UTS UNIVERSITY OF TECHNOLOGY SYDNEY

How different constraints in the practice environment influence skill behaviours in professional Australian football

by Rhys Tribolet

Thesis submitted in fulfilment of the requirements for the degree of

Doctor of Philosophy

under the supervision of

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Faculty of Health

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Certificate of Original Authorship

I, Rhys Tribolet, declare that this thesis is submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the Faculty of Health at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise reference or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis. This document has not been submitted for qualifications at any other academic institution. This research is supported by the Australian Government Research Training Program.

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Rhys Tribolet

29/06/2022

Date Submitted

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This journey has been difficult, frustrating and mentally draining. It has taken a large toll. There is an ever-present imposter syndrome that you can constantly feel, even after publishing multiple times and feeling somewhat like you should belong in the company you are in. The trials and challenges, coupled with working in professional sport, has been difficult. It has meant there has been collateral along this journey, largely in the way of missing time with family and friends for having to finish and stay on top of work. There has been a psychological brutality to this work. I am definitely looking forward to living life post PhD.

Nonetheless, whilst this journey has concurrently been extremely difficult, frustrating and mentally draining, I have always had my family to help and encourage me. To my dad Ian, and my mum Bronwyn – you have both been an incredible source of support over the past 3.5 years, and more so over the last 6 months. I hope you both get to enjoy the retirement you deserve. Thank you to my brother Jake, and my sister Katie. You have both been a great source of support throughout my academic career. Thank you to all my friends for their constant support and presence in my life. To all my family and friends, I hope I have made you proud and I hope this thesis reflects everyone's support in my journey so far. I love you all dearly.

Preface

This thesis is for the Degree of Philosophy and is in the format of conventional thesis. The thesis abides by 'Procedures for Presentation and Submission of Thesis for Higher Degrees – University of Technology, Sydney; Policies and Direction of the University'.

The research design and data collection by the candidate has resulted in four manuscripts being published in peer-reviewed journals and one manuscript under review. The thesis begins with an introduction to provide a background to the research and the research problem, followed by the purpose and significance of each study and their integration with one another. This is followed by a literature review which provides an overview of how complex systems operate in team sports, the characteristics that relate to team sport and how this framework relates to enhancing our understanding of behaviour in Australian football. Each study that follows is presented in manuscript form as submitted to and accepted for publication in peer-reviewed journals. The manuscripts include an abstract, introduction, methods, results, discussion, conclusion and references. Figures and tables appear in the thesis within each manuscript as they appear in publication. Following the final study of the thesis, a general discussion chapter is presented, reviewing and integrating the main findings of the thesis into current literature and presenting an adapted framework, with due consideration of the limitations of the thesis. The final chapter provides a summary of the contribution of the thesis and directions for future research. The University of Technology Sydney (Harvard) referencing style is used throughout this thesis, with a list of references provided in Chapter 11.

Publications Arising from the Work Undertaken in the Thesis

Tribolet, R., Sheehan, W.B. Novak, A.R., Watsford, M.L. & Fransen, J. (2021), How does practice change across the season? A descriptive study of the training structures and practice activities implemented by a professional Australian football team, *International Journal of Sports Science and Coaching,* DOI*:* 10.1177/17479541211019829.

Tribolet, R., Sheehan, W.B. Novak, A.R., Watsford, M.L. & Fransen, J. (2021), A descriptive and exploratory study of factors contributing to augmented feedback duration in professional Australian football practice, *International Journal of Sports Science and Coaching,* DOI: 10.1177/17479541211037038.

Tribolet, R., Sheehan, W.B. Novak, A.R., Watsford, M.L. & Fransen, J. (2021), Factors associated with cooperative network connectedness in professional Australian football practice, *Science and Medicine in* Football, DOI: 10.1080/24733938.2021.1991584.

Tribolet, R., Sheehan, W.B. Novak, A.R., Rennie, M.J., Watsford, M.L. & Fransen, J. (2021), Match simulation practice may not represent competitive match play in professional Australian football, *Journal of Sports Sciences,* DOI: 10.1080/02640414.2021.1995245.

Tribolet, R., Sheehan, W.B. Novak, A.R., Watsford, M.L. & Fransen, J. (2021), An observational study of player behaviours under varying task constraints in professional Australian football players, *In Preparation*.

Related Publications throughout Candidature

Obrien-Smith, J., **Tribolet, R.,** Smith, M.R., Bennett, K.J.M, Pion, J., Lenoir, M., & Fransen, J. (2019), The Use of the Körperkoordinationstest für Kinder in the Talent Pathway in Youth Athletes: A Systematic Review, *Journal of Science and Medicine in Sport*, DOI: 10.1016/j.jsams.2019.05.014.

Sheehan, W.B., **Tribolet, R.,** Rennie, M., Novak, A., Watsford, M., & Fransen, J. (2020), Using cooperative networks to analyse behaviour in professional Australian Football, *Journal of Science and Medicine in Sport,* DOI: 10.1016/j.jsams.2019.09.012.

Sheehan, W.B., **Tribolet, R.,** Rennie, M., Novak, A., Watsford, M., & Fransen, J. (2020), Improving the interpretation of skill indicators in professional Australian Football, *Journal of Science and Medicine in Sport*, DOI: 10.1016/j.jsams.2020.01.016.

Toum, M., **Tribolet, R.,** Watsford, M. & Fransen, J. (2020), The confounding effect of biological maturity on talent identification and selection within youth Australian football, *Science and Medicine in Football*, DOI: 10.1080/24733938.2020.1822540.

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Sheehan, W.B., **Tribolet, R.,** Novak, A., Fransen, J. & Watsford, M. (2021), An assessment of physical and spatiotemporal behaviour during different phases of matchplay in professional Australian football, *Journal of Sports Sciences*, DOI: 10.1080/02640414.2021.1928408.

