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ORIGINAL ARTICLE

An exploratory investigation of traditional scoring in diving and relationships to the development of Artificial Intelligence opportunities

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ABSTRACT

This study investigated the conceptions of perfection that figure in the minds of divers, coaches, and judges. Additionally, consideration was given to their views of whether an Artificial Intelligence (AI) based scoring system could be relied upon to yield authentic results, allied with the desirability of its use. Six participants (2 each of diver, coach, judge) were interviewed. Following verbatim transcriptions, thematic analyses were conducted to identify commonly occurring themes relevant to diving and its scoring system. The results of this preliminary study have shown a leaning towards clarification of the rules on point deductions by FINA (Fédération Internationale De Natation/ International Swimming Federation). Furthermore, the concept of perfection in diving changes from country to country and culture to culture, providing further difficulties in the objectivity of judging and there was a call for openness and clarity. With the human element of judging carrying weakness and allowing for errors, subsequently, it was felt by the respondents that some parts of a dive should be measured with technology where feasible. There was a consensus that judges could not be fully replaced without substantive changes to the sport of diving, in effect losing the artistic element that is subjectively assessed.

K**eywords**: Performance analysis of sport, Perfection, Technology, Judging, FINA, World Aquatics, AI.

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INTRODUCTION

High level sport and the demand for excellence can be considered bedfellows, albeit what constitutes excellence continues to be debated (see Devine, 2022). Not in doubt is that excellence, as posited by Devine, is conducive to winning (within the permitted means) and is multi-dimensional, constituted by physical, intellectual, and volitional capacities (p.197). Yet, the literature has outdistanced excellence in the concept of perfectionism, with Hill, Jowett and Mallinson-Howard (2017) asserting that perfect performance and the perfect body are not only desirable, but are perhaps revered in sport, dance, and exercise. They recognise the healthy and defining character of perfectionism for elite performers as well as its more negative ramifications for athletes (e.g., Flett and Hewitt, 2014, 2016; Hall,2016). Working definitions of perfection include "*striving for flawlessness*" (Stoeber and Childs, 2011, p. 2) and "*demanding of oneself or others a higher quality of performance than is required by the situation*" (Hollender, 1978, p. 384). Thus, judging standards in artistic sports such as skating, diving, gymnastics, and winter and summer aerial sports (e.g., skateboarding and snowboarding) are set against the standards of hypothetical "*ideal (perfect) models*" of technical and artistic performance.

Perfection is a much-debated construct in philosophical literature (e.g., Breivik, 2010). However, this study was not intended to theorise perfectionism as a specific topic, but to draw on the sports literature for a working definition that is applied when judging sports by awarding points against defined and undefined values. Perfection in sports settings is context-dependent, therefore domain-specificity must be explored prior to the examination of perfection (Anshel and Eom, 2003; Dunn *et al*., 2005; McArdle, 2010). According to Dunn *et al*. (2005), the move towards domain-specificity is key when defining or assessing perfection. Perfection in football and diving, for instance, are modular and not comparable. One reason may be found in Best's (1978, pp. 101-103) distinction between what he calls aesthetic and purposive sports, the difference inhering in the respective relationships between means and ends. For example, in football (a purposive sport), the aim is to score goals, and as long as they are within the rules, the manner of their scoring does not matter. They all count equally. In aesthetic sports (such as diving, gymnastics, and skating) by contrast, the ends are inseparable from the means of their production. Skill is essential.

Moreover, perfection goes beyond being victorious in a contest or competition. Aesthetic sports performance is judged against a measure of suggested perfection, with maximal scores of 10 the "*gold standard*" of perfection in many of them. The most memorable example is Nadia Comăneci, the first gymnast to receive the "*perfect 10*" from judges (Comăneci, 2009; Stirling *et al*., 2020). Gymnastics no longer uses that scoring system, instead opting for an unlimited score, with difficulty marks providing infinite possibilities to raise score levels.

In the sport of artistic diving, judges are physically separated on the poolside, resulting in different perspectives while observing a dive. The exact physical differences depend on competition level, the number of judges, the layout of the pool, and other factors such as COVID-19 social distancing measures. This presence of such a variable contributes confounding factors to competition organisation and outcomes, bringing with it domain-specific judging. Such a phenomenon has never been investigated in artistic diving but given its presence and its potential impact on judging, there is a need for study, incorporating the views of competitors, coaches, and officials.

