

# Tortured phrases in sport-related literature

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## SHORT COMMUNICATION

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## ABSTRACT

There is interest in appreciating if 'tortured phrases' (i.e., odd linguistic phrases in scientific literature that purportedly show technical explanations, but which actually are nonsensical or difficult to interpret) exist in the sport literature. To gain an appreciation of this phenomenon, the Tortured Phrases Detector of the Problematic Paper Screener (PPS) was consulted on 9 September 2023, revealing 160 results. After manual screening and filtering, 54 papers related to any aspect of sport (as assessed by papers' titles) were examined, in consultation with their entries at PubPeer (if available) to appreciate the level and extent to which tortured phrases have infiltrated the sport literature. Of the 54 papers examined, 41 were retracted (or withdrawn) to date (11 July 2024), mostly from Elsevier's *Microprocessors and Microsystems*, but none indicated tortured phrases as an explicit reason for retraction in their retraction notices. Even though the absolute volume of papers with tortured phrases is tiny relative to the wider body of sport-related literature, that argument is countered by noting that these 54 papers had already, at least until 6 October 2023, collectively been cited 449 times, suggesting that imperfect or fraudulent science tainted by tortured phrases has already begun to permeate the wider sport science literature.

### Keywords

*communication, editorial oversight, ethics, plagiarism aversion, reproducibility*

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## The integrity of sport literature

There is a very small, but dedicated, literature focused exclusively on the integrity of sport literature, which has some serious integrity issues, as exemplified by 237 or 908 items with retractions and/or expressions of concern in the topics “Sports Science” or “Sports and Recreation,” respectively.<sup>1</sup> The very first analysis of retractions in the sport literature assessed 52 papers, eight deriving from the *Journal of Applied Physiology*, noting that 61% were associated with misconduct, while 39% were labelled as honest error (Kardeş et al., 2020). In kinesiology research, some of the questionable research practices include publication bias, exploratory research that is reported as confirmatory, post hoc hypothesizing (or HARKing), excessive self-citation, and data fabrication (Tiller & Ekkekakis, 2023). Sports researchers also need to reflect on proper experimental design and statistical analyses (Bernards et al., 2017). From 129 original research papers published in four top-ranked sports journals, (Büttner et al., 2020) found that the primary study hypothesis in about 26% of them was only partially supported by the results, raising the alarm about three questionable research practices (HARKing, P-hacking, and cherry-picking). Given the wide-ranging problems with statistical analyses in sports research (McLean et al., 2021), some have suggested the need to collaborate with statisticians when publishing sports research (Sainani et al., 2021). Some sports journals have seen a marked increase in submissions, with several authors not having noble publishing objectives, requiring jour-

nal editors to raise the bar and fortify ethical screening procedures (Abt et al., 2022). One of the important tasks that editors and peer reviewers have is being able to distinguish valid science from pseudoscience (Tiller et al., 2023). Such practices would involve the implementation of more transparent research practices (Caldwell et al., 2020; Schulz et al., 2022). Gaspar and Esteves (2021) advocate for the need to better appreciate misconduct within sport science. To meet that end, and given that one of the ultimate aims of sports researchers who publish is to have their work cited (Khatra et al., 2021), the objective of this short communication is to bring to the attention of the sport science community a relatively new phenomenon that straddles the line between poor scientific writing practices and, in some instances, misconduct.

## Tortured phrases: A brief introduction

In this paper, focus is placed on an issue that has not yet – to the author’s knowledge – been formally addressed in the sport literature or by the sport scientific community: a linguistic and ethics-related phenomenon, ‘tortured phrases’, which can broadly be described as odd phrases that purportedly show technical terms in the scientific literature, but that are not, and may have arisen from imperfect translation or reverse translation, one reason being the desire of the authors of those papers to avoid plagiarism being detected, but instead resulting in non-sensical text (Cabanac et al., 2021). In biomedicine, the presence of tortured phrases not only negatively impacts the specificity of writing. If these terms are used by early career researchers or others who might have limited experience, they might copy and/or cite such incorrect terms, thinking that they are accurate (Teixeira da Silva, 2022a). Authors of papers in which tortured phrases appear are to blame, but so too are journals that claim peer-review and stringent quality control as they might not be completing proper peer review or other processes (e.g., copyediting) associated with careful screening of the content of papers they publish (Moradzadeh et al., 2023), to determine whether they contain tortured phrases (Teixeira da Silva, 2022b).

