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Enhancing the memorization of tactical soccer scenes: Investigating the role of drawing according to visuospatial abilities

Sabrina Tlili, Hatem Ben Mahfoudh, Bachir Zoudji

► To cite this version:

Sabrina Tlili, Hatem Ben Mahfoudh, Bachir Zoudji. Enhancing the memorization of tactical soccer scenes: Investigating the role of drawing according to visuospatial abilities. Mardi des Chercheurs, Mar 2024, Mons, Belgium. hal-04598398

HAL Id: hal-04598398

<https://uphf.hal.science/hal-04598398v1>

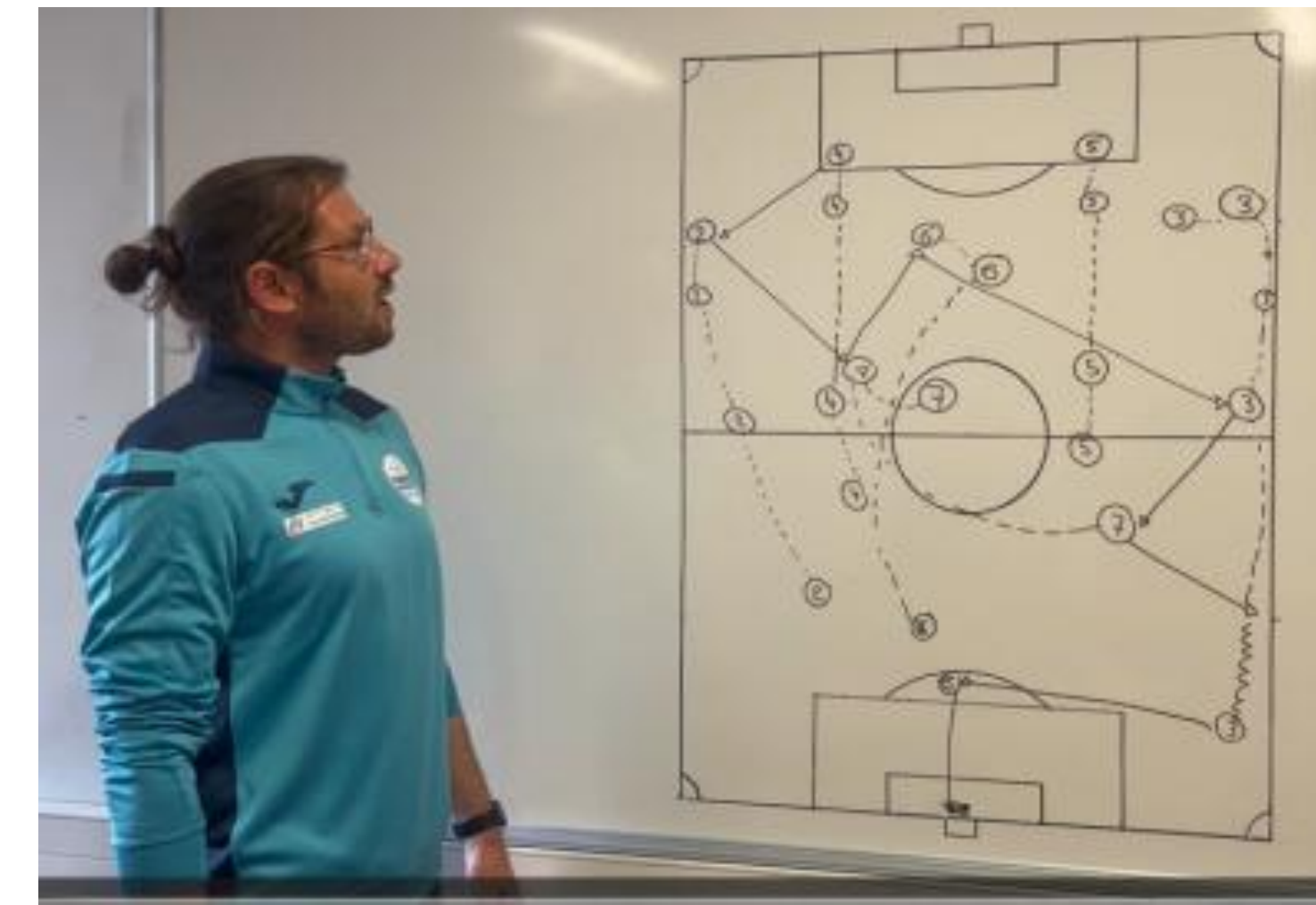
Submitted on 3 Jun 2024

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Introduction

Tactical diagrams in team sports serve as powerful tool when paired with comprehensive verbal explanations, fostering deep learning among players (Khacharem et al., 2013). Nevertheless, novice learners often struggle with processing auditory instructions while simultaneously deciphering relevant information in diagrams. Therefore, incorporating hand-drawn diagrams alongside verbal descriptions is proposed as an effective method to enhance cognitive processing and improve learning outcomes (Fiorella & Mayer, 2016). The aim of this study was to investigate the impact of drawing diagrams on the memorization of narrated tactical soccer scenes and to assess the moderator effect of individual characteristics, particularly participants' visuospatial ability (VSA).



Without-drawing condition

Method

Participants : Fifty-four male university students, all novices in soccer, participated in this study.

Materials : Using an Ultra HD camera, two versions of a video-based tactical lesson were recorded.

Control test: Participants' static and dynamic VSA were evaluated using two tests: the mental rotation task for static VSA, and the shoot task for dynamic VSA.

Main test: The main test involved memorizing one of two versions of a tactical soccer scene: one verbally described by the coach with the scene already drawn (Without-drawing condition), and the other with the coach drawing each step while explaining (With-drawing condition).