Presence of technology in sport

In attempts to minimise human error and provide greater transparency, some sports have already introduced video technology. Video Assistant Referee (VAR) was adopted by the International Football Association

Board (IFAB) and is now used extensively via a variety of technological systems (IFAB, 2018), while tennis has the "*Hawk-eye*" line examination system (Hawk-Eye Innovations Ltd., Sony Business Europe, Basingstoke, England) to enhance and sometimes replace the line judges who use the naked eye (Spitz *et al*., 2021; Yan and Xin, 2021). In some cases, the main aim of introducing AI was not to limit human error, but to assist with score prediction in sports or injury risk assessment/prevention (Li and Xu, 2021; Claudino, *et al*., 2019).

Artistic sports (Best's "*aesthetic*" sports), in which competition is not decided by distance or time measurement, have not yet used technology as a tool to assist judges. However, the revolutionary work of Fujiwara and Ito (2018) could create an outline for judging artistic competitions in the future. With the aim of improving fairness by removing human error and bias, therefore increasing the objectivity of a subjective system, a 3D laser technology has been created. The International Gymnastics Federation (FIG) tested the system in 2019 at the World Artistic Gymnastic Championship, and the final tests took place in Liverpool in late 2022 (Takaomi, 2021). The system is based on Artificial Intelligence. A scanning unit uses lasers to analyse motion, while joint position recognition software assesses angles of body segments such as arms, legs, and ankles. Finally, performance data is compared to database models, to create numerical data on similarities and differences of the angles of segments and deduct points accordingly. Critical review of the system was conducted, including interviews with judges, coaches, and gymnasts. The study identified possible benefits for gymnastics, as well as potentially negative impacts. Possible benefits included demystification of the sport, making it easier for the public to understand what is judged and why, and improvement of the validity and reliability of judging through the reduction of subjectivity. Possible drawbacks attached to the complexity of judging artistic components, with the majority of respondents believing that the AI system could not judge the artistic elements of gymnastics (Allen, *et al*., 2021). There were also concerns that the role of judges could be devalued, with consequences for recruitment and retention. Additionally, concerns were noted around potential impacts to some of the sport's traditions (Allen, *et al*., 2021).

Other concerns surface when the current scoring rules are considered with rules and point deductions being based on pictorial illustrations and vague descriptions (Fujiwara and Ito, 2018). However, descriptions include point deductions for "*slight bend*" or "*strong bend*", which are not yet possible to identify with present technology.

Judging in the sport of diving

In diving, similar issues are present and similar clarifications are necessary before consideration of technology as an addition to or a replacement for judges. For example, the Diving Officials Manual (2017-2021) of the Federation Internationale de Natation (FINA, 2020) describes a dangerous dive as a dive in which the diver's head is "*unsafely close*" to the platform or diving board. This is a subjective measure and marks will be deducted according to a judge's perception of what is "*unsafely close*". Likewise, deductions (Table 1) for faults such as "*insufficient height*" or "*off to the side*" without hitting the platform or springboard' are "*according to own opinion*".

Since competitive diving is a sport in which the notion of perfection is salient (judges can award a "*perfect 10*"), and a sport with demands for greater transparency and accuracy in judging, this study was designed to investigate the concept of perfection in diving. With the advancement of technology in sport, there is a growing need to consider conceptions of the potential role(s) of Artificial Intelligence (AI) in offering greater transparency and fairness in diving competitions. This study had three research questions (RQ):

RQ (1) What are the conceptions of perfection that figure in the minds of divers, coaches, and judges?

RQ (2) According to divers, coaches, and judges, would an AI-based scoring system be able to capture perfection in a dive and therefore be relied upon to yield authentic results?
RQ (3) According to divers, coaches, and judges, what is the final desirability of an AI-based scoring system?

Table 1. Judges guide for points deductions during the flight of a dive (from FINA, 2020).

