

EFFECTIVE COACH FEEDBACK AND FIGHTER APPLICATION IN MIXED MARTIAL ARTS

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INTRODUCTION

Mixed Martial Arts (MMA) is an emerging sport which involves competitors in a ring or cage utilising strikes as well as submission techniques to defeat opponents. The MMA Unified Rules of Conduct was established in 2000, allowing for regulated MMA events for an international audience. While MMA is practiced worldwide, with fighters incorporating martial arts ranging from kickboxing and wrestling to karate and Brazilian jiu-jitsu (Ford, 2015), there is minimal existing research designed to aid the development of performance in MMA.

Effective coaching is vital to an athlete's optimal sporting performance (Hughes & Franks, 2007), so that increasing our understanding of 'what is effective coaching' can challenge poor coaching behaviour and improve MMA athlete performance. Coaching feedback has traditionally been associated with subjective rather than objective measures. Research has shown that using a systematic analysis provides valid and reliable understanding of 'effective coaching variables' and reduces coach bias (Hughes & Franks, 2007).

Feedback provided by coaches can be both motivational and informational. Motivational feedback is useful, as it aims to provide the athlete with encouragement to repeat good performances (Hughes & Franks, 2007) and to reduce errors, thereby enabling the athlete to get closer to delivering their desired performance. Accurate informational feedback delivers salient information to encourage specific changes in performance, which will lead either to continued performance, if the result was successfully achieved, or a change in performance if it was not. Inaccurate feedback leads the athlete to deliver a sub-optimal performance (Cannon & Witherspoon, 2005). Therefore, effective informational and motivational feedback from a coach during training is paramount to a fighter's performance.

MMA is an emergent and exciting sport which continues to take big strides in its development, particularly at the professional level. As a result, there is an opportunity to improve fighter performance through an analysis of coaching behaviour. A coach's skill in providing feedback and instruction is known to be influential in helping athletes to perform at their optimal level. The previous research discussed above has touched on this link between coach feedback, athlete application and performance.

In mixed martial arts, each fight consists of three (preliminary and main card) or five (championship) rounds, with a 1-minute break in between each round (UFC, 2015). The coach uses the 1-minute break to deliver optimal (in terms of type, duration and complexity) feedback to the athlete. Analysis of coach feedback and fighter performance

allows us to assess a fighter's progress (Hughes & Bartlett, 2002) and to understand which coach behaviours are more effective. The hypothesis is a simple one: the more effective the coach feedback (in terms of the level of application shown by the fighter) during the break, the better the fighter can either maintain his dominance or try to shift the momentum of the fight in his favour.

This study will measure both the fighter's application of their coach's feedback (communicated during the 1-minute break) and the kinds (type and method) of feedback used by coaches.

METHOD

Participants

Participants in the three professional MMA divisions (championship, main card and preliminary) were analysed, championship being the highest level. The fights studied involved 36 fighters and 36 head coaches (Table 1).

Division	Weight						
	Fly	Bantam	Feather	Light	Welter	Middle	L Heavy
Championship (n = 12)	2	2	0	0	4	0	4
Main Card (n = 12)	2	0	0	4	0	2	4
Preliminary (n = 12)	0	2	2	4	2	0	2

Table 1. Fighter Divisions and Weight.

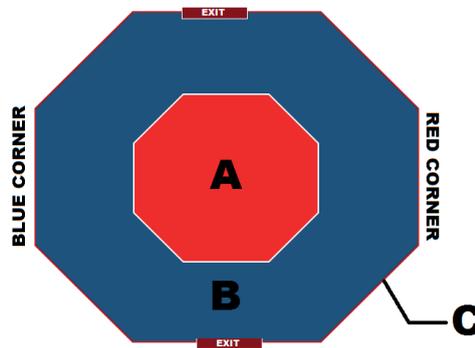


Figure 1. Floor Map of MMA Octagon.