Sheehan, W.B., **Tribolet, R.,** Watsford, M., Novak, A., Rennie, M.J. & Fransen, J. (2021), Tactical analysis of individual and team behaviour in professional Australian football: Original investigation, Science and Medicine in Football, DOI: 10.1080/24733938.2021.1923792.

Fransen, J., **Tribolet, R.,** Sheehan, W.B., McBride, I., Novak, A.R. & Watsford, M.L. (2021), Cooperative passing network features are associated with successful match outcomes in the Australian Football League, *International Journal of Performance Analysis in Sport,* DOI: doi.org/10.1177/17479541211052760.

Conference proceedings and abstracts

Tribolet, R., Sheehan, W.B. Novak, A.R., Rennie, M.J., Watsford, M.L. & Fransen, J. (2021, November 26-27). Assessing player adaptability in team sport: A quasi-experimental study in professional Australian football players, Presented at the Australasian Skill Acquisition Network Conference.

Statement of Contribution by Others

This thesis details original research conducted by the candidate at the Sydney Swans Football Club while enrolled in the Faculty of Health at the University of Technology Sydney. The thesis includes research articles of which I am the lead author and was primarily responsible for the conception and design of the research, ethical approval to conduct the research, data collection, analysis and interpretation, manuscript preparation, and correspondence with journals.

Where explicitly acknowledged in each experimental chapter, a number of individuals have contributed to the research presented in this thesis.

- Dr. Job Fransen: Study design, data analysis, interpretation and manuscript review
- Assoc Prof Mark Watsford Study design, data interpretation & manuscript review
- Dr. Andrew Novak: Data analysis and interpretation, & manuscript review
- Will Sheehan Data interpretation & manuscript review
- Michael Rennie Data interpretation & manuscript review

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Date: ……

COVID-19 Impacts on the Research

COVID-19 had a significant impact on my ability to design research studies and collect data related to this thesis and subsequently, execute research studies. A number of limitations arising from COVID-19 have affected this, including:

- An inability to access research participants as a result of government restrictions. Additionally, my embedded position in an Australian Football League (AFL) club meant further restrictions were placed on which staff had face-to-face contact with the playing group when government restrictions did begin to ease
- An inability to collect data for a whole season as a result of government and AFL restrictions
- An inability to liaise and discuss potential research study designs and their implications with key personnel in the AFL organisation due to government and AFL restrictions

Collectively, the restrictions implemented by government resulted in an inability to access research participants and collect data for a whole season. Additionally, the relationship with the industry partner was subsequently affected as a result of disrupted communication. Although not tangible, it had an impact on the 'buy in' from key stakeholders (e.g. coaching group) upon resumption of normal training. This also had an impact on the overall impact and outcomes of this PhD thesis.

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Thesis Abstract

Australian football (AF) is a dynamic and complex team evasion sport, which demands high levels of team and individual skilfulness. From an ecological dynamics perspective, AF performance is a complex system characterised by dynamic interactions between the players and the environment. These interactions provide collective opportunities for action through shared affordances and consequently, players' decisions and actions are influenced by many different sources of information. Coaches' manipulate and implement different activities in practice, attempting to change or reinforce certain behaviours and to ultimately have this behaviour transfer to match-play. In practice, coaches' typically rely on experiential knowledge (intuition, 'gut feel') to design practice, typically without using empirical information. There has been little evidence supporting the use of objective data to aid decision making systems for practice design in AF and therefore the sequence of studies presented in this thesis aimed to provide insights into this important area of inquiry.

Study One revealed that coaches' changed the frequency of practice types across pre- and in-season, in addition to the duration of the practice type activity. Furthermore, coaches' implemented more training-form activities during pre-season than in-season. *Study Two* demonstrated that feedback intervention frequency and practice time along with the interaction between both were associated with the amount of augmented feedback provided by coaches', explaining 65% of the variance. *Study Three* explored the factors and constraints explaining Connectedness, a particular cooperative passing network variable associated with successful AF performance. The results demonstrated that the time in the small-sided game (SSGs) activity and the number of shots at goal explained 65% of the variance in Connectedness scores. These findings provide possible applications about how constraints can be manipulated to elicit favourable cooperative behaviours. *Study Four* showed goals were scored more frequently with less passing actions per minute during match simulation than during competitive games. Furthermore, the receiving and distributing passing networks during simulations were more centralised (reliance on fewer key individuals), with less turnovers and tackles per minute compared to match-play. Such differences have implications on skill transfer to competitive environments. *Study Five* investigated individual level changes in individual and integrative levels of behaviour across six conditions (SSGs, match simulation and AFL match-play), suggesting no or negligible changes for integrative measures across changes in condition. Individual level behaviours demonstrated varied responses across changing conditions.

Overall, the findings of this thesis can enhance current practice design in team sport settings and guide future empirical research.

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List of Abbreviations

AF	Australian football
AFL	Australian Football League
AFLW	Australian Football League Women's
AIC	Akaike information criterion
β	beta
χ^2	Chi square value
CI	Confidence interval
CNS	central nervous system
d	Cohen's d effect size
df	Degrees of freedom
DST	Dynamical systems theory
ED	Ecological dynamics
GPS	Global positioning systems
HB	Handball
IPT	Information processing theories
JASP	Jeffrey's amazing statistics program
KPI	Key performance indicator
MANOVA	Multivariate analysis of variance
m^2	Metres squared
mins	Minutes
N	Number of
η^2	Partial eta squared
r	Pearson correlation
Q-Q	Quantile-quantile
SD	Standard deviation of the mean
SSGs	Small-sided games

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