlers reported imaging from an internal perspective during competition, whereas external images were viewed during spectating. It is probable that when skips are imaging through their own eyes and from various angles, it can help them better perform strategies in competition. The fact that skips as spectators use CG imagery from a third-person perspective is another unique finding of this study.

Regarding sessions, the use of structured images before, during, and after competition, and during practice suggests that skips' imagery is systematic. On the other hand, the use of unstructured sessions before, during, and after competition, and while spectating shows that skips keep changing their images after each rock is thrown by their teammates or opponents, since the anticipated result may not occur. Depending on the situation, athletes mentioned how often they use CG imagery. For example, during and after competition skips reported imaging always, whereas before competition and during spectating they indicated using images less frequently (i.e., many times and sometimes). In terms of speed, skips indicated only imaging in real time during competition. It seems that imaging what is going to happen next in real time helps them to decide the best strategy to employ during the game.

Study strengths, Limitations and Conclusions

The current study highlighted a number of characteristics associated with CG imagery use that are likely unique to the sport being studied. The use of a qualitative methodology in order to investigate CG imagery in curling, which is a highly-strategic team sport and has received limited attention by researchers, provided in-depth information regarding how the use of CG imagery can be beneficial for curlers. Another strength of this study was the examination of the interaction between characteristics and situations of CG imagery use in a team sport by athletes of various skill levels. Previous research only investigated this interaction in primarily elite individual sport athletes (golfers and skydivers) and the use of visual imagery was the main focus of the research (Bernier & Fournier, 2010; Fournier et al., 2008).

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The present study is not without limitations. The majority of the participants were older male, recreational skips. It is possible that differences may occur regarding the interaction between characteristics and situations of CG imagery use in curlers of different ages and competitive levels, and with female curlers. Another limitation is the fact that the data collection was done at the end of the season and the results might change if the data was collected during the competitive season. Moreover, Paivio (1986) argues that imagery is a conscious and non-conscious process. The approach taken in the present research could only focus on the verbal conscious experiences of the curlers. It is possible that other non-conscious processes may influence the imagery experience.

Overall, the findings of the current study may be applied to other sports with strategic requirements. Practitioners can encourage their athletes to incorporate all imagery characteristics that are beneficial for them in different situations while they are using CG imagery to achieve their goals. Thus, imagery interventions should be designed based on the individual needs and preferences of each athlete (Cumming & Williams, 2012). Each athlete, can use different characteristics in their images to develop and enhance their strategies before, during, and after competition, during and outside practice, as well as during spectating. For example, in football athletes may incorporate sport surroundings and modalities in their images while they are watching a game on television. Moreover, soccer players may view different angles from an internal perspective when they perform set strategies (e.g., corner kick) in competition.

To conclude, the present study confirms the notion that characteristics of images vary across different situations (e.g., Fournier et al., 2008), in a sample of recreational and competitive athletes engaged in a team sport. Additionally, some unique findings were identified regarding the situation (i.e., spectating) and the perspective (i.e., viewing different angles from an internal perspective) of CG images, which increase our understanding in athletes' CG imagery use and may be beneficial in other sports in which strategic skills are needed.

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