Coach Behaviour (Type and Method of Feedback)

The type and method of coach feedback provided during each 1-minute break between rounds and the corresponding performance actions of the fighter (post-coach feedback) were observed and coded using Sportscode™ V10 (Hudl, USA). The observation system was based on the protocol developed by Mesquita et al. (2008), used in their study of judo coaches (Table 2).

Nature of Coach Feedback	
Prescriptive	The coach gives an indication that the athlete should respect in the next combat, imposes a solution, possibly underlining the mistakes to avoid.
Descriptive	The coach describes the way the athlete accomplished any previous action
Positive Evaluation	The coach evaluates the athletes' performance in a positive way or he praises or encourages the athlete
Negative Evaluation	The coach evaluates the athletes' performance in a negative way reflecting disapproval
Form of the Information	
Verbal	The coach transmits the information in an exclusively verbal way
Visual	The coach transmits the information in a non-verbal way, through gestures or facial expressions, which may show approval, disapproval or demonstration 'simulation'
Kinesthetic	The coach transmits the information manipulating the athletes body
Combined (Verbal/Visual or Verbal/Kinesthetic)	The information is transmitted in a verbal and gestural way or in a verbal way with manipulation of the athletes' body respectively.
Motivational Feedback	Non-technical information to inspire athlete to perform

Table 2. Observation system of coach instruction

The Fighters

The feedback or instructions communicated by the coach between rounds were coded to reflect their type and method, and differences were determined by fight outcome. The mean level of fighter application of coach feedback (i.e., the frequency that the fighter employed the actions suggested by the coach) was determined, then compared by outcome (Table 3), division and round.

Ethics

Institutional ethical approval was granted by Auckland University of Technology ethics committee prior to the start of the study.

Win C	Winning fighters in Championship division
Loss C	Losing fighters in Championship division
Win M	Winning fighters in Main Card division
Loss M	Losing fighters in the Main Card division
Win P	Winning fighters in Preliminary division
Loss P	Losing fighters in the Preliminary division
R1R2	60 second break in between rounds 1 and 2
R2R3	60 second break in between rounds 2 and 3
R3R4	60 second break in between rounds 3 and 4 (Championship only)
R4R5	60 second break in between rounds 4 and 5 (Championship only)

Table 3. Fighter Division, fight outcome and rounds

Striking Actions	Definition
Punch	Successful strike which connects with opponent with a closed fist
Elbow	Successful strike which connects with opponent with the point of the elbow
Kick	Successful strike which connects with opponent with the foot, leg or heel
Knee	Successful strike which connects with opponent with the kneecap and surrounding area of kneecap
Grappling Actions	
Clinch	A grapple at close quarters with opponent, to be too closely engaged for full arm blows
Submission	Attempts at yielding the opponent with a grapple with the intent to finish the fight
Takedown	A grappling manoeuvre where the opponent is brought down to the mat from a standing position
Guard	Execution of a ground grappling position where fighter has their back to the ground while attempting to control the other fighter using their legs

Table 4. General Performance Indicators

Fighter Application of Feedback

Fighter performance indicators ($n = 8$) were categorised into two groups: general and coach feedback-dependent. General performance indicators were those used in actions by the fighter during the bout and consisted of striking (offensive or defensive) and grappling techniques (Table 4).

The coach feedback-dependent performance indicators were those observed being communicated by the coach to his fighter during the 1-minute breaks between rounds.

For example (Figure 2 and Table 5), during one such break, the fighter was instructed by his coach to keep his opponent pressured by *driving forward*, stay in the *centre of the ring* and concentrate on using *body kicks*.

