Contextualised skill acquisition research : a new framework to study the development of sport expertise

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Contextualised Skill Acquisition Research:

A New Framework to Study the Development of Sport Expertise

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Abstract

Objective: Research on expertise in sport has rarely attempted to examine socio-cultural constraints on athletes. Here, we outline a new contextualised approach to studying socio-cultural constraints on individuals, proposing an interpretive, multi-method approach to holistically investigate the interacting constraints on an athlete's development pathway.

Aims: We explain a rationale for adopting an interpretive research paradigm (in contrast to traditional positivist approaches) for exploring socio-cultural constraints. The epistemological and methodological assumptions of Bronfenbrenner's Bioecological Model of Human Development are proposed as an underpinning framework for data collection and organisation of material. We advocate for ethnographic strategies of inquiry, followed by a discussion of potential methods for generating and analysing data: contextual analysis, participant-observation, and open-ended interviews. Finally, we discuss evaluation criteria for this contextualised approach viewed from a coherence theory of truth.

Purpose: This position statement seeks to: 1) promote methodological possibilities to investigate the effect of socio cultural constraints on expertise acquisition in sport; and 2), offer significant new theoretical and epistemological insights from the constraints-led approach to expertise and to integrate some of the interdisciplinary differences that exist in the body of sciences.

Keywords

socio-cultural constraints, ethnography, constraints-led approach, bioecological model, coherence theory of truth

Introduction

The acquisition of perceptual-motor expertise in different performance domains (e.g., clinical, physical education, music, sport coaching) is a complex, contextualised process. Theoretically, the constraints-led[1] approach to motor learning has provided major insights, mainly from empirical research on individual and task constraints (see 2008). However, there is a need to further explore the socio-cultural environmental constraints of this model. Environmental constraints that impinge upon a learner's development are multiple, intangible, intertwined and dynamic (Davids et al. 2013). To understand such processes, a broad, yet sensitive set of research tools is required. Motor learning research has traditionally persevered with a relatively narrow range of research tools emanating from a long history of a positivistic, laboratory-based research paradigm. Such tools seem suitable for investigating how unique personal constraints interact with task-related factors in the skill acquisition process (Araújo and Davids 2011). However, for the study of socio-cultural constraints, other methodologies may be more functional.

On a day-to-day basis, physical education and sports coaching practitioners are confronted with learners whose personal experiences and attributes have been shaped by the socio-cultural constraints that surround them. Movement preferences, individual differences and nonlinear rates of development are as much a function of social milieu in which learners have developed as they are of an individual's physiology, anatomy or psychology. Here, we highlight the importance of socio-cultural constraints during learning and argue that practitioners and researchers would benefit from greater awareness of their influence.

We propose contextualised skill acquisition research as a new research framework that is relevant for examining the nature of interacting, dynamic socio-cultural constraints on expertise acquisition. In advocating exploration of socio-cultural constraints via this

methodological framework, we also hope to offer new epistemological insights on how to integrate quantitative and qualitative research approaches, as well as positivist and social/interpretive research paradigms. We are not the first to propose a potential solution for these limitations of kinesiology and physical education (e.g., Ingham 1997; Andrews 2008). Andrews et al. (2013) paint an explicitly socially critical vision for kinesiology – under the aegis of Physical Cultural Studies as: "an interdisciplinary field ground within a critical curriculum of the corporeal that draws on a range of exciting and innovative methodologies that can provide the languages of, and possibilities for, a politically progressive, socially just, and democratic citizenry." Although not grounded in critical paradigms and political projects in precisely the same way, we too envisage future possibilities in which biophysical sciences and socio-cultural sciences may be inextricably linked. We acknowledge that our tentative contribution to the development of this new paradigm is to build bridges across the methodological boundaries between sociology and motor learning in the first instance, rather than offering a unifying approach for the whole field.

Our aim here is to construct a rationale for contextualised skill acquisition exemplified by philosophical, theoretical and methodological foundations (see Table 1). The scope of this paper is limited to justification and explanation of the new contextualised skill acquisition approach. Later in this position paper, we will refer to the first author's PhD research programme to clarify how contextualised skill acquisition processes can be investigated. The specific purpose of this position statement is to provide a foundation for future empirical papers on this topic and to stimulate other researchers to consider the framework.