Fault	Range of deduction
Insufficient height	½ to 2 points
Dive is too close to the board (but does not hit the springboard or platform)	According to own opinion
Dive is too close to the board with the head (but does not hit the springboard or platform)	2 maximum awards
Diver hits the springboard or platform with feet or hands (does not affect the dive)	According to own opinion
Diver hits springboard or platform with the head	2 maximum awards
Dives off to the side (would have hit springboard or platform with the head and would have affected the dive)	2 maximum awards
Dives off to the side but would not have hit springboard or platform	According to own opinion

METHODS

Participants

Following ethical approval from the University of Sunderland Research Ethics Group (number 011065), purposive sampling (Bernard, 2002) was employed to identify and recruit participants. Participants were sent an outline of the study, including its aims and the means by which anonymity would be ensured. If comfortable with the details, participants were asked to sign and return an Informed Consent form.

In accordance with Mears (2009, cited in Allen *et al*., 2021), six participants (3 male, 3 female) were recruited for interviews. They had to meet criteria. First, participants were needed from the categories of judge, coach, and diver (albeit these distinctions can be fragile in practice, given the common plural occupation of roles across careers in diving). Second, participants had to cover as wide a base of competition level, location, and culture as possible. This, again, is because conception of ideal technique and understanding of the scoring system differs depending on competition level, culture, and location. (Divers, coaches and judges from Russia, China, Australia, and the UK, for instance, will all have different respective conceptions of the perfect dive.) Therefore, the participants came from a range of countries, including the UK, New Zealand, Australia, Hungary, and the Netherlands. Two participants worked for local diving clubs, representing grassroots diving. However, as the possible presence of perfectionism is more common in elite sports, the remaining four participants had Olympic experience, with a total of 11 appearances (diver or judge) between the 1980 and 2020 Olympic Games. The participants, moreover, included an Olympic gold medallist, a FINA judge, a FINA educator, a technical diving committee member, a European Championships competition director, and a Judge Evaluator (see Table 2). (Researchers were aware of the nationality of each competitor but have excluded that from the table to safeguard anonymity).

Data collection

A qualitative design was employed to collect, compare, and analyse descriptive data, gathered from semi-structured interviews. The advantages of using semi-structured interviews have been outlined by Wilson (2014) cited by Allen *et al*. (2021) as the method offers a form of structure while allowing flexibility for new insights from interviewees. The interviews were conducted online (Zoom Video Communications, Inc., San

Jose, California) due to geographical limitations and the need for social distancing due to COVID-19. An *aide-memoire* / topic guide (Irvine, Drew and Sainsbury (2013) was employed to steer the interviews, which were audio recorded to ensure accuracy for subsequent *verbatim* transcription.

Table 2. Participants' personal details.

Participants	Sex	Age	Current Role	Highest personal competition level
P1	F	59	Judge	Olympic Games
P2	F	49	Coach	National
P3	F	32	Diver	Olympic Games
P4	M	40	Judge	Olympic Games
P5	M	53	Coach	International
P6	M	34	Diver	Olympic Games

Data analysis

Following the six steps set out by Braun and Clarke (2006), inductive thematic analysis of the interview transcripts was conducted by the first and third author, to identify commonly occurring patterns and themes (Joffe, 2012; Braun and Clarke, 2014; Maguire and Delahunt, 2017). We first familiarised ourselves with the data by reading and re-reading the responses. Codes were next identified independently by both authors, and subsequently themes were created. In the fourth step the themes were reviewed, and in the fifth step they were named. Subsequently, meetings were held between all three authors, where the themes were reviewed and discussed until a consensus was reached. Finally, the themes were written up by the first author, checked by the third author, then reviewed by the third author. Although coding is subjective and interpretative, and coding by multiple individuals is not necessary to enhance rigour (Braun and Clarke 2019), we felt it important that at least two researchers be involved in the analysis. The study was reported according to the Standards for Reporting Qualitative Research (SRQR) (O'Brien *et al.*, 2014).

RESULTS

Following *verbatim* transcription of the interview recordings, a total of 16, 435 words were presented for analysis using a hybrid approach of inductive and deductive methods, as outlined by Fereday and Muir-Cochrane (2006).

The study was designed to consider the *Concept of Perfectionism* [in diving], based on the participants' backgrounds and experiences, as well as to consider their views of *Acceptance of Technology* [AI]. Those two constructs became General Dimensions, under which all themes and categories would be allocated. One hundred and thirty-nine meaning units were identified. These were distilled to 19 themes, which were reduced to 8 categories.