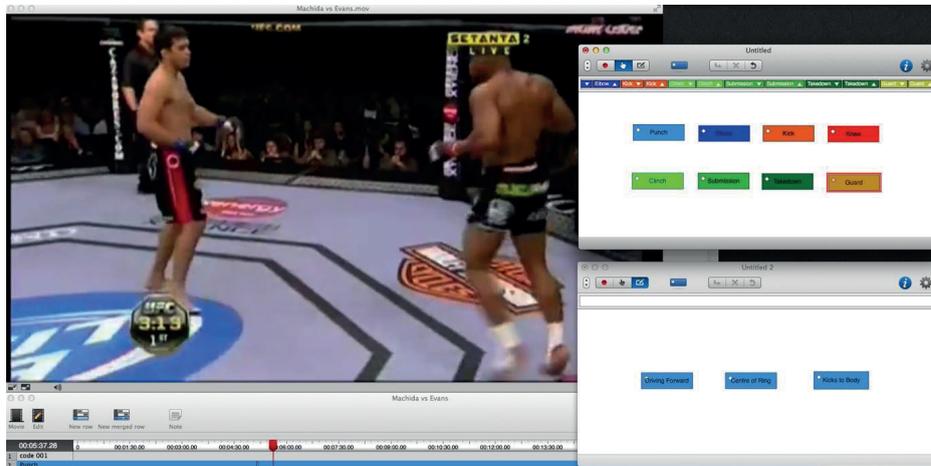


Figure 2. Screenshot of SportsCode Gamebreaker software (Sportstec, 2015)

Coach Feedback	Fighter Application of Coach Feedback
Drive forward	Obvious forward movement fighter towards opponent
Centre of ring	Duration fighter is in the “Centre of ring” (Figure 2)
Kicks to body	Successful strike which connects with opponent’s torso with the foot, leg or heel

Table 5. Example of coach feedback dependant indicators used by a coach.

When observing and coding the actions of the fighter; the general code window layout remained constant, while the coach feedback-dependent code window layout could change with each round to correspond to the coach’s instructions to the fighter (e.g., Figure 3).

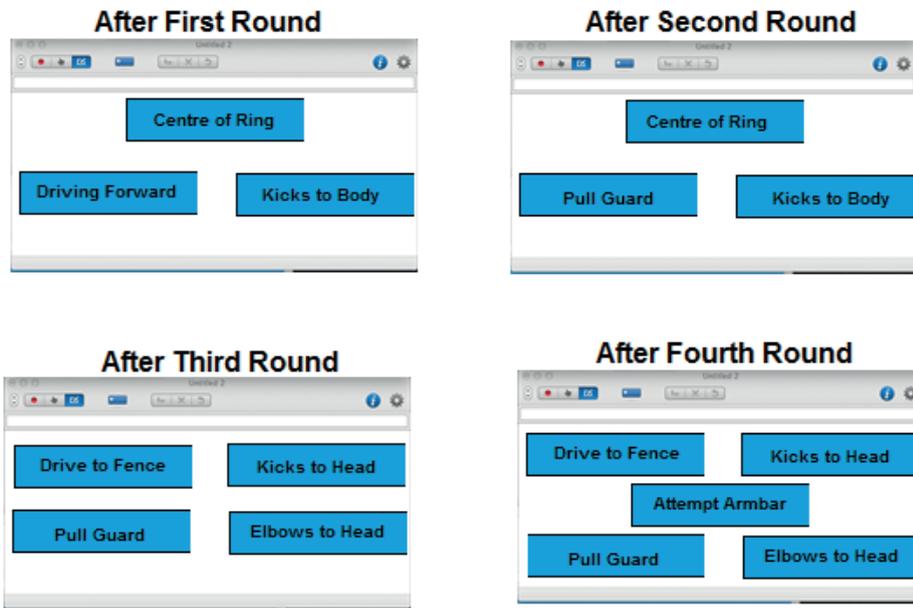


Figure 3. Example of coach feedback dependent code window formats

To measure the effectiveness of 'coach feedback translating into fighter action,' a feedback application grading system was used (Table 6). For example, if a fighter followed one out of three instructions, this was coded as a 2 (low application); if a fighter followed two out of three instructions, this was coded as a 4 (high application).

Reliability

Hughes and Franks' (2007) intra-operator percentage error calculation ($\frac{\sum(\text{Mod}(V_1 + V_2))}{V_{\text{totmean}}} \times 100$) was used to confirm the reliability of the coding of the nominal data collected. A single bout was coded four times, under identical working conditions, one week apart. The operator was 98% accurate in their reliability in terms of the behaviours coded (Table 7).

