Paper:
Bench behaviour of ice hockey coaches: Psychophysiological and verbal responses to critical game incidents

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**Short Title**
Bench behaviour of ice hockey coaches
Abstract
The purpose of this study was to examine coaches’ psychophysiological and verbal responses to different game situations. The in-game heart rate and verbal responses of 3 elite ice hockey coaches to 4 critical game incidents (Goals For/Against; Penalties Taken/Drawn) over 4 University Women’s games were assessed. Verbal comments were categorised using the Coach Behaviour Assessment System, and then comments and heart rate were sequenced to critical incidents recorded on video review. Overall, in-game heart rate was greater than rest and coaches were rarely silent. General encouragement and general commentary were the most common verbal comments. Two hundred and eight critical incident comments were recorded (Goals For/Against 34.6%; Penalties Taken/Drawn 65.4%) associated with a 10 bpm greater heart rate. Most common verbal responses to critical incidents were general commentary, silence, and organisation. The type of comment was affected by the type of critical incident. In 78% of critical incidents the type of comment made before incidents differed to type of comment after the incident, coaches rarely talked at the same time and silence was common. These novel findings are limited to ice hockey coaches given the small sample size. However these results should encourage more research into the psychophysiological and verbal responses of coaches in other team sports real game situations to better understand in game coaching behaviour.
Keywords
Coach behaviours, psychophysiological, game criticality, coach education

Introduction
Coaching behaviour has been systematically studied using direct observation and other analytical methods providing great insight into the actions and motivations of coaches.\textsuperscript{1,2} This body of knowledge has shown that instruction is a key aspect of coaching and that overall the types of behaviours coaches display are consistent across age and skill level.\textsuperscript{3} However, most of our knowledge of coach behaviours has been obtained in practice settings rather than games or competitions due to greater frequency of practices (compared to games) and willingness of coaches to be observed.\textsuperscript{2} Unfortunately, practice behaviours do not translate to competition behaviours\textsuperscript{4} and game coaching behaviour has been identified as an important aspect of a coach’s overall performance strategy.\textsuperscript{5} Thus, increasing our knowledge of coaches’ in-game behaviours seems pertinent. As Partington and Cushion\textsuperscript{1} explained, having a richer understanding of coaches’ behaviour during competition is a necessary step to initiate greater change in general coaching practices.

The few studies that have examined coaching behaviour during games have used a variety of quantitative (observation to determine behavioural categories), qualitative (interviews), and mixed methods approaches to obtain data.\textsuperscript{2} A synopsis of observational research identifies spontaneous and reactive behaviours, associated with performance
development, encouragement, and purposeful silence.\textsuperscript{2,4,6} Despite silence being identified as one key coaching behaviour, the majority of behaviours are associated with some verbal attribute. Accordingly, some researchers have specifically examined the verbal behaviour (comments) of coaches during games.\textsuperscript{6,7} Such studies have identified the positive effect coaches’ verbal comments can have on athletes’ motivation and performance. For example, athletes have indicated that in high pressure situations verbal comments that are ‘direct and to the point,’ as well as not sounding nervous or emotional have a calming effect\textsuperscript{8} or improve focus.\textsuperscript{9} Some factors influencing coaches’ comments during competitions have also been identified. For example, it has been suggested that verbal comments of coaches are influenced by the importance of that sport to National pride,\textsuperscript{7} as well as the team’s league standing, the time in the season, and within game morale.\textsuperscript{6} However, what is not well understood is the influence situation criticality and specific incidents within a game have on coaches’ verbal behaviours. Situation criticality, which has been defined as the perceived importance assigned to a competitive situation,\textsuperscript{10} has been recognised as an important variable that can affect emotional and behavioural reactions in sport. Given the pressures that coaches can experience during competitions,\textsuperscript{11} it is feasible to assume coaches’ behaviours and emotions will also be affected by different incidents and critical situations as they occur during games.
Although research has yet to examine coaches’ verbal reactions to different critical incidents, some insights have been gained into the impact of competition and situation criticality on coaches’ psychophysiological stress (measured through changes in heart rate (HR)). Psychophysiological stress is defined as increased psychological and physiological arousal caused by a reaction to perceived threats and demands, and HR has been used to measure this because it is a tightly controlled index of arousal. McCafferty, Gliner, and Hovath examined the HR response of coaches working in various sports, such as swimming, water polo, and volleyball, and identified an increase in HR in response to competition. In addition, it has been found that coaches’ HR responds to specific features of competition such as type and importance of contest. Together these studies provide consistent evidence that coach’s experience average HR during games/competitions is greater and certain aspects of a competition may accelerate the HR response from baseline game HR.