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1. <http://retractiondatabase.org/RetractionSearch.aspx> (last accessed: 11 July 2024). Disclaimer: entries taken at face value as a crude barometer, and not verified for accuracy, false positives, etc., nor were overlapping entries between these two categories assessed. That database primarily indexed retractions and expressions of concern, but errata/corrigenda also appear. It is also noted that these values were 175 or 539, respectively, on 12 September 2023, and 183 or 561, respectively, on 6 October 2023, suggesting that for some reason, there has been a sharp increase in retractions recently.

No scientific field is immune to being “infected” by tortured phrases, such as neuroscience (Teixeira da Silva, 2023a; Teixeira da Silva & Daly, 2023). While not always the case, the presence of tortured phrases in an article might reveal a deeper set of ethical issues (Else, 2021), including the undeclared use of revision or translation services (Kendall et al., 2016; Teixeira da Silva, 2021; Teixeira da Silva et al., 2024). For this reason, tortured phrases can serve as an epistemic marker (or identifier) of potentially wider ethical infractions (Teixeira da Silva, 2023b). Tortured phrases are not limited to peer-reviewed literature, and might also be prevalent in preprints, i.e., non-peer-reviewed literature (Teixeira da Silva, 2023c).

## Probing for tortured phrases in the sport literature

To determine whether any papers, preprints, congress papers, or book chapters might contain tortured phrases, the Tortured Phrases Detector of the Problematic Paper Screener (PPS) was searched on 9 September 2023 using “sport” as the keyword (Cabanac et al., n.d.). This search yielded a total of 160 results, which were manually screened to identify, from titles, whether the articles were truly related to sport, or not. Following this filtering process, a body of 54 candidate papers was identified (Table 1). Of these 54 documents published between 2020 and 2023, 87% were articles (the rest being book chapters, preprints and proceedings papers), while 41 (76%) were retracted (or withdrawn). The latter status and corresponding statistic was last assessed on 11 July 2024. The highest incidence of tortured phrases was in Elsevier journals, followed by Springer Nature, mostly in *Microprocessors and Microsystems* and *Arabian Journal of Geosciences*, with a history of association with manipulated peer review as well as incompetent guest editors of special issues, leading to mass retractions.<sup>2</sup> Fake, improper or

2. <https://retractionwatch.com/2021/07/12/elsevier-says-integrity-and-rigor-of-peer-review-for-400-papers-fell-beneath-the-high-standards-expected/>; [manipulated peer review, especially of special issues, is an issue that is plaguing the integrity of the scientific literature \(Rivera & Teixeira da Silva, 2021\). According to PPS, these 54 articles had accrued 449 citations until 9 September 2023. None of the journal titles are related directly to sport. Although the papers are on topics related to sport, mostly via an applied prism \(e.g., detection of movement of sportspersons, image analysis, etc.; see column 1 of \*Table 1\*\), the vast majority were published in journals or books covering other specialties \(e.g., computer science\).](https://retraction-</a></p></div><div data-bbox=)

## Conclusion and limitations

Authors in the sport sciences need to appreciate that when using online thesauruses or other software that might be used for reverse translation (e.g., QuillBot<sup>3</sup>), the selected output text might not always have the same and desired technical meaning. The English term to substitute the word might be correct in a broad sense (*sensu lato*), but incorrect in a strict technical sense (*sensu stricto*), i.e., technically or scientifically. Related to this broad versus narrow sense of linguistic terms in scientific writing, it is the responsibility of editors (specifically editors-in-chief) or journal management (including copyeditors employed by the journal or publisher) to ensure that once papers are accepted for publication, they are properly copyedited and screened for nonsense text, such as tortured phrases. Even if such papers have already been accepted for publication, if tortured phrases are detected at the copyediting stage, editors are obliged to pause the processing and publication of that paper, and initiate an investigation, including of the peer reviewers, to assess fully why the authors employed such terms, and why peer review failed to detect them. This study only provides a very small window of appreciation of this

[watch.com/2021/07/19/tortured-phrases-lost-in-translation-sleuths-find-even-more-problems-at-journal-that-just-flagged-400-papers/](https://retractionwatch.com/2021/07/19/tortured-phrases-lost-in-translation-sleuths-find-even-more-problems-at-journal-that-just-flagged-400-papers/); <https://retractionwatch.com/2021/11/04/springer-nature-geosciences-journal-retracts-44-articles-filled-with-gibberish/>

3. <https://quillbot.com/translate>

topic (see limitations in Table 1 footer), limiting itself to a few dozen papers, but a large-scale study is merited.