Procedure: After completing the control test followed by the main test, participants rated their mental effort and subsequently engaged in a recall test to replicate the game system on a printed football field.

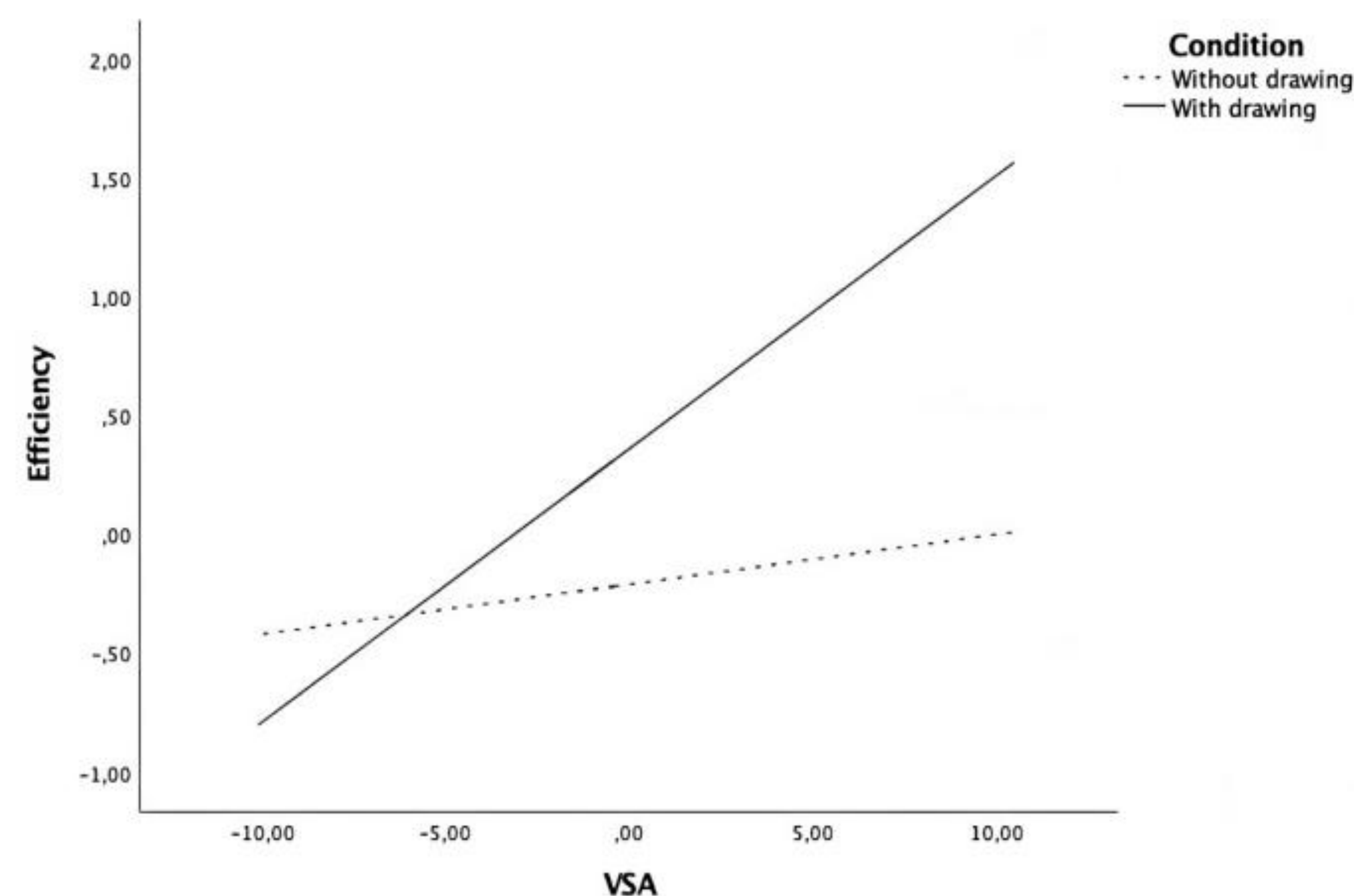


With-drawing condition

Results

The results revealed no main effect of drawing conditions on overall mental effort, recall time, and learning efficiency, but an interaction between VSA and drawing conditions was detected for recall time and learning efficiency scores.

Participants with low and medium VSA demonstrated similar benefits from both conditions, whereas those with high VSA exhibited superior memorization of the tactical scene in the with-drawing condition compared to the without-drawing condition ($p < 0.001$).



Discussion

The study's findings, demonstrating no performance improvement across conditions, can be attributed to the image principle of multimedia learning, where low-embodiment drawing may distract participants' attention from diagrams. However, a significant interaction between VSA and drawing conditions supports the ability-as-enhancer hypothesis, with high VSA participants excelling in the with-drawing condition, indicating their ability to allocate additional cognitive resources and benefit from multimedia learning principles inherent in dynamic drawings. Conversely, participants with low and medium VSA experienced similar performance under both conditions, potentially due to challenges in processing transient information from the dynamic creation of static visual elements.

conclusion

These findings emphasize the importance of matching drawing formats with individual traits, particularly VSA, to improve memorization from narrated tactical diagrams.

References

Fiorella, L., & Mayer, R. E. (2016). Effects of observing the instructor draw diagrams on learning from multimedia messages. *Journal of Educational Psychology*, 108(4), 528.



Khacharem, A., Zoudji, B., Kalyuga, S., & Ripoll, H. (2013). Developing tactical skills through the use of static and dynamic soccer visualizations: An expert–nonexpert differences investigation. *Journal of Applied Sport Psychology*, 25(3), 326-340.