RESULTS

Coach Behaviour Analysis

Frequency of Coach Feedback. The quantity of feedback communicated by the coaches increased as the fight progressed. This trend occurred in each of the divisions coded (Figure 4).

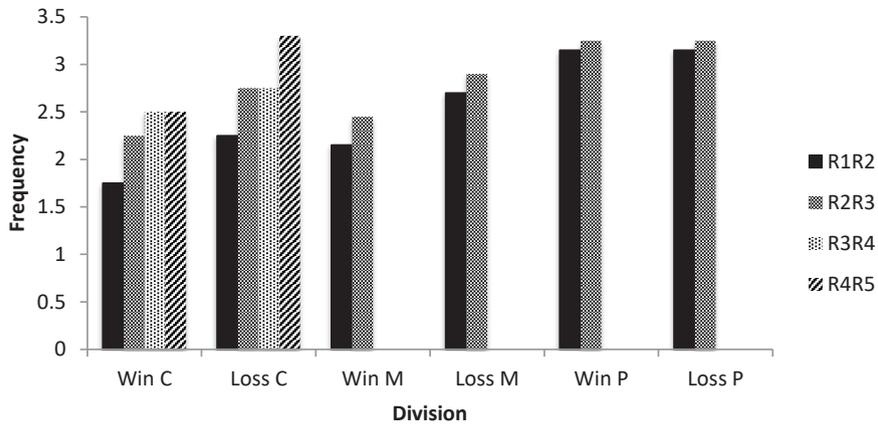


Figure 4. Frequency of coach communication per round

Coaches of losing fighters ($M = 2.95, SD = .6$) communicated more feedback than did winning coaches ($M = 2.57, SD = .72$). Preliminary division fighters received the greatest amount (40%) of feedback from their coaches, while championship and main card fighters received the same amount (30%). Because championship fighters have a maximum of five rounds compared to the main card fighters' maximum of three, championship fighters received less information relative to the other divisions.

Methods of Feedback and Divisional Differences

When fighter division is considered, coaches at championship level offered a greater proportion of verbal feedback, while the preliminary-level coaches used more combined (visual/verbal or verbal/kinaesthetic) feedback, although this association was not statistically significant ($p = .79$) (fig 5). There was no association between fight outcome (win/loss) and the method of feedback used ($p = 0.09$).

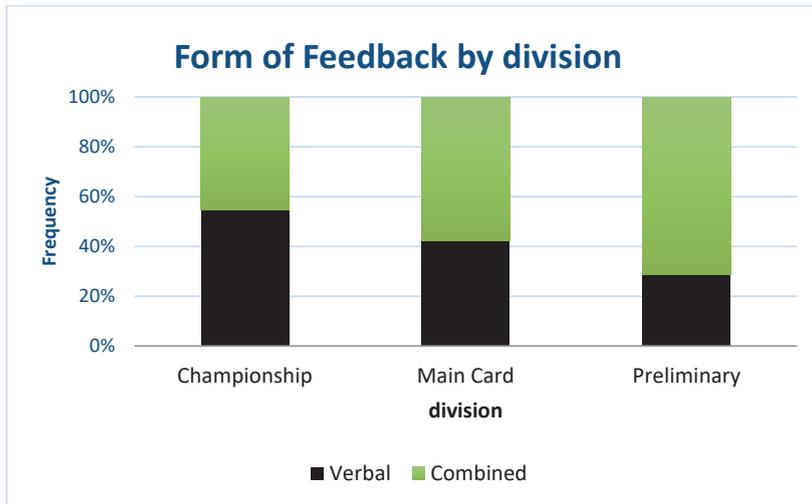


Figure 5. Percentage of form of coach feedback by division

Types of Coach Feedback

From the 36 fights coded, coaches used prescriptive feedback 50% more frequently than other methods of feedback. Descriptive and negative feedback were the next most frequent categories, with positive evaluation being the least expressed method of feedback. Championship fighters were the main recipients of prescriptive feedback (Figure 6).