However, to date, the simultaneous analysis of psychophysiological and verbal comments to specific critical incidents in a competitive setting have not been determined. Thus, the purpose of the current study was to examine high performance coaches’ psychophysiological and verbal responses to competition and different game situations. Specifically, the study sought to examine: (a) Ice hockey coaches’ HR response and verbal
comments to a competitive game, and (b) whether critical game incidents were associated with a change in HR and specific types of verbal comments. We hypothesised that HR would vary over the course of a game and would increase in response to critical incidents witnessed by the coaches and decrease after the critical incident. We also hypothesised that critical incidents would cause a change in verbal comments from the coach and that the type of verbal comment would change depending on the type of critical incident occurring.

Methods
Participants
One Head Coach (HC) and two Assistant Coaches (AC) of a Canadian university women’s hockey team participated in the study. The university league is the most competitive amateur ice hockey league in Canada and is the main women’s elite developmental league for Hockey Canada. The HC was a 46-year-old male who had been a full-time professional HC for the current university team for 12 years, with 16 years of total experience as a coach. The part time AC’s were a male coach aged 44 years (AC 1) and a female (AC 2) aged 49 years. Both AC’s were high level hockey coaches with diverse playing and coaching experiences.

Data Collection
The study received institutional research ethics board approval and written informed consent was obtained from all participants before initiating data collection. Data collection
occurred at four regular season home games. Verbal comments, HR, and critical game incidents for each game were collected as outlined below.

**Critical Incidents.** For the purpose of this study, the four most important critical incidents to a game outcome (goals for and against, and penalties taken and drawn) as indicated were examined. Initially, two researchers recorded the critical incidents while watching the games live. A third researcher confirmed the timings and details of the critical incidents by reviewing video recordings of the games.

**HR.** Pre-game HR (30 minutes immediately prior) and game HR response was measured continuously with Suunto T6 heart monitors set to record and store HR data every 10 seconds with subsequent download and analysis using Sunnto Team Analysis software. For determination of the HR associated with a critical incident the HR corresponding to the time point at which the incident occurred was determined. In addition, the HR immediately preceding and immediately after the critical incident were also used to come up with a 30 second average HR for each critical incident. This conservative approach was taken to ensure that the critical incident was truly captured within that HR time frame and to reduce any HR artefact due to a sudden movement or breath hold, both of which affect cardio-acceleration of HR. To determine % of HR max the coaches were
working at, the age predictive HR Max equation 205.8-0.685(age)\textsuperscript{16} was used, where overall mean period HR was divided by their predicted maximum HR.

Verbal comments. A lapel-microphone connected to audio-recorders was attached to each coach’s jacket. All the comments each coach made from the warm-up to the end of the game were recorded. Audio-comments made during the game were transcribed verbatim and the time each comment was made was recorded. Each comment was then coded against the categories outlined in the Coach Behaviour Assessment System (CBAS).\textsuperscript{17} To ensure the comments were coded in context the coding took place while listening to recordings of comments and watching game video. Comments were coded in the following categories: General communication, organisation, general encouragement, general tactical instruction, mistake-contingent tactical instruction, mistake-contingent encouragement, and criticism.\textsuperscript{17} Additional categories of general commentary and communication with the referee were also used. Once the data had been coded against the CBAS, a selection of the coded comments was shared with another researcher who confirmed the allocation of data within the categories.

Data Analysis

Data matching. Once all the comments had been coded, the HR data downloaded, and the critical incidents recorded, each set of data was then matched by time. Once the data had been matched by time one researcher re-watched all the recordings of each game
while listening to the audio recordings and reviewing the time matched data to ensure accuracy. Two researchers then reviewed the time-matched data, looked at each critical incident, and reviewed the HR responses and verbal comments to verify accuracy of matching. Any potential errors (e.g., comments that did not appear to match the incident) were rechecked against the raw data.

**Statistics.** Full descriptive statistics was completed using SPSS V 22.0. HR data was analysed using repeated measures ANOVA with a level of significance set a priori at $p < 0.05$. Verbal comments were assessed using cross-tabulation with categorical variables of coach, period, type of critical incident, and timing of comment (pre or post) used where appropriate to elucidate the verbal comments patterns. The verbal comment comparisons are provided in greater details in the results both for overall frequencies (regardless of critical incident) and also in regard to the critical incident assessed.