Under the General Dimension of *Concept of Perfectionism* four categories were identified: y "*Attainability?*" "*Influencing Factors*", "*Terminology*", and "*Appropriateness*". Similarly, *Acceptance of Technology* elicited four categories: "*Positive Aspects*", "*Negative Aspects*", "*Logistics*", and "*Regulatory Issues*". Each of the eight categories held between one and five themes (see Figure 1 for fuller descriptions and Figure 2 for exemplar statements of each theme).

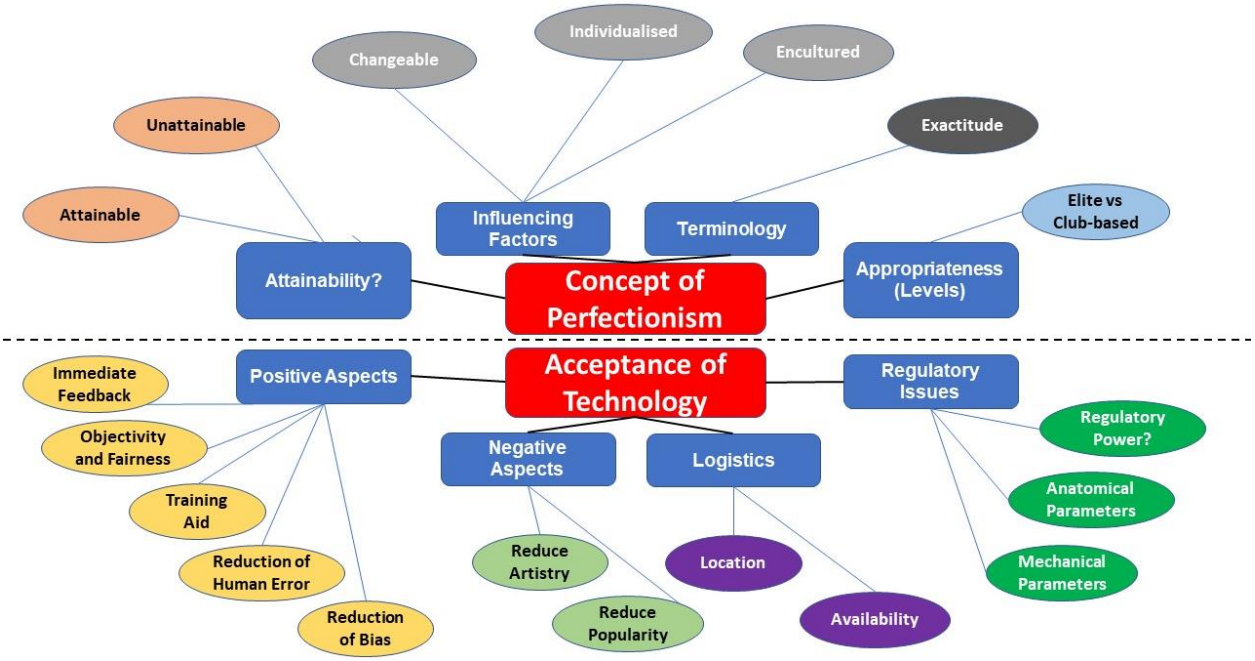

Figure 1. Diagrammatic representation of the findings following analysis of semi-structured interviews with divers, coaches, and judges showing General Dimensions of Concept of Perfectionism and Acceptance of Technology each with four associated categories and their relevant themes.