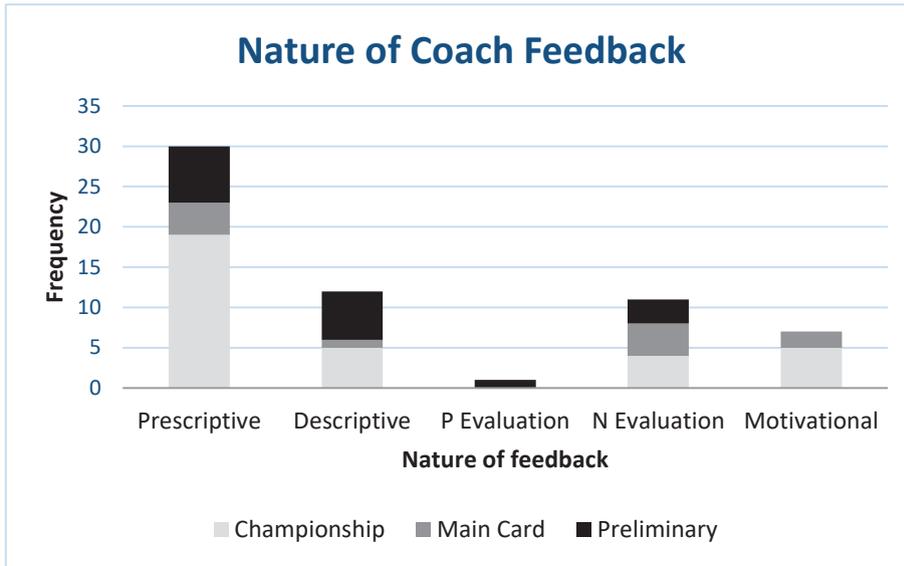


Figure 6. Frequency of Nature of coach feedback and fight level

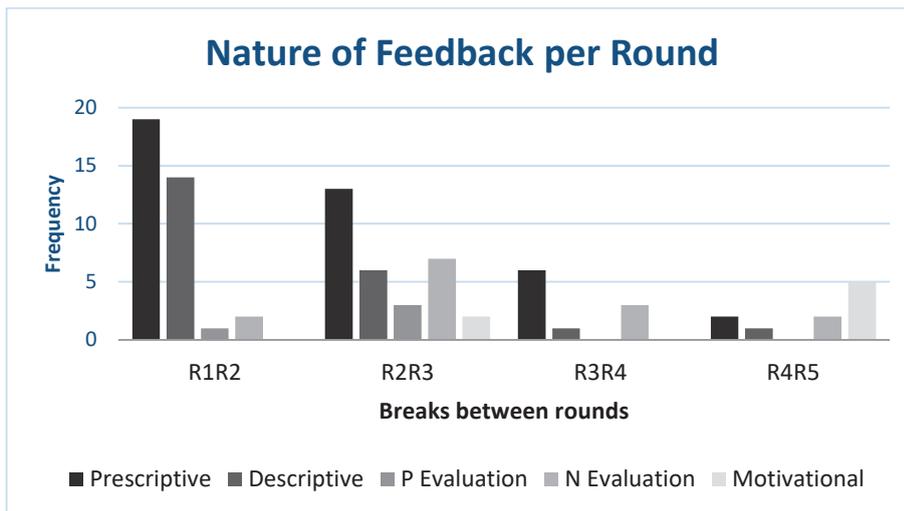


Figure 7. Frequency of Nature of coach feedback per round

This greater use of prescriptive feedback occurred during the first three 1-minute breaks (Figure 7). As a fight progressed, the feedback type used by the coach changed. Descriptive feedback was most frequently used during R1R2, whilst negative evaluative feedback increased in R2R3 and remained present in R3R4 and R4R5. Positive evaluation was typically used in R1R2 and R2R3, but not communicated in R3R4 and R4R5. Motivational feedback was communicated in R2R3 and R4R5, and was the method of feedback least used by the coaches.