**Results**

*Overall HR response*

The overall HR responses are presented in Table 1. The mean period HR expressed as a percentage of HR max was 63, 48, and 45 % respectively for HC, AC1, and AC2.

****Table 1 here****
**HR response to critical incidents**

The raw HR response of each coach is shown in Figure 1 where Panel (a), (b), (c) are Periods 1, 2 and 3 respectively.

![Figure 1 here](image1.png)

The HR response for the HC revealed that critical incidents correspond to a 10 beat increase in HR with a subsequent decrease after the critical incidents had occurred. Visual inspection of Period 1 for the HC provides four instances of a marked increase in HR corresponding to a critical incidents and this pattern is repeated in Period 2 and 3. Towards the end of Period 3 a large increase in HR for the HC (highest HR for Period 3) corresponds with a ‘Time Out’ as shown in Panel C and all coaches show an increase in HR as Period 3 ends. AC 1 and AC 2 do not have the same frequency of cardio-acceleration as the HC across this representative game.

Based on the critical incidents of ‘Goals For’ and ‘Goals Away,’ as well as ‘Penalties Taken’ and ‘Penalties Drawn’ there was no significant difference between the HR responses for these critical incidents overall (all coaches combined) or for each coach (HC, AC 1, AC 2; Figure 2). However, there was a significant difference between the HC and AC 1 and AC 2 for each of the critical incidents analysed (Figure 2); HR was on average 25 – 31 beats/min greater for the HC compared to AC 1 and AC 2.

![Figure 2 here](image2.png)
**Overall verbal comments of coaches**

The overall number of comments made by the coaches differed between the coaches. AC 1 made the least comments (248 comments per game) compared to the HC (318 comments per game), significantly less than AC 2 (471 comments per game; p < 0.05). The average number of comments made in Period 3 were significantly greater than Period 1, 2 and OT/SO (Per 1 = 103, Per 2 = 107.5, Per 3 = 125.8, OT/SO = 28.2; p < 0.05) and AC2 made significantly more comments per period (147.7 comments) compared to HC (100.0 comments) and AC1 (88.3 comments). In OT/SO the average number of comments made by coaches was similar (range = 25 – 31 comments).

Coaches made comments that were coded across the categories shown in Figure 3. General commentary (a running commentary of the game, usually muttered under the coach’s breath) and general encouragement accounted for 28.7 and 16.5 % of comments recorded. Figure 3 shows that across Periods the proportion of different types of comment made is consistent (for example organisation ranges between 8.4-8.8 % across Periods). In OT it was found that general commentary and general encouragement, as a proportion of all comments made within OT, was greater than within Periods (Figure 3).

*****Figure 3 here*****
For the HC, the greatest proportion of comments were general commentary, mistake contingent tactical instruction and general tactical instruction (19.2, 18.2 and 16.4 % of comments respectively). General commentary was the most prevalent type of comment for the AC’s (AC1 = 24.8 and AC2 = 40.7 %). However, general encouragement and positive reinforcement were the 2nd and 3rd most prevalent types of comments (19.8 and 14.3 % for AC1 and 16.7 and 17.8 % for AC2).

Verbal reaction by critical incident
There were 208 instances where a critical incident was associated with a verbal comment as categorised by the CBAS (Goals For and Against = 34.6 % and 65.4% for Penalties Taken and Drawn). There were more comments associated with Goals Against (19.7 %) compared to Goals For (14.9 %), as well as Penalties Taken (35.1%) compared to Penalties Drawn (30.3 %). Of all comments recorded before a critical game incident occurred, general commentary and silence were the most prevalent (24.0 and 28.4 % respectively). After a critical incident silence, organisation, general encouragement, and general commentary were the most common (18.8, 17.8, 16.3 and 13.0 % respectively).

The most common type of comment made by coaches for each type of critical incident is summarised in Table 2. Values are expressed as percentage comment type for each critical incident.

*****Table 2 here*****
The HC and AC1 were silent the most (23.6 and 31\%) and AC2 most often provided general commentary (27.8\%) around critical game incidents. Other comments from the HC include mistake contingent tactical instruction (19.5\%) and general commentary (16.1\%) before the incident, and organisation and general encouragement after. AC1 provided general commentary (21.4\%) prior to a critical incident, and general encouragement (26.2\%) after a critical incident. AC2 was the least silent, and provided general commentary both before and after incidents (34.2 and 21.5\% respectively), as well as reinforcement (16.5\%) before and organisation (22.8\%) after.