**Table 1**  
List of papers related to sport containing tortured phrases<sup>1</sup>

DOI (sport-related theme/topic) <sup>2</sup>	Tortured phrase <sup>3</sup>	Standard term (likely) <sup>4</sup>
10.1016/j.micpro.2020.103490 (recognition of movement in sport)*	designs preparing unit facial acknowledgment keen gadget molecule swarm uphold vector machine profound learning	graphics processing unit facial recognition smart device particle swarm support vector machine deep learning
10.1016/j.micpro.2020.103593 (recognition of movement in sport)*	clamor decrease picture recognition brutal conduct acknowledgement	noise reduction image recognition recognizing rough play?
10.1016/j.micpro.2020.103583 (sport injuries)*	touchy factor X-beam large information blunder rates	sensitive issue? X-ray big data error rates
10.1016/j.micpro.2020.103437 (recognition of movement in sport)*	administered learning concealed/shrouded Markov model equal calculation histogram levelling likelihood appropriation picture division/handling	supervised learning hidden Markov model parallel computing histogram equalization probability distribution image segmentation/process- ing
10.1109/ICRTCCM.2017.57 (video-based sport event recognition and classification)	acknowledgment framework characterization execution highlight vector Gaussian appropriations/dissemi- nation information mining likelihood appropriation/circula- tion misfortune work picture grouping	recognition system classification performance feature vector Gaussian components/distrib- ution data mining probability distribution loss of function image classification

DOI (sport-related theme/topic) <sup>2</sup>	Tortured phrase <sup>3</sup>	Standard term (likely) <sup>4</sup>
	speculation capacity	predictive ability
	help vector machine	support vector machine
	K-closest neighbors	K-nearest neighbors
	bolster vector	support vector
10.48550/arXiv.2209.07528 (sports analytics)	choice tree	decision tree
	exactness rate	accuracy rate
	grouping and relapse	classification and regression
	grouping errand	classification task
	prescient model	predictive model
	center internal heat level	core body temperature
	cloud worker	cloud server
	directing convention	routing protocol
10.1016/j.micpro.2020.103423 (detection of movement and a body's physiological parameters in sport)*	far-off wellbeing checking	remote health assessment
	inertial estimation unit	inertial measurement unit
	irresistible ailment	contagious disease
	mist registering	cloud computing
	radio recurrence	radio frequency
	sign to commotion	signal to noise
	10-crease cross validation	10-fold cross validation
	choice emotionally supportive network	dynamic decision support system
	clamor	noise
	condition of-workmanship	state-of-the-art
	creating nations	developing countries
	discourse acknowledgement	speech recognition
	enormous information	big data
10.1016/j.micpro.2020.103753 (movement analysis in swimming)*	human services conveyance	healthcare delivery
	information gushing	information overload
	nourish forward	feed forward
	p esteem	p value
	palatable execution	satisfactory performance
	Parkinson's ailment/infection/malady/sickness	Parkinson's disease
	PC vision	computer vision
	shrouded layer	hidden layer
	sigmoid capacity	sigmoid function

DOI (sport-related theme/topic) <sup>2</sup>	Tortured phrase <sup>3</sup>	Standard term (likely) <sup>4</sup>
10.1109/ICESIC53714.2022.9783514 (machine learning to predict outcome of cricket matches)	slope plunge	gradient descent
	therapeutic gadgets	medical devices
	unfriendly wellbeing	adverse health
	directed learning	machine learning
	AI calculation	machine learning algorithm
	arrangement calculation	classification algorithm?
	characterization relapse~5	classification and regression
	choice tree	decision tree
	directed learning calculation	supervised learning algorithm
	logistic relapse	logistic regression
man-made brainpower	artificial intelligence	
regulated AI calculation	supervised machine learning algorithm	
flickering	batting	
10.1063/5.0114360 <sup>5</sup> (unclear)	heat/warmhmove/movement/transport/flow	heat transfer
	limit layer	boundary layer
	standard differential condition	ordinary differential equation
	thick dissemination	viscous dissipation
	warm conductivity	heat conductivity
	warm radiation	heat dissipation
10.1155/2022/1061461 (sports training education management)* <sup>6</sup>	R <sup>2</sup> /p/t esteem	R <sup>2</sup> /p/t value
	direct/straight relapse	linear regression
10.1515/9783110790146-011 (augmented and virtual reality for sports)	expanded/increased reality	augmented reality
	PC upheld	computer-aided
	PC vision	computer vision
	face acknowledgment	face recognition
	high-exactness	high-resolution
10.2139/ssrn.3620017 (AI in sport)	distinguishing proof	identification
	Formula 1 tennis	?
	human-made consciousness/ computer-based intelligence/ simulated intelligence/automated insights	artificial intelligence