Fighter Application of Coach Feedback

Outcome of Fight. Analysis by fight outcome showed that application of coach feedback made a significant difference. Winning fighters ($n = 44, M = 4.14, SD = 1.02$) were significantly more likely to have applied coach feedback ($t(86) = -2.87, p = 0.005$, two-tailed) than losing fighters ($n = 44, M = 3.56, SD = 0.82$). The magnitude of the differences in the means (mean difference = $-.57$, 95% CI $(-.96$ to $-.18)$ was moderate ($\eta^2 = .09$). Figure 8 suggests a trend of “reduced application of feedback” by losing fighters at each level of MMA.

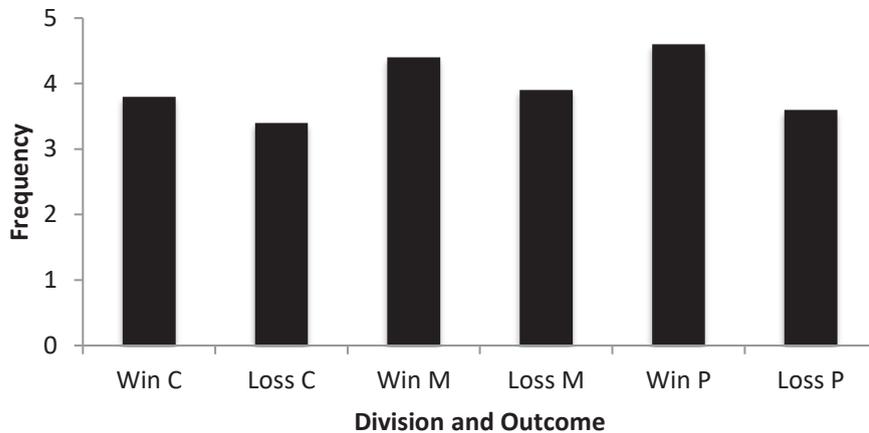


Figure 8. Mean frequency of information applied by the fighter (by division)

Influence of Particular Round

A paired-samples t -test evaluated the impact of ‘round’ on a fighter’s level of application of feedback. There was a statistically significant decrease in the application of coach feedback from the first round ($M = 4.47, SD = .56$) to the final round ($M = 2.5, SD = 1.18$), ($t(35) = 9.44, p = 0.001$, two-tailed). The mean decrease in application was 1.97, with a 95% CI ranging from 1.55 to 2.40. The η^2 statistic (.72) indicated a large effect size.

Mean information applied by fighters in all divisions showed a decreasing trend as rounds progressed (Figure 9). Negative trends were exaggerated as fighters proceeded through their fight, and these were particularly evident in the championship division. The greatest decline in the application of information was displayed by the losing preliminary division fighters.