Insert Table 1 about here

Philosophical Foundations of Contextualised Skill Acquisition Research

Research in the related sub-disciplines of movement science and motor learning has burgeoned over the past five decades (Button and Farrow 2012). Traditionally, studies in this area have been guided primarily by methods of quantitative inquiry (Mullineaux, Bartlett, and Bennett 2001), underpinned by philosophical assumptions of the positivist paradigm (see Abernethy and Sparrow 1992). Laboratory-based research has been ubiquitous in this positivist approach, where experimental design and methods are rigorously controlled. Traditional analyses have been limited to movement models involving few motor system degrees of freedom (i.e. joints, muscles, body segments). A considerable challenge for researchers is to apply the data and models of motor learning, developed with such laboratory-based tasks, to the study of behavioural phenomena in sport performance and learning environments (Davids et al. 2006). On a broader but related note, there are increasing concerns that the field of kinesiology has become too fragmented and that the current positivist hegemony may be restricting our understanding of human behaviour. An implication of traditional approaches is the marginalisation of the study of s the broader socio-cultural contexts and problematics of human performance and learning (e.g., Andrews 2008; Larsson and Quennerstedt 2012).

These issues raise a number of philosophical challenges. While there has been a lot of quantitative research on informational and instructional constraints on action (e.g., Renshaw et al. 2010), there is a paucity of qualitative research addressing socio-cultural constraints in the environment (Araújo et al. 2010). It is beyond the scope of this article to fully explicate the foundation of positivism, as well as other philosophical orientations, but we briefly highlight and contrast key paradigmatic concepts to discuss how future research might be guided.

Positivist, Quantitative Paradigms

Historically, positivism has been the *dominant paradigm* in many different academic disciplines (see Sparkes 1992). The positivist paradigm is conceptualised according to realist external ontology, objectivist epistemology, and experimental/manipulative methodology. A major assumption is that a singular reality exists independent of the researcher and that it operates according to natural laws. Thus, the aim of science is to objectively elucidate such a reality through controlled manipulations by the inquirer, while attempting to avoid biases by controlling unwanted interference. In addition, rigorous controlled experimental conditions are used to yield a *valid* and *reliable* nomothetic research programme that can test pre-conceived hypotheses and assumptions underpinned by theoretical frameworks (Guba 1990). The field of motor learning readily adopted such assumptions from its parent discipline of experimental psychology as it sought to establish itself as a valid, rigorous field of study in its own right (Abernethy and Sparrow 1992).

The positivist paradigm leans toward quantitative modes of data collection, through which deterministic relationships of *cause* and *effect* are sought in order to report outcomes that can be *generalised and representative* (see Denzin and Lincoln 2005; Guba 1990). However, in the last few decades many qualitative researchers have been critical of this reductive model that is premised on being independent of cultural context and politically neutral when it is applied to the infinite, multiply layered complexities of the social world. A key question concerns how movement cultures are the product of social, economic and historical contexts.

Interpretive, Qualitative Paradigms

Andrews (2008) rejects the notion that socio-cultural constraints can be productively investigated in the same objective way as the natural sciences. Indeed, the richly complex, socio-cultural contexts in which skill acquisition occurs contains a plethora of unconventional

‘variables’ that can be best illuminated from an interpretive perspective. Specifically, this interpretive approach is centred upon understanding phenomena *within,* not *independent of* their social context.

Qualitative research, however, is not a unified ‘church’, but cuts across disciplines and fields and encompasses different methods, strategies of inquiry, and paradigms (Table 1). It has a long history and tradition in the humanities, sociology and cultural anthropology (Denzin et al. 2000). On a philosophical level, Denzin et al. (2005) proposed that qualitative research is located on a continuum between postpositivism at one extreme and poststructuralist perspectives at the other. The closer research is to postpositivism, the more realist and objectivist it will be[1]. In contrast, the closer research is situated to poststructuralism, the more relativist and subjectivist the research will be[2] (see Denzin et al. 2005).