In 45 instances the type of comment made before and after the critical incident was the same and the pattern that was most common was silence (14 instances), general commentary (10 instances), organisation (8 instances), with mistake contingent tactical instruction, general tactical instruction, general encouragement, general communication, and reinforcement also identified with this pattern. Silence and general commentary accounted for 63\% of all same type comments associated with Goals For and Against. Silence and general commentary was also common for Penalties Drawn (69\%) and in Penalties Taken 46\% of same type comments were identified as organisation.
In 163 instances the type of comment differed before and after the critical incident. The frequency of the before comment and the associated after comment are summarized in Table 3.

Discussion

The purpose of this study was to examine coaches’ psychophysiological and verbal responses to different game situations. Findings show that psychophysiological responses (measured by HR) and verbal comments (as a surrogate of coaching behaviour) change with critical incidents. Although this may be assumed as being reasonable and an expected response, this is the first study to confirm that coaches are sensitive to distinct incidents within a game. Moreover this research is the first to systematically investigate this coaching experience (combination of the HR and verbal commentary) during competitive game play.

Psychophysiological response to game play

As shown in Table 1 the HR response to competition increased significantly compared to pre-game and practice HR indicating, like others, that coaching in a competitive game induces increased arousal. The average HR expressed as % of max HR corresponded to very light continuous aerobic exercise for both AC’s and light to moderate continuous aerobic exercise for the HC, less than what has previously been reported in participation coaches and professional coaches.
More importantly we wanted to understand if psychophysiological strain measured as HR was sensitive to emotional critical incidents\(^1\) that have a major influence on the outcome of the game. Cardioacceleration of HR (rapid increase in HR) was evident in many instances associated with one of the four key critical incidents graphically illustrated in Figure 1 for each coach in a representative game. Others have found unequivocal psychophysiological responses of coaches to winning or losing game contexts.\(^2\) Thus there may be an implication that the type of critical incident is important to evoking a psychophysiological response.

Figure 1 also illustrates that coaches do have psychophysiological arousal induced HR response during a competitive game. This conclusion can be made because the activity level was very low (the coaches stood or paced very slowly) for the duration of the games. Thus HR is greater than what would be expected given the level of activity the coaches made during the games. Additionally, the rate of increase (magnitude /given period of time) in these coaches to a critical incident followed the classic ‘exercise onset cardioacceleration’ pattern of rapid increase to peak at 10s followed by transient drop in HR within 20 seconds, illustrating significant autonomic nervous system involvement.\(^3\) Thus, the HR variation in our study is likely psychophysiological, where the assessment of
a situation evokes both a behaviour and a physiological response (HR) of coaches in game situations.  

Verbal response to game play

With regards to the verbal comments coaches’ made during the games, there appear to be some inconsistencies with previous research, particularly with regards to the amount of comments the coaches’ made. Although few studies have examined coaches’ verbal comments during competitions, the findings from those that have generally conclude that coaches spend a considerable proportion of their time making no comments. However, in the current study, the coaches, particularly the AC’s were rarely silent. Instead the AC’s spent much of their time either organising the team (i.e, telling different lines to get ready and go onto the ice) or providing a general commentary of the game. This general commentary was not directed at any players and did not appear to fulfil any specific coaching need (that is it contained no instruction, reinforcement, or encouragement). Two potential explanations for such an extensive commentary are that it allowed the coaches to remain engaged with the game and was also used as a strategy to help coaches’ manage their own emotions, although this is clearly speculative.

Overall, compared to the AC’s, the HC did spend more time standing silently watching the game, particularly leading up to and following certain goals and penalties. Given the HC’s large HR response to critical incidents, it is perhaps surprising that such
behaviours were evident. In line with previous suggestions (cf., 23), it appeared that such silence was purposeful and perhaps adopted to provide the players with an opportunity to process and assess the situation themselves, before being provided with instruction.²

With regards to the coaches’ verbal reactions to specific critical incidents two patterns emerged; the same type of comment was made before and after the incident, or different types of comments were made pre and post-incident. Overall, only 22% (45 of 208 instances) of all critical incidents had the ‘same type’ before and after critical incident, and of those 45 instances silence-silence accounted for 33% of all pairs. Of those silence-silence pairs Penalty Drawn and Goals Against were the most prevalent incidents that were met with silence. In these instances, silence seemed to be a behavioural choice from the coach, either to allow other coaches to verbally communicate with players or to allow players to consider the situation themselves.