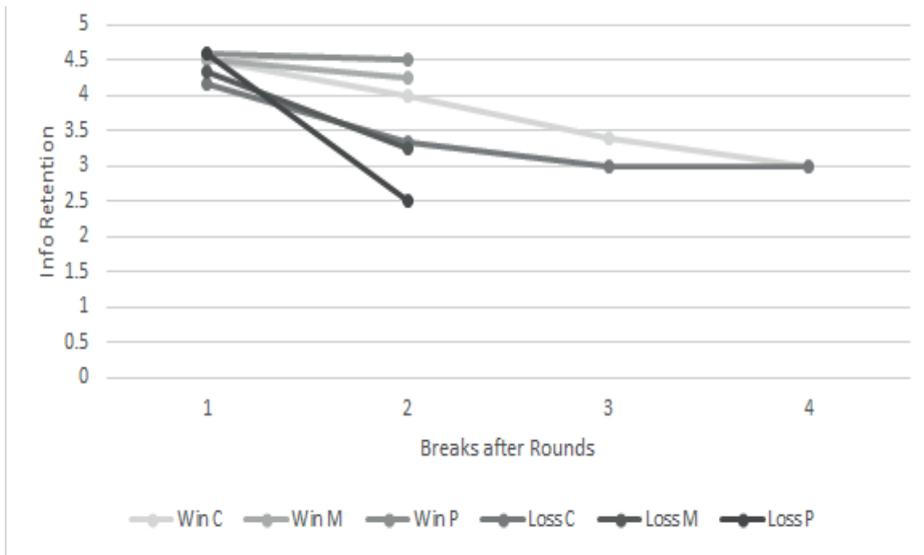


Figure 9. Fighter application of coach feedback

Although losing fighters were given more feedback than winners in the same division, they applied it less frequently – suggesting that the more feedback given to a fighter, the less information they applied (Figure 10).

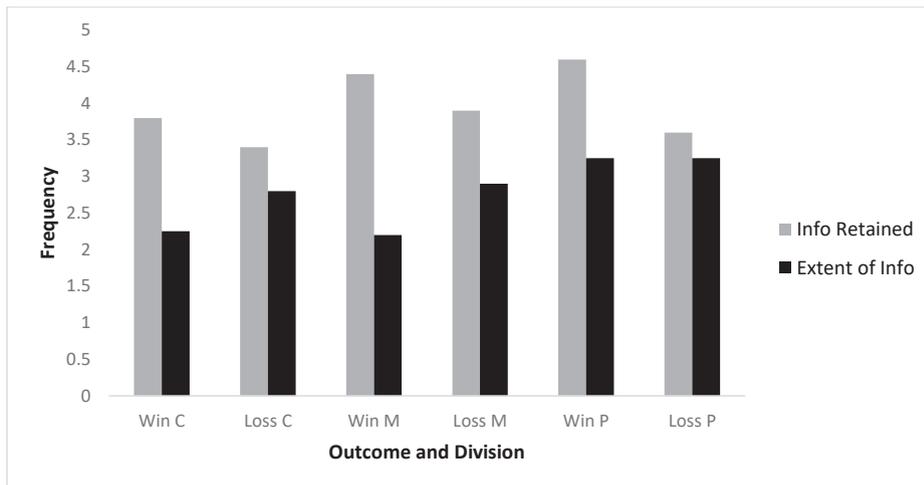


Figure 10. Quantity Fighter applied feedback and quantity of of coach feedback

DISCUSSION

The purpose of our research was to understand the type and method of coach feedback and fighters' application of this feedback, and to investigate its relationship with fight outcomes. The study was divided into two components – information application and amount of feedback offered. We considered that these two aspects could well determine whether the coach's instructions during a fight have an impact on the fighter's performance. In addition, further research was conducted to determine which type of feedback was most effective, with a view to establishing the optimal type and method of feedback delivery.

Fighter Information Application

The hypothesis for information application was that the more thoroughly the fighter applies the coach's feedback, the more likely the fighter is to win the fight. Results showed that as the rounds in a given fight progressed, the association between the instructions given to the fighter and their execution began to decrease. Such a staged decline could be caused by fatigue. Under these conditions, fighters' neuromuscular junction processes begin to slow down due to the extensive amount of energy expended (Marieb, 2012). Takahashi et al. (2006) concluded that muscle fatigue and recovery affect arm movement, especially during intensive exercise.

Our results also revealed that preliminary-level fighters applied the most coach information, possibly due to their lack of experience and knowledge compared to more seasoned fighters. This suggests that preliminary-level fighters rely more on their coach's decisions than their own.

These results contradict the findings of Januário et al. (2013) and Mesquita et al. (2008), who concluded that athletes unsuccessfully applied most of the information given by their coaches, and that feedback coherency was in inverse proportion to the number of instructions provided. Nonetheless, the present study has demonstrated the importance of feedback, as our results showed that winning fighters applied more information than did losing fighters. Thus, applying and adhering to the coach's feedback does indeed have an influence on a given fight, thus confirming our hypothesis. According to Grădinaru et al. (2014), sporting outputs are determined by several factors involving the athlete including motor memory. The more information applied, the more likely the fighter will win.