DOI (sport-related theme/topic) <sup>2</sup>	Tortured phrase <sup>3</sup>	Standard term (likely) <sup>4</sup>
	wellspring of income	source of income
	profound figuring	deep learning
10.1007/978-981-15-5258-8_22 (soccer anthropometry and player attributes)	high pay nations	high-income countries
	onlooker base	fan base
10.1016/j.micpro.2021.103945 (mobile communication and aerobics)*	incorporated aloof gadget	integrated passive device
	relative blunder	relative error
	global wandering	international roaming
	yield layer	output layer
	fake neural organization	artificial neural network
	help vector machine	support vector machine
10.1016/j.micpro.2021.103924 (sports course management)*	Linux Working Framework	Linux Operating System
	information mining	data mining
	recognizable proof	identification
10.1016/j.micpro.2020.103648 (sports dance movement)*	PC vision	computer vision
	info picture	input image
	k-implies calculation	k-means algorithm
	move learning	transfer learning
	test arrangement	test set
10.1016/j.micpro.2020.103348 (sports movement detection)*	PC vision	computer vision
	distinguishing/recognizable proof	identification
	image acknowledgment	image recognition
10.1007/s41133-019-0025-2 (virtual reality in sport)	choice help	decision support
	enlarged/increased reality	augmented reality
10.1016/j.micpro.2021.104083 (sports injury prediction)*	Gaussian dissemination	Gaussian distribution
	information mining	data mining
	muscle shortcoming	muscle weakness
	prescient model	predictive model
	muscle gatherings	?
	muscle harm	muscle injury
	muscle lopsidedness	?
	sports wounds	sports injuries

DOI (sport-related theme/topic) <sup>2</sup>	Tortured phrase <sup>3</sup>	Standard term (likely) <sup>4</sup>
10.1016/j.micpro.2021.104063 (RoboCup Federation international soccer competition)*	computerized reasoning hereditary calculation picture preparing self-ruling vehicles fluffy regulator	artificial intelligence genetic algorithm image processing autonomous vehicles fuzzy logic?
10.1016/j.micpro.2021.104019 (sports injuries)*	focal sensory system lactic corrosive recurrence band worldwide situating	central nervous system lactic acid frequency band global positioning
10.1016/j.micpro.2021.104120 (sports information management)*	common language handling picture acknowledgment preparing information	natural language processing image recognition training data
10.1016/j.micpro.2021.103927 (sports app to assess fitness and performance)*	versatile stages arbitrary woods informational index	mobile platforms random forest dataset
10.1016/j.micpro.2021.103975 (sports injury simulation)*	increased reality PC vision picture acknowledgement	augmented reality computer vision image recognition
10.1016/j.micpro.2020.103631 (sports administration)*	man-made cognizance neural associations / organization	artificial intelligence neural networks
10.1016/j.micpro.2020.103676 (badminton injuries)*	cloud worker shrewd sensors upper appendage	cloud server smart sensors upper limb
10.1016/j.micpro.2021.104000 (sports industry in coastal cities)*	versatile correspondence colossal information monetary development	mobile communication big data economic development
10.1016/j.matpr.2021.01.489 (physical activity in sports)*	acknowledgment execution inertial estimation unit	recognition performance inertial measurement unit