Organisation-organisation comments before and after critical incidents were also common and was associated with penalties taken (8 of 10 instances). Furthermore, within ‘non-same’ type comments there were 12 additional instances that coaches provided organisation type comments after a Penalty Taken, but only one coach provided organisation advice. Although it is well known that a ‘penalty kill’ is an important aspect of
ice hockey and is practiced extensively,24 this study highlights the frequency of ‘in game’ organisation comments from coaches to elite ice hockey players.

It is worth noting that, regardless of the specific incident or the time in the game, the coaches were rarely critical of the players; almost all their comments were instructive, encouraging, or reinforcing good play. Such findings indicate that coaches coaching at the collegiate level differ from coaches of children where the majority of verbal comments (when made) were categorised as neutral or negative, with only 35.4% of comments being positive.7 This may simply be indicative of the coaching philosophies of the three coaches or the programme in which these coaches work, but might also be a demonstration of the control these coaches have over their emotions and awareness of the comments they are making. Interestingly, Walters et al.7 identified that sports with high national significance may expect their coaches to be more competent (and successful), placing more pressure on coaches and provoking controlling behaviours. In this project, we have studied a sport that has great national significance but, similar to others who have studied ice hockey in Canada,4 such cultural pressure did not seem to provoke significant negative comments.

When comparing the results of this study to other research examining coaching behaviour in ice hockey games, there appears to be quite substantial differences. Trudel et al.4 observed the behaviours of 14 coaches during elite youth hockey games. Trudel et al.4
identified that the majority of the coaches’ time was spent observing the game, and, when coaches did interact with players the most frequent behaviours were organisation and directing the game. In contrast to the findings of the current study where mistake-contingent tactical instruction and general tactical instruction accounted for 24% of all comments, the coaches in Trudel et al.⁴ and colleagues study provided limited instruction to their players. Trudel et al.⁴ offered that the low amount of feedback observed in their study demonstrated that coaches were not utilising teachable moments during games. In the present study, the coaches appeared to use games as opportunities to teach their players in context.

Limitations

This study focused upon four critical incidents. However, other critical incidents such as errant shots or poor passes could provide greater insight into the coaching behaviours of ice hockey coaches. Additionally, given the continual nature of ice hockey games, it is possible that coaches were reacting to more than one critical incident at a time or were commenting on incidents that coincided with incidents that were coded by the research team.

Conclusion

In summary, these ice hockey coaches experienced cardioacceleration of HR was associated with critical incidents, a finding which brings greater insight to the physiological
The coaches also consistently talked throughout each game and the majority of their comments were general commentary and positive in nature. Critical incidents were associated with a change in the type of comment made, although coaches were also silent in response to critical incidents. This enforces the idea that these coaches in ice hockey are judicious in their use of comments at times of critical game incidents. Furthermore the type of critical incident caused specific patterns in type of verbal comment such as penalties taken associated with organisation type comments. In combination our data identifies that ice hockey coaches seem able to control the types of comments they made during games, despite the psychophysiological response that occurs to the critical instances studied. These results are not immediately generalizable to other team sports coaching behaviours however these preliminary findings in ice hockey do provide novel insight to in-game coaching behaviour. Thus despite the small sample size these results are sufficient to encourage further research of in-game coaching behaviours and psychophysiological responses during ice hockey and other continuous time sports such as basketball, soccer, handball, field hockey, ultimate, and rugby.
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3 Neither author has benefited personally or financially from the application of this research.

4 **Declaration of Conflicting Interests:**

5 The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.
References


Figure 1. Ten second averaged heart rate (HR) response measured in beats per minute for each coach (see legend for identification of each coach) where Panel (a), (b), (c) are Periods 1, 2 and 3 respectively. Critical incidents are highlighted by rectangular boxes and mean HR response for each coach for each period is shown has the horizontal line bisecting the HR response line.
Figure 2. Mean heart rate ± SD response measures in beats per minute for each critical incident overall (coaches combined) and individual response for each coach for ‘Goals For’ and ‘Goals Away’ as well as ‘Penalties Taken’ and ‘Penalties Drawn’. µ indicates a significant difference between the HC and AC 1 and AC 2 for each of the critical incident.
Figure 3. Coded comment of all coaches combined expressed as percent of comments made by period and during overtime.
Table 1. The overall mean heart rate ± SD expressed in beats / minute for the pre-game period of 30 minutes immediately prior to the game and each period of play (all 4 games combined).