The Amount of Information Delivered by the Coach

Our hypothesis also stated that the more information given to a fighter, the more likely the fighter will win. Our results showed that the *quantity* of coach feedback increased per round. This could be due to the longer time the coach has to observe the fighter during the fight. According to Hughes and Franks (2007), information leading to the success or failure of a performance is crucial to the athlete. It can lead either to continued performance, if the outcome was successfully achieved, or a change in performance if it was not. Our results also showed that preliminary-level fighters were given the most information, further justifying the preliminary division's need for feedback due to less experience in the sport.

Losing fighters within all divisions had more information given to them than winning fighters. This raises the issue of information overload. In the integrated marketing communications framework (Kotler and Armstrong, 2010), exposure to an excessive amount of information containing different messages can cause an individual to become overwhelmed and confused, thus countering our hypothesis. In fact, according to the study (Figure 10), the fewer instructions given to fighters, the more information they apply; and the more information they apply, the more likely they are to win. This conclusion is backed up by the research conducted by Rosado (2008), who concluded that athletes had greater difficulty in applying information when that information was lengthy and poorly contextualised.

The Types and Methods of Feedback from Coaches

Following the completion of our research, additional analysis was conducted in order to expand on the information gathered. This examined the most effective and most common types and methods of feedback. According to our findings, motivational feedback was the least used, occurring only during the final break of a fight. This might be related to a concept known as combat motivation. First reported in soldiers, it describes the psychology of disciplined individuals in combat, in particular the revitalisation of an individual's fighting spirit during combat when given incentives to continue fighting (Kellett, 2013). Our results also revealed that combined feedback, involving information delivered both verbally and kinaesthetically (Mesquita, 2008), was used most in the preliminary fighter division. Once again, this underlines the need for more feedback for less experienced fighters.

Finally, our findings showed that prescriptive feedback was the most common type of feedback, pointing to performance errors and solutions to remedy them (Mesquita, 2008). By contrast, descriptive feedback identifies and encourages positive aspects of performance; according to Wrisberg (2007), this type is most suitable for experienced athletes, whereas prescriptive feedback suits less experienced individuals who require more detailed instruction. These considerations further develop the information gathered on the differences between seasoned and less experienced MMA fighters.

Limitations

The limitations of this study may have affected the accuracy and reliability of its findings. Firstly, the sample size of the study was restricted to 18 fights, involving 36 coaches and 36 fighters. This may not be a sufficiently representative sample to yield definitive results that would apply to all mixed martial arts situations. Secondly, the subjectivity of the individuals studied may have been a limiting factor, as each fighter thinks and behaves differently and each coach operates differently from their peers. Nonetheless, this study has identified some clear trends and conclusions regarding the influence of feedback on mixed martial arts fighters.

Applied recommendations for MMA coaches from this study could be summarised as: the fewer instructions given by the coach to the fighter, the more information the fighter will apply; and the more information they apply, the more likely they are to win.

CONCLUSION

This study of coaching behaviour in a mixed martial arts context has shown that less experienced fighters require additional feedback and instructions from their coaches compared to more experienced and knowledgeable fighters. Prescriptive feedback communicated visually and verbally is the most effective way to deliver this information. Most importantly, the less information given to the fighter, the more they are likely to apply it – and the more information they apply, the more likely they are to win the fight.

The conclusions drawn from this study can be practically applied to the sport of mixed martial arts and to general coaching strategies during combat sporting bouts. Our research has highlighted the value of feedback provision between rounds of a fight, as this has a definite influence on the outcome. Coaches should monitor the feedback they give to their fighters to ensure its effectiveness and efficiency. Further research should be conducted on this aspect of the sport. In particular, the optimal number of coaches engaged in providing feedback and the specific content of this feedback would be useful subjects for research in future studies.

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