THE SIGNIFICANCE OF DOMINANT BALL CARRYING COLLISIONS AS AN INDICATOR OF SUCCESS IN RUGBY UNION AND THE BIOMECHANICAL ANALYSIS THEREOF

by

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DEDICATION

This dissertation is dedicated to my very special wife Michelle and our daughter Nicola, as well as my mother Aletta Evert and my grandparents Stan & Sue Evert who have always supported me and been there for me! You have all left an indelible mark on me.

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Blue Bulls U21	–	2002	(Currie Cup U21 Champions);
Blue Bulls U20	–	2003	(Currie Cup U20 Champions);
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Blue Bulls U20	–	2004	(Currie Cup U20 Champions);
South Africa U21	–	2004	(3rd Place at the IRB World Championship);
Blue Bulls Vodacom	–	2005	(Semi-Finalists);
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"I have strength for all things in Christ who empowers me, I am ready for anything and equal to anything through Him; I am self-sufficient in Christ's sufficiency."

Philippians 4:13

"You chart the path ahead of me, and tell me where to stop and rest,
Every moment you know where I am.
You know what I am going to say even before I say it, LORD.
You both precede and follow me.
You place your hand of blessing on my head.
Such knowledge is too wonderful for me, too great for me to know."

Psalm 139 verse 3 - 6

SYNOPSIS

TITLE	The significance of dominant ball carrying collisions as an indicator of success in rugby union and the biomechanical analysis thereof.
CANDIDATE	Ashley Evert
PROMOTER	Prof. P.E. Krüger
DEGREE	DPhil

The goal of this study is to gain a better understanding of the factors that play a role in dominant collisions in rugby as well as the relative significance of dominant collisions as an indicator of success. By means of video footage of matches played during the 2003-2005 Super 12 competitions, notational analysis was performed and information was gathered in order to gain the relative data. The hypothesis stands that if a team is aware of the factors that lead to a dominant collision, are able to execute them in a match situation, that team should be more successful.

The following key performance measurements were evaluated in order to indicate how each factor affected the level of success of a team. They are as follows: average total number of collisions for a try to be scored, average total number of forced missed tackles for a try to be scored, ratio of dominant collisions versus passes executed when a try is scored and average positive velocity change of dominant collisions resulting in a try being scored.

In order to prove the hypotheses a *k*-sample case will be used. The samples are related, thus the data used is interval and ratio. Therefore, the test used will be the repeated measures ANOVA test, a special form of n-way analysis of variance.

The statistical evaluation is the critical test value where the d.f values are as following: Key Measurement (3,8), Year Rating (2,8), Year Rating by Key Measurement (3,8). When comparing these with a statistical table for critical values of the F distribution for $\alpha = 0.05$, the critical values are as following: (3,8): 4.07, (2,8): 4.46, and (3,8): 4.07.

Thus, the statistical results are grounds for accepting all three null hypotheses and concluding that there is a statistical significance of at least 95% with an alpha of 0.05 between the means in all three instances. This shows that the data captured for the twelve teams for all tries scored by these teams over a period of three years and for the four key measurements, have a statistical significance of 95% for the readings respectively.

After evaluation of the data and making use of regression analysis and multiple regressions in order to establish the correlation between log position and the four key measurements there can be no doubt that the teams that finished higher on the log did indeed perform better according to the identified key performance measurements.

KEY WORDS: rugby, coaching, biomechanics, running lines, defensive lines, dominant collisions, video footage, notational analysis.

SAMEVATTING

TITEL	Die beduidendheid van dominante bal-draende- botsings as ‘n indikasie van sukses in rugby en die biomeganiese analise daarvan.
KANDIDAAT	Ashley Evert
PROMOTOR	Prof. P.E. Krüger
GRAAD	DPhil (MBK)

Die doel van hierdie studie is om die faktore wat ’n rol speel in dominante botsings in rugby te identifiseer, sowel as die relevante waarde van hierdie dominante botsings as ’n moontlike indikator van sukses in rugby. Deur middel van video opnames van wedstryde wat gedurende die 2003 – 2005 Super 12 kompetisies gespeel is, is noterende analises van hierdie wedstryde gemaak en is die relevante inligting uiteengesit om die relatiewe data te verkry. Die hipotese is gestel dat ’n span wat bewus is van die faktore wat lei tot dominante botsings en die vermoë besit om hierdie botsings ook in ’n wedstrydsituasie uit te voer, behoort meer suksesvol te wees in die wedstryde wat hulle speel.

Die volgende sleutelmetinge is geevalueer om ‘n indikasie te lewer van hoe elk van bogenoemde faktore die vlak van sukses van die spanne sal beïnvloed: die gemiddelde totale hoeveelheid botsings voordat ‘n drie gedruk is,die gemiddelde totale hoeveelheid van geforseerde mislukte laagvatte voordat ‘n drie gedruk is, die verhouding van dominante botsings teenoor aangeë uitgevoer voordat ‘n drie gedruk is, en die gemiddelde positiewe snelheidsverandering van dominante botsings wanneer ‘n drie gedruk is.

Om die hipotese te bewys word ’n *k*-monster gebruik. Die monsters is verwant, dus is die data wat gebruik word is interval en verhouding. Dus, die toets wat gebruik word sal dus die herhalende metings ANOVA toets wees, ’n spesiale vorm van n-rigting analise van variasies.

Die statistiese evaluasie is die kritiese toetswaarde waar die d.f waardes as volg is: Sleutel Meting (3.8), Jaar Meting (2.8), Jaar Meting volgens Sleutel Meting (3.8). Wanneer die voorgaande vergelyk word met ’n statistiese tabel vir kritiese waardes van die F verspreiding vir $\alpha = 0.05$, is die kritiese waardes as volg: (3,8): 4.07, (2,8): 4.46, en (3,8): 4.07.

Dus, die statistiese resultate onderskryf die aanvaarding van al drie die nul hipoteses en bevestig dat daar ’n statistiese waarde van ten minste 95% met ’n alfa van 0.05 tussen die gemiddeldes van al drie gevalle voorkom. Dit bevestig dus dat die data wat versamel is vir die twaalf spanne en vir al die drieë wat deur hierdie spanne oor ’n tydperk van drie jaar gedruk is, en vir die vier sleutel metings, besit ’n statistiese waarde van 95% vir die lesings onderskeidelik.

Na evaluering van die data en die gebruikmaking van regressie analise en veelvoudige regressies ten einde die korrelasie tussen log posisie en die vier sleutel metings te bepaal, kan daar onomwonde verklaar word dat die spanne wat hoër op die punteleer geëindig het, inderdaad ook beter presteer het volgens die geïdentifiseerde prestasie metings.

SLEUTEL WOORDE: rugby, afrigting, biomeganika, hardlooplyne, verdedigingslyne, dominante botsings, video-opnames, merkbare analise.

TABLE OF CONTENTS

CHAPTER 3

CHAPTER 4

CHAPTER 5

CHAPTER 7: METHODS, THE EXPERIMENTAL DESIGN AND THE RELEVANT PROCEDURES

CHAPTER 8: ANALYSIS AND INTERPRETATION

CHAPTER 9

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES