Pepperdine University

Graduate School of Education and Psychology

VIEW FROM THE VIRTUAL POCKET:
USING VIRTUAL SIMULATION AND VIDEO GAME TECHNOLOGY TO ASSESS THE SITUATION AWARENESS AND DECISION MAKING OF NCAA QUARTERBACKS

A dissertation proposal submitted in partial satisfaction

of the requirements for the degree of

Doctor of Education in Learning Technologies

by

Burnie Bristow

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Linda Polin, Ph.D. – Dissertation Chairperson

This dissertation is written by

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under the guidance of a Faculty Committee and approved by its members, has been submitted to and accepted by the Graduate Faculty in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

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DEDICATION

Dear God,

Thank you for breathing life into the heart and soul of a virtuous woman.
My Mom was my roadmap to YOU!

To: My Mom
Bertha L. Bristow
- My First and Greatest Teacher -

Your unconditional love, nurturing spirit and unwavering faith in my dreams and aspirations propelled me to grow into the crown of scholarship, manly deeds, and love for all mankind.

ACKNOWLEDGEMENTS

"Happy is the man who…gains understanding." Pr 3:13

As I close the book on this professional milestone and begin the next phase of my ideal life, I'm compelled to pay homage to scores of individuals that have impacted my life well beyond the completion of this manuscript. Please know that you will be receiving a personalized expression of my heartfelt gratitude.

Thus, I will reserve this section to acknowledge the unique contributions that fueled the development and completion of *View from the Virtual Pocket*.

Dissertation Committee:

To Dr. Linda Polin, the distinguished chair of my dissertation committee: You were the intellectual compass that inspired me to write the next chapter in my ideal life. *View from the Virtual Pocket* is a testament to your role in my professional, intellectual and spiritual transformation.

To Dr. Jack McManus: By honing and encouraging my desire to challenge what is known, you allowed me to call an audible in the stadium of naturalistic decision making.

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Dissertation Support:

To Dr. Michelle Kowalsky, my secret weapon in this doctoral journey, many thanks to you -- my content, process, and emotional mentor. Thank you for (a) cultivating that "aha" moment! And for (b) helping me develop the scholarly voice required to turn an intriguing hypothesis into an intellectual touchdown.

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To My Study Participants:

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XOS Digital

To Joe Schrimpl, Regional Sales Manager: Thank you for (a) championing the virtues of this study, for (b) believing that, for better or worse, I had the expertise and integrity to fairly represent the capabilities of PlayAction Simulator, and for (c) the countless hours and resources you gave in support of bringing the empirical investigation of the PlayAction simulator PC to fruition. Your background as an award-winning video coordinator served as scaffold between the situational analysis and the system design. But most of all, I will never forget your unwavering commitment to this study.

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Football Experts

To the incomparable Darrel "Mouse" Davis: I have been a fan of yours all my life. Thank you for being so gracious with your time. Thanks for taking me under your wings and treating me like YOUR quarterback. Meeting you was the cerebral opportunity of a lifetime. This study is a salute to you, and to all the collegiate and professional teams employing the concept of multiple adjusting routes in the dynamic and time constrained domain of the quarterback.

To John Jenkins, NCAA, NFL, CFL, USFL: Thank you for unfettered access to your playbook, schemes and teaching methods. Your learning environment should be patented! Thanks for a marathon session on defensive coverages! You helped me to conceptualize multiple adjusting routes and shaped my thinking around the link between reinforcement learning and expert decision making in football. Most of all, you reminded me how much unadulterated FUN you can have in the Run and Shoot offense. Man, how I miss 700-yard passing games and 54-touchdown seasons! The NFL could certainly use an injection of your innovative ideas.

To Nick Rolovich, Offensive Coordinator, University of Hawaii: Thank you so much for your time and for the unparallel look inside the huddle of the Run and Shoot quarterback. You helped me eliminate all the wrong decisions so I could begin to locate the correct options. The rich and detailed analysis of my data collection was the result of our knowledge elicitation session. Mahalo nui loa!

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To David Klingler, NCAA Record-setting Quarterback: You are the glue to this manuscript. Thanks for your profound explanation of "how" the innovative concepts of these great coaches are implemented on the field. The concept and process of the optimization of serially generated options is forever linked to "*how"* you attack defensive coverages. But equally important, thank you for reminding me of Faith, Family, Football!