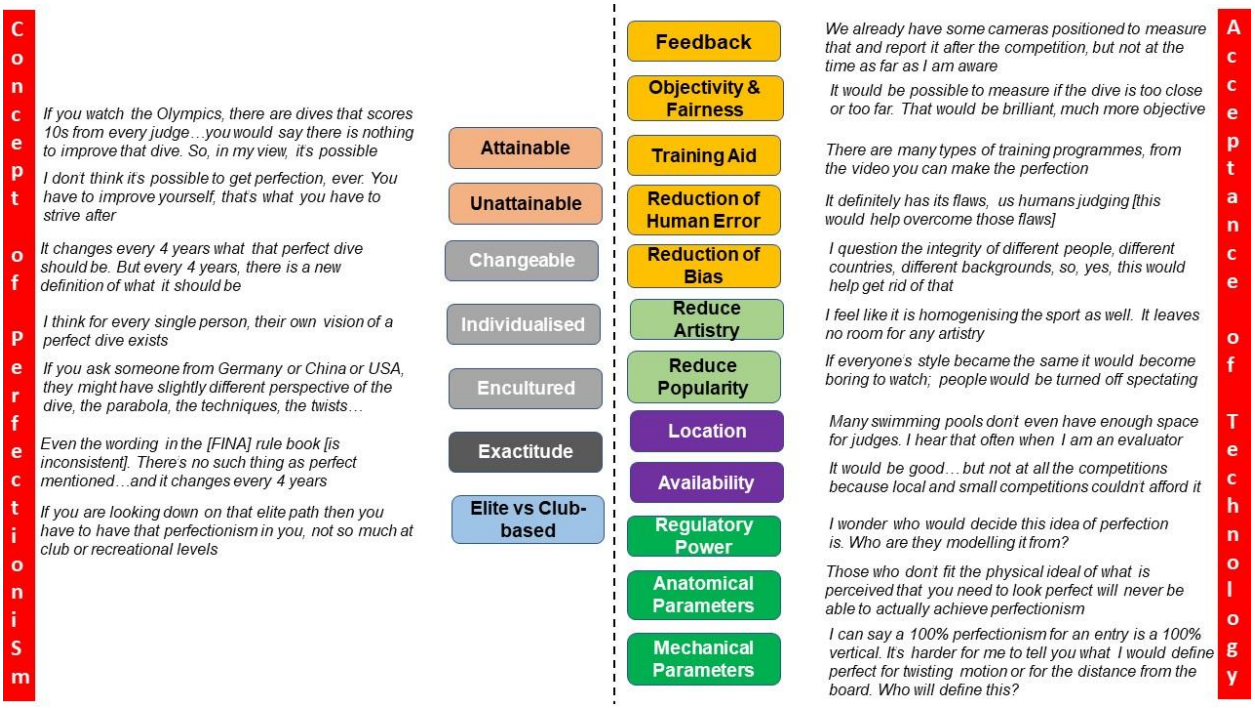

Figure 2. Diagrammatic representation of the findings following analysis of semi-structured interviews with divers, coaches, and judges showing General Dimensions of C*oncept of Perfectionism* and *Acceptance of Technology and* associated themes with exemplar statements. To provide a logical presentation of the data, results are organised to reflect the research questions intimated at the outset.

RQ (1) What are the conceptions of perfection that figure in the minds of divers, coaches, and judges?
The key research findings indicated that the majority of participants do not believe that the perfect dive exists. On the side of the non-believers, Participant 3 stated candidly: "*I think there is no perfection… there is always something you can improve on.*" Participant 2 also responded negatively: "*No, you can always dive a little bit higher, there is always something that can be improved. Even if it appears to be a perfect dive*." However, the same participant then backtracked:

> *Would you say that the perfect dive is watching a computer simulation of it? And if so, I think there have been dives that have kind of followed that exact form and pattern. So, yeah, I think there probably is [such a thing as a perfect dive].* (Participant 2).

Participant 6 was less confused:

> *Technically, I think I could describe to you what a perfect dive should look like, and I could probably see [in my mind's eye] or recognise one if it was performed, but I have never seen one and I am not sure that it can be performed.*

An Olympic gold medallist diver proposed it is an "*empty pursuit*", suggesting that athletes should aim, not for perfection, but for excellence.

RQ (2) According to divers, coaches, and judges, would an AI-based scoring system be able to capture perfection in a dive and therefore be relied upon to yield authentic results?
Participants did not see a way for a computer to judge the artistry of the sport, potentially reducing the role of AI in judging.

To a direct question about whether AI should be used as an additional tool, Participant 2 responded:

> *I think it would be great as an addition, but I would hate to take the people out of judging, as it [AI] couldn't judge artistry.* (Participant 2)

This was reinforced by Participant 6:

> *There are certainly things that AI could look at, but there are things it would miss. The overall impression [of a dive] for example.* (Participant 6).