<table>
<thead>
<tr>
<th></th>
<th>Pre Game</th>
<th>1st Period</th>
<th>2nd Period</th>
<th>3rd Period</th>
<th>4th Period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HC</strong></td>
<td>101.4±6.3</td>
<td>111.6±0.26</td>
<td>108.1±0.20</td>
<td>108.0±0.19</td>
<td></td>
</tr>
<tr>
<td><strong>AC1</strong></td>
<td>75.4±7.6</td>
<td>83.3±0.17</td>
<td>82.0±0.21</td>
<td>81.4±0.28</td>
<td></td>
</tr>
<tr>
<td><strong>AC2</strong></td>
<td>74.6±8.4</td>
<td>77.2±0.37</td>
<td>79.2±0.37</td>
<td>81.3±0.44</td>
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</table>
Table 2. Type of coded comment associated with critical incidents both before and after the critical incident occurred. Values are expressed as percentage comment type for each critical incident. Where no comment was associated with any critical incident in the before analysis or after analysis the row is greyed out (communication with referee before and criticism after are the two instances where this occurred).

<table>
<thead>
<tr>
<th>Comment Category</th>
<th>Goal Against Before</th>
<th>Goal For Before</th>
<th>Penalty Drawn Before</th>
<th>Penalty Taken Before</th>
<th>Goal Against After</th>
<th>Goal For After</th>
<th>Penalty Drawn After</th>
<th>Penalty Taken After</th>
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<tr>
<td>Communication with referee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criticism</td>
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<td>0.0</td>
<td>1.6</td>
<td>0.0</td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>General commentary</td>
<td>24.4</td>
<td>25.8</td>
<td>20.6</td>
<td>26.0</td>
<td>17.1</td>
<td>9.7</td>
<td>14.3</td>
<td>11.0</td>
</tr>
<tr>
<td>General communication</td>
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<td>3.2</td>
<td>4.8</td>
<td>6.8</td>
<td>2.4</td>
<td>0.0</td>
<td>4.8</td>
<td>9.6</td>
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<tr>
<td>General encouragement</td>
<td>9.8</td>
<td>12.9</td>
<td>11.1</td>
<td>2.7</td>
<td>17.1</td>
<td>19.4</td>
<td>22.2</td>
<td>9.6</td>
</tr>
<tr>
<td>General tactical encouragement</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1.4</td>
<td>2.4</td>
<td>0.0</td>
<td>0.0</td>
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<tr>
<td>General tactical instruction</td>
<td>2.4</td>
<td>9.7</td>
<td>3.2</td>
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<td>4.9</td>
<td>0.0</td>
<td>12.7</td>
<td>4.1</td>
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<td>Mistake contingent encouragement</td>
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<td>3.2</td>
<td>1.6</td>
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<td>4.9</td>
<td>0.0</td>
<td>1.6</td>
<td>1.4</td>
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<td>12.9</td>
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<td>12.2</td>
<td>3.2</td>
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<td>13.7</td>
<td>9.8</td>
<td>0.0</td>
<td>11.1</td>
<td>35.6</td>
</tr>
<tr>
<td>Reinforcement</td>
<td>9.8</td>
<td>12.9</td>
<td>6.3</td>
<td>8.2</td>
<td>0.0</td>
<td>41.9</td>
<td>9.5</td>
<td>9.6</td>
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<tr>
<td>Silence</td>
<td>29.3</td>
<td>19.4</td>
<td>33.3</td>
<td>27.4</td>
<td>29.3</td>
<td>25.8</td>
<td>17.5</td>
<td>11.0</td>
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</table>
Table 3. Summary of comment pairs (before and after) where the after critical incident comment differs from the before critical incident. Values expressed as frequency of times each of comment pair was recorded across the 4 games analysed.

<table>
<thead>
<tr>
<th>Before incident comment type</th>
<th>After incident comment type</th>
<th>Frequency of occurrence</th>
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</thead>
<tbody>
<tr>
<td>Silence</td>
<td>General encouragement</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Organisation</td>
<td>10</td>
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<tr>
<td></td>
<td>General commentary</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Reinforcement</td>
<td>8</td>
</tr>
<tr>
<td>General commentary</td>
<td>General communication</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Organisation</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Reinforcement</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>General encouragement</td>
<td>4</td>
</tr>
<tr>
<td>General encouragement</td>
<td></td>
<td></td>
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