To Dan Morrison, Quarterback Coach, Southern Methodist University: Thank you for your review of THREE iterations of Goal Directed Task Analysis! I wanted to provide attribution to you for your introduction to the concept of "unconscious competence" listed in the decision making model for quarterbacks. I'm grateful for your patience, indebted to you for your time, amazed and thankful for your insights into decision making expertise.

Up Close and Personal

To: My Dad: Burnie Bristow Sr.
Thanks for reminding me that success is uncommon, therefore not to be enjoyed by the common man.

To: My Sister: Brenda L. Savage
Thanks for letting me know we have a Guardian Angel!

To: My Brother: Bradford L. Bristow
Thanks for showing me the Genesis of a purposeful life!

To: Kim Rousseau
My love for you is indelibly etched in the Hall of Fame of my Heart.

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To Michael Terrizzi, for allowing me to quarterback the Passaic County Tech Bulldogs.

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To Manny Matsakis, Bob Jones, Mark Mickens and the Butler Bulldogs for showing me the TripleShoot Offense.

To the City of Paterson, New Jersey: If you call, I will answer.

To my children: With Love!

To countless family, friends and well wishers…My love, admiration and respect for you extend beyond the pages of this manuscript.

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EDUCATION AND CERTIFICATION

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B.S., Workforce Development Education, Southern Illinois University, 1991

National Board Certified Teacher of Educational Media and Technology, 2004-2014
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PROFESSIONAL EXPERIENCE

Assistant Principal, School of Performing Arts, Paterson, NJ (2010-2011)

Technology Director, P.A.N.T.H.E.R. Aviation and Space Science Academy, Paterson, NJ (2004-2010)

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National Board for Professional Teaching Standards (NBPTS), Assessment Center Expert in Library Media; Scoring Validator for ECYA-LM, Dallas, TX (2006)

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Educational Media Coordinator, Newark Public Schools, Newark, NJ (2001-2004)

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Passaic County Technical Institute, NJ, Quarterback/Wide Receiver

Kennedy High School, NJ, Wide Receiver/Kick Returner
All-Passaic Valley Conference; All Area Team

Iowa Wesleyan College, IA, Wide Receiver/Kick Returner
Scholarship Recipient

AWARDS AND HONORS

Passaic County's First National Board Certified Teacher

Featured in the 9th Edition of "*Who's Who Among America's Teachers"*

Successfully certified, mentored and nominated three Bill and Melinda Gates Scholars

NJ Senate and General Assembly Citation: "Unsung Hero Award"

Finalist for United States Navy Sailor of the Year
Naval Air Station, Jacksonville, Florida

Navy Good Conduct Medal and Navy Achievement Medal

Member of the last All Passaic Valley Conference Football Team

ABSTRACT

View from the Virtual Pocket is a proof of concept study in which a theoretical proposition about situation awareness in time constrained decision making is wedded to the affordances of a computer based simulation to ascertain if the real world decision making in the pocket of an NCAA quarterback can be modeled successfully for simulation based learning.

The researcher used the Situation Awareness Global Assessment Technique (SAGAT) for the purposes of (a) analyzing the situation awareness requirements for expert decision making and (b) to empirically assess the viability of using a computer based football simulator as a SAGAT simulation tool.

The highlight of this study is a Goal Directed Task Analysis developed in conjunction with some of the most recognized names in professional and collegiate football. The results of the (GDTA), a form of cognitive task analysis, defined the information requirements for expert quarterbacking and shed light on the enormous cognitive demands placed on the quarterback.

The researcher was able to create, categorize and program SAGAT queries from the Goal Directed Task Analysis into an innovative virtual reality simulator called the PlayAction Simulator PC. Once the queries were programmed and the plays were published, the Researcher evaluated the simulator's ability to (a) stop a simulated repetition at random points to ask probing questions aimed at evaluating a quarterback's SA and (b) create the ecological validity required to extapolate the informating needed to measure situation awarness in the domain of the quarterback.

The results of this inquiry (a) identified the goals of the quarterback, the decisions the quarterback has to make to achieve those goals and the information the quarterback needs to know in order to make accurate decisions, (b) validated the ability of the interactive virtual simulator to used as a SAGAT Simulation tool in the assessment of the quarterback's situation awareness.