Participants were also asked for any areas that they felt AI might help, given consensus that, due to difficulties with artistry, technology could not be employed for analysing and scoring the total dive. Participant 3 noted:

> *Perhaps dangerously close dives could be measured and identified with the help of technology, therefore assisting judges. I wouldn't say no to that.* (Participant 3).

Participant 1 also suggested using laser technology as an additional tool to help with measurements difficult to see with the naked eye:

> *If we agree how many centimetres from the board is acceptable, then they can put the laser in. This I can more imagine than dive by dive analysis.* (Participant 1)

However, most participants, as elaborated in Figure 2, would find some technological innovation to be a great tool to help the decision-making of the judges. Some key elements of diving could be better analysed, though (again) rules and point deduction protocols ought to be clarified by FINA beforehand.

RQ (3) According to divers, coaches, and judges, what is the final desirability of an AI-based scoring system?

Participants agreed on the benefits of technology as an addition. However, issues around the availability and trustworthiness of any technology were raised. This first question about availability was addressed by several participants, most of whom were supportive, but with caveats:

> *I think in this case, it would be good… but not at all the competitions because local and small competitions cannot use it, as the cost would be prohibitive.* (Participant 1).

The issue of availability was a concern with Participant 3, who commented that cost could be a limiting factor, with the impact felt not only in competition, but potentially in training environments:

> *As introduction of laser technology or AI-based programmes will be costly and nations where diving isn't funded or supported as much may be at a disadvantage. This hits competition and training venues.* (Participant 3)

There were some practical issues that also caused concern:

> *I don't know if it would work, but I fear that it would take too long... Especially in diving, we have 50-60 divers, times 6… so it's 300 dives. I don't know if it is sitting minutes and hours to analyse it.* (Participant 1)

Further concerns about practicality considered the divers, coaches, and spectators:

> *The trouble with diving is that people always liked the scoring system. The public… because it was so quick compared to gymnastics and ice-skating. (Participant 5)*

Suggestions were mooted that competitions would lose a valued cultural atmosphere if judges were not in attendance. Participant 2 vocalised this sentiment:

> *In my opinion, I think that would be great to have in addition. But I don't think… there is just something nice about the judges being there and seeing the real thing going on. (Participant 2)*

Worries were also expressed about losing the individual nature of diving if AI took over:

> *You know, I feel not quite resistant [to the introduction of AI], but I am slightly reluctant to introduce something like this because… then I feel like it is homogenising the sport as well. (Participant 6)*

But there was positivity:

> *I mean, during the pandemic, tennis used no linesmen and used a technology for it. I feel like diving has been a little bit stagnant; we haven't embraced as much technology as we possibly could. (Participant 4)*

DISCUSSION

There is a need for domain-specificity when conceiving perfectionism in sport (Anshel and Eom, 2003; Dunn *et al*., 2005; McArdle, 2010; Haase *et al*., 2013). Sports are different; therefore, the conception is not a "*one-size fits all*". Perfectionism in diving has been found related to athletes' mindsets, as well as scores, according to Olympic divers and judges. Findings suggest that an existing perfect dive is a misconception, due to personality and cultural differences with study participants implying major differences in techniques, from country to country and culture to culture. According to the Olympic gold medallist diver, it is easy to distinguish

a Chinese diver's style from a Russian's (a Russian diver "*kicks out differently*"). Such dissimilarities may cause problems when determining the perfect dive and building a computer-based system around that ideal model. Whose ideal model would be selected? Moreover, FINA tries to implement modifications, clarifications, or removal and addition of rules in each FINA cycle (four years), and slight rule changes would be likely to cause extreme difficulties in "*older*" dives. A dive that resulted in a score of 10 from a judge eight years ago would be unlikely to receive the same scores today. And the database does not store previous dives, as the new rules prohibit comparisons. The personal preference of judges, the cultural and technical differences in styles and execution, and the FINA rule changes all suggest the inadequacy of an AI-based scoring system in diving.

Participants implied that the subjectivity of the system does not equal weakness. However, research suggests otherwise. Figure skating has been in the spotlight due to the controversial events at the 2002 Winter Olympic Games (Cheng, 2013; Zitzewitz, 2014; Lom, 2016). The pairs' figure skating event had suspicions of wrongdoings, officials were later suspended, and the scandal led to the introduction of the more objective ISU Judging System (Van Veen, 2012). Consequently, the possibility of organised scandals in artistic sports was heavily reduced.