DOI (sport-related theme/topic) <sup>2</sup>	Tortured phrase <sup>3</sup>	Standard term (likely) <sup>4</sup>
10.1016/j.micpro.2021.104181 (big data in sports)*	National B-Milk Acceptance/ National Board of Accreditation (NBA) area of enthusiasm information mining	National Basketball Association (NBA) region of interest data mining
10.1016/j.micpro.2020.103792 (sports image segmentation)*	picture division	image segmentation
10.1016/j.micpro.2021.104069 (imaging techniques to assess sports injuries)*	PC vision distinguishing proof	computer vision identification
10.1016/j.imavis.2021.104214 (automated detection of sports move- ments)	concealed state recurring neural network	hidden condition? recurrent neural network
10.1016/j.micpro.2020.103345 (sports video and image analysis)*	help vectors help vector machine	support vectors support vector machine
10.1016/j.micpro.2020.103389 (detection of sports motion and injuries)*	preparation information programmable rationale gadgets	training data field programmable gate array (FPGA)
10.1016/j.micpro.2021.103837 (sports training management)*	man-made brainpower	artificial intelligence
10.1016/j.micpro.2021.103918 (analysis of basketball game images)*	concealed Markov model information mining	hidden Markov model data mining
10.1016/j.avb.2021.101587 (assessment of physical and psycholog- ical stress in sportspersons)*	Fourier change exactness accuracy~5	Fourier transform accuracy
10.1016/j.micpro.2020.103654 (prediction of sports injuries)*	info information info picture	input data input image
10.1007/s12517-021-08077-0 (unclear)*	PC vision fluffy induction	computer vision fuzzy induction
10.1016/j.micpro.2020.103335 (unclear)*	keen gadget shrewd home	smart device smart home

<b>DOI (sport-related theme/topic)<sup>2</sup></b>	<b>Tortured phrase<sup>3</sup></b>	<b>Standard term (likely)<sup>4</sup></b>
10.1016/j.micpro.2021.103984 (promotion of public sports)*	shrewd gadget	smart device
10.1007/s12517-021-07335-5 (unclear)*	image determination	image assessment
10.1007/s12517-021-08185-x (unclear)*	information mining	data mining
10.1016/j.jbusres.2021.03.031 (management of sport sponsorship)	distinguishing proof	identification
10.1007/s12517-021-07198-w (unclear)*	information mining	data mining
10.3390/ijerph18179049 (AI to improve students' physical quality and motor skills)	information mining	data mining
10.3390/app12094429 (computer vision in sports)	highlight extraction	feature extraction
10.1155/2022/9789933 (development of sports facilities)*	forbidden search	Tabu search
10.1007/s00779-019-01242-z (development of the sports industry)	huge information	big data
10.1016/j.micpro.2020.103445 (monitoring health of sportspersons)*	coronary illness	coronary artery disease
10.1016/j.micpro.2021.103900 (prediction of sports injuries)*	information mining	data mining
10.1016/j.micpro.2020.103331 (mobile communication for improved sports coverage)*	figuring asset	computing resource
10.1016/j.micpro.2020.103584 (sport tourism)*	movement business AND tourism	tourism industry

<sup>1</sup>As assessed by the Problematic Paper Screener (PPS), with additional verification on PubPeer using documents' DOIs.

<sup>2</sup>Actual, presumed, or supposed topic based on the author's perception; whenever the topic was unclear, these instances have been noted as "unclear."

<sup>3</sup>Lists derived from PPS, PubPeer, and author's determinations. Not listed in any specific order.

<sup>4</sup>Lists derived from PPS, PubPeer searches in unrelated entries, and author's determinations; several possibilities are not entirely clear, and are denoted as a question mark ("?").

<sup>5</sup>This entry was determined exclusively from the PPS entry since the full text could not be obtained.

<sup>6</sup>The retraction notice does not use the term "tortured phrases" but alludes to the integrity of the content more broadly, claiming that it was one of several indicators of "systematic manipulation of the publication process."

\*Retracted or withdrawn (although two terms are used, they are considered the same, i.e., literature whose scholarly record was removed for any reason).

Limitations and disclaimer: The lists of tortured phrases were drawn mainly from PPS and PubPeer, where errors or false positives might exist. Listed papers might carry more tortured phrases than are indicated. In several papers, the text is literally incomprehensible; therefore, tortured phrases may appear insignificant relative to the full body of text. Given that this is a nascent branch of publishing ethics, there are no absolute guarantees that the interpretation of the existence of these tortured phrases is correct, absent a confession by authors of the use, for example, of translation or reverse translation software, or other software that paraphrases sentences.

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### Data availability statement

All relevant data are within the paper.