Additionally, the Goal Directed Task Analysis led to the creation of the Decision Making Model 4 QB's. The model, a hybrid of the Endsley (2000a; 2000b) SA Model and the Klein (1998) RPD Model, represents a viable and testable description of the situation assessment process that quarterbacks use to formulate an aerial hypothesis. Inherent in this new model is a proposition about the role of unconscious competence in the optimization of serially generated options.

Chapter 1

Figure 1. Virtual football trainer. Reprinted from UM-VRL: Virtual Football Trainer, n.d. Retrieved October 9, 2009, from http://www-vrl.umich.edu/project/football/index.html. Copyright 2008 by Klaus-Peter Beier. Reprinted with permission.

> *"It might not be the real thing, but the Virtual Football Trainer comes pretty darn close," says the U-M player who inspired No. 7 to take the simulated snaps -- former Wolverine quarterback Tom Brady, who saw an early version of the program in 1999.* (Hoffman, 2001, p. 16)

Introduction

In the summer of 1999, engineers at the University of Michigan put a little-known back-up quarterback named Tom Brady in a computer automated virtual environment that housed a unique full-immersion virtual football trainer designed to improve the decision making ability of NCAA quarterbacks. Once inside the CAVE (Computer Animated Virtual Environment), Brady became fully immersed in an artificial, three-dimensional football world that was completely generated by a computer (Beier, 2001). Wearing lightweight stereo glasses, he was able to take snaps and read the reactions of the computer-generated avatars.

During the fall season of 1999, Brady was named team captain and his steady play on the field was rewarded by being named All-Big Ten (Honorable Mention). He capped off his stellar season with an overtime victory over Alabama in the Orange Bowl. In that game, Brady threw for 369 yards and four touchdowns. But few NFL scouts took notice.

Upon the completion of his collegiate career, Brady was not selected until the sixth round of the NFL draft. He was the 199th player selected, and the seventh quarterback selected. He was drafted behind the likes of Giovanni Carmazzi and Spergon Wynn! It goes without saying that Brady did little to impress NFL scouts with his ability, and displayed little potential to be a quarterback in the NFL. He began his rookie season as the number four quarterback on the New England Patriots' roster.

But, almost a decade after his view from the virtual pocket, Brady is widely regarded as one of the best quarterbacks of his era. He has played in four Super Bowls, winning three of them (XXXVI, XXXVIII, XXXIX). He has won two Super Bowl MVP awards (XXXVI and XXXVIII), has been invited to four Pro Bowls, and holds the NFL record for most touchdown passes in a single season!

Watching Brady shred NCAA and NFL defenses, one can't help but wonder about the connection between his uncanny decision making ability and the time he spent in the University of Michigan Computer Animated Virtual Environment (CAVE). How did Tom Brady -- operating in a high-stakes adversarial environment, under extreme time constraints, and on the biggest stage in professional sports, the Super Bowl -- display such unparalleled examples of expert decision making and performance? Was the virtual football trainer his secret weapon?

Context of the Study

To answer this question, this study used a Goal Directed Task Analysis, developed in conjunction with expert coaches and quarterbacks, to identify what great quarterbacks need to know to make great decisions. Armed with "what" they need to know, the researcher programmed a virtual football trainer, the PlayAction PC, in an attempt to create an ecologically valid environment to assess the quarterback's situation awareness. The researcher sought empirical evidence of how expert quarterbacks read and recognize complex NCAA defenses and parlay that knowledge into decisive and appropriate action. What are the situation awareness (hereafter, SA) requirements for the exemplary decision making displayed by NCAA record setting quarterbacks like David Klinger, Colt Brennen and Heisman Trophy winner Andre Ware? What do great quarterbacks know and see that average quarterbacks miss, and how do we design and use immersive virtual reality simulators as a tool to assess this situation awareness expertise or lack thereof?

The researcher's secret weapon in this endeavor is the aforementioned virtual reality football trainer called the PlayAction Simulator PC, developed by XOS Digital, a national leader in the sports technology industry. "Powered by EA SPORTS, …athletes can now practice using their teams' customized plays against realistic scout defenses in a three-dimensional, video-game-simulated environment. A quarterback using this new tool can practice reading a defense, picking up blitzes and making quick decisions on where to throw the ball, all based on the tendencies of the team he is going to play the upcoming weekend" (BusinessWire, 2007, p. 2).