Further results show the importance of context within judging. Scores are substantially impacted according to whether one is judging, for instance, children, juniors, amateur or elite competitors. According to the participants, the scores are not comparable, as the context of the dive is ineliminable. For example, a dive that receives a 10 is merely the best in *that* competition, with *its* rules and broader context of adjudication. The scores of a dive at Tokyo 2021 (for example) should not be compared to the scores of a dive at Athens 2004.

Other findings are supported by Allen *et al*. (2021). Artistic elements are difficult to judge with computer technology. Participants have revealed that technology might struggle to identify the perfect spin, twist, parabola of the dive or the ideal time spent in the air. These components of a dive are subjectively measured, and it might not be possible to measure them numerically, due to the different techniques, body shapes and styles of divers from different countries. Nevertheless, there are feasible ways to include technology as an addition to traditional judging methods. First, the degree of entry may be measured, and judges could receive a quantitative result, which can ground point deductions, in turn strengthening the objectivity and fairness of results. One participant suggested that judges should be experienced enough and disagreed with the need for technology to measure the degree of entry. However, human errors are inevitable. Therefore, this study supports the introduction of a more accurate technological system to analyse the entry. Second, if a diver's head is dangerously close to the board, the dive should not exceed a score of 2 (Figure 1). Once rules are clarified, technology ought to measure the distance between the platform or springboard and the diver's head at all times during a dive. If the head enters the "*danger zone*", judges should be notified. This technological modernisation is pending, with OMEGA (see www.omegatiming.com), the official timekeeper of the Olympic Games (Featherstone and Tamari, 2019), prioritising safety and fairness. By introducing computer technology to measure the distance between the head and the board/platform, the safety of participants could be ensured. There are other, potentially pioneering OMEGA proposals. A joint recognition software could analyse motion and posture, such as bent knees in pike position or open knees in tuck position. Finally, OMEGA aims to look at the point of entry and horizontal displacement from the board/platform. While investigating the point of entry, joint recognition may be used to compare divers to the ideal model (100% vertical). These steps should be regarded as the first towards the introduction of technology in diving. OMEGA differs from other companies, as their technology offers live metrics with extremely fast information

processing (which could enhance fan entertainment). Further tools may be implemented, although current FINA rules and point-deduction descriptions would substantially impact innovations.

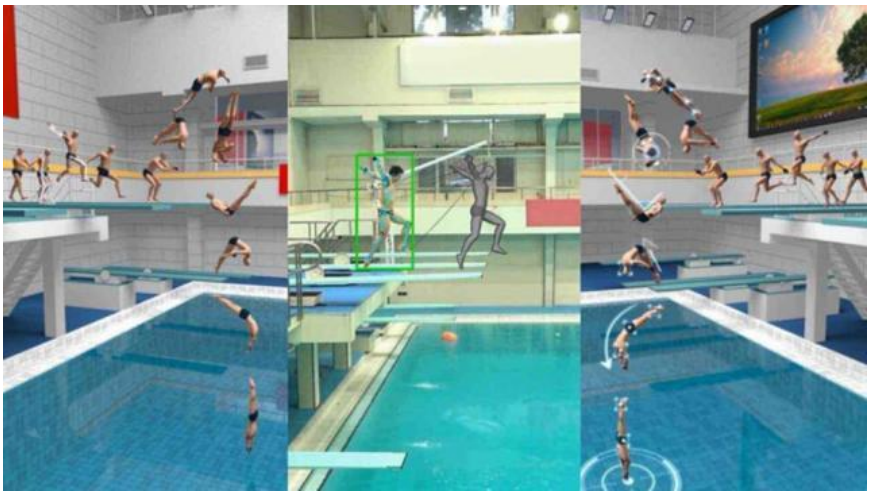

Figure 3. Baidu's AI-based training system (Zhang, 2021).

The innovative technology of Baidu (see www.baidu.com) should also be examined. The giant technology company created a training system to help the national diving team of China (Zhang, 2021). The company's high-speed video provides real-time feedback to coaches about the angle of joints and the posture of divers. Baidu's technology captures in 2D before estimating the posture and the angle of joints in 3D on coaches' tablets (Figure 3). There is currently no relevant literature that explores the advantages and potential of the system. However, it is believed to be used only for training purposes and could not be used for judging yet. Coaches are still required to decide what the perfect motion should look like.

The nearest theoretical idea comes from the concept of Action Quality Assessment (AQA). AQA can assess how well an action is performed. However, complications surface in the context of diving (Kim, 2021) due to the nature of the sport and the complicated point deduction system; capturing motion and pose estimations are not enough. Consequently, Kim (2021) suggested the use of spatiotemporal features, while Parmar and Morris (2019) recommended a multitask learning (MLT) approach to judging a dive. With MLT performing better in capturing the quality of action (Parmar and Morris, 2019) the current authors suggest that it could possibly lead to future innovation in sports where a subjective judging system is used.

While Baidu's training system could be modified and advanced, participants remain against the introduction of a fully automated scoring system. Homogenising the sport would take away the freedom, creativity, and flair of the divers. It would become boring to watch, as every diver would aim for the same robotic routine. This could undermine the popularity of the sport.

The Human factor

Though subjectivity in the scoring system was found to be attractive in ways, issues regarding the "*human factor*" are indisputable. Latimer (2020) explains how the processing of "*complex information in a condensed timeframe*" exceeds human capabilities. Humans make mistakes. In some cases, these are down to limited experience or immense pressure. In other cases, incorrect scores are associated with explicit biases, especially liable where performances are judged on a subjective basis. Such biases have been identified by previous literature (Leskošek *et al*., 2012; Leandro *et al*., 2017; Latimer, 2020). Latimer (2020), again,

separates explicit biases into nationalistic and reverse nationalistic. One of the participants (details withheld to assure anonymity) cited the latter, having observed a sudden change in scores after changing nationality. Though the diver has improved, the change of flag next to the name resulted in slightly lower scores in the European and World Championships. Therefore, wrongdoing can be seen, confirming Houston (2022), at even the highest level of diving. FINA has taken the remedial measure of having neutral panels of judges for finals.

Limitations and recommendations for future research

Conception of the perfect routine changes from country to country and culture to culture. Sample size and demographic seems to be this study's greatest limitation. The study did not include divers, coaches, and judges from North or South America, Africa, or Asia. To improve reliability and validity of the findings, future research should include a wider range of countries, which would deepen understanding of the perfect dive and unveil the best way to introduce technology into diving. Investigation of media personnel, equivalent to Allen *et al.*'s (2021) gymnastics investigation, could augment the findings. Finally, when technological tools are investigated, cost-related advantages and disadvantages must be considered. Introducing expensive technology to diving might widen the gap between countries, due to availability or funding. More advanced countries might have a greater advantage in practising with expensive technological devices. Consequently, researchers should consider cost-effective alternatives.

CONCLUSION

A need for innovation has been outlined by participants in this study. Further research and examples from sport (e.g., figure skating in 2002, discussed in Zitzewitz, 2014) also suggest the need to improve the objectivity of the scoring system in artistic sports. AI is yet to measure motion and judge complex movement patterns, as the constantly changing and culture-relative "*perfect*" routine seems difficult to describe. Nevertheless, technology should be used as a tool to assist the judges. Combining the radical proposals of Baidu, OMEGA, and Fujitsu (Fujiwara and Ito, 2018) can lead to the reduction and possible elimination of bias and subjectivity. Issues regarding the current scoring system derive from the uncertain and vague FINA rules. Therefore, the federation must clarify their rules and point deduction system. It must elucidate terms such as "*unsafely*" or "*insufficient*" and assign numerical values to allow computer technology to judge and score dives. Again, the database of dives and their tariffs change over time, meaning investment is needed to ensure that tariffs are updated accordingly. Technology can then be implemented, not to replace but to assist judges. Diving would then not only be fairer but be seen to be fairer.

AUTHOR CONTRIBUTIONS

Conceptualisation of project: Simon Jakab, Paul Davis. Literature review (including write-up): Simon Jakab, Paul Davis. Data collection: Simon Jakab. Data analysis: Simon Jakab, Ian Whyte. Write-up: Simon Jakab, Paul Davis, Ian Whyte. Editing: all authors.

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