Across the qualitative spectrum, there are several paradigms that have undergirded qualitative research in physical education (see Sparkes 1992). Pertinent to our multi-method approach is the interpretive paradigm. Interpretivists adopt an internal-idealist ontology and a subjectivist epistemology (see Table 1). The internal-idealist ontology takes reality to be mind-dependent. Consequently, mind and object cannot be separated, signifying that ‘the knower and the process of knowing cannot be separated from what is known and we can never hope to see the world outside of our place in it’ (Sparkes 1994, 13). Further, interpretivists believe that there are multiple realities, which means that an inquiry must engage multiple interpretations (Sparkes 1992). With regard to the subjectivist epistemology,

[1] Postpositivists believe that reality exists, as positivists do. But such reality is imperfectly attainable due to the inevitable influence of the researcher (for further details, see Guba 1990).

[2] Poststructuralism refers to a school of thought that is very similar to the theoretical perspectives of postmodernism (Fawcett 2008). “One general distinction (with many exceptions) is that poststructuralism tends to be more abstract, more philosophical, and less political, than postmodernism”(Ritzer 1997).

reality is constructed and sustained through the meanings and actions of the individual and the researcher interacts and personally engages in the process of investigation (Sparkes 1992). Therefore, the researcher is the main research tool, which differs to positivism where the main tool of investigation is typically a detached technical instrument, such as, for example, a highly structured questionnaire or a high-speed camera to film skill performance (Sparkes 1992). Interpretivists believe that investigated phenomena, and hence *data*, cannot be understood in an objective way, but are subject to interpretation.

In summary, the traditional philosophical paradigms that have been adopted by skill acquisition researchers (i.e., positivist, objective) have arguably created an *organismic asymmetry* (Davids & Araújo, 2010) in which the role of the learning environment has been underemphasised. Furthermore, the traditional reductionist tendency to consider factors in isolation does little to capture the richness of the complex interactions that typify an athlete's world. A less radical and arguably more practical message, however, is that when it comes to choosing between either qualitative or quantitative research paradigms, one is not superior to the other. Rather each provides a different means with which to conduct research. This is the position adopted in our current programme of work investigating socio-cultural constraints on the acquisition of expertise in sport. It also aligns with the views of Silverman (2006), who stated that 'the choice between different research methods should depend upon what you are trying to find out' (p. 34). These ideas suggest that movement scientists need to consider how a range of interpretive, qualitative philosophies can provide added benefit when examining skill acquisition.

Theoretical Foundations of Contextualised Skill Acquisition Research

In recent decades, the dominant research philosophy within motor learning has been questioned through emerging theories, namely ecological psychology and dynamical systems

theory under the umbrella of the constraints-led approach (see Davids, Button & Bennett, 2008). The framework of 'ecological dynamics' conceptualises movement coordination as an emergent property resulting from interacting individual, task, and environment constraints (Seifert, Button, and Davids 2013). As indicated in Table 1, researchers have also advocated strongly for *representative design*, resulting in a better understanding of the information needed to be included in empirical investigations, whether in the field or laboratory (Pinder et al. 2011). However, whilst theoretical advances such as representative design have had a positive impact within the motor learning discipline, the influence of the environment, and in particular socio-cultural constraints, upon learning have yet to be fully elucidated. The social and historical "context" in which skill acquisition occurs is still undervalued in empirical investigations.

Urie Bronfenbrenner (1995) proposed an important model which may help to strengthen the theoretical basis of ecological dynamics. In general terms, the bioecological model conceives human development as function of the *interaction* between nature *and* nurture (see Krebs 2009). Under the notion of contextualisation, mutual co-determination between individual and context provides common ground between the bioecological approach and the constraints-led approach to skill acquisition (Davids et al. 2008). The mutual interactions between performers and context create an ecological dynamic which can eliminate the organismic asymmetry (bias towards the person) typical of traditional research approaches in the behavioural sciences (Davids and Araújo 2010). In addition, within the parameters of contextualisation, analysis cannot be maintained with a linear deterministic focus. For this reason, Bronfenbrenner advocated that environmental properties cannot be 'distinguished by reference to linear variables but analysed in systems terms' (Krebs 2009, 117).

While the bioecological model serves as both a theoretical and methodological framework to investigate socio-cultural constraints on expertise development, it cannot serve as a general explanatory theory of skill acquisition. Indeed, as Araújo et al. (2010, 174) admit, '…this model is more a framework for organising knowledge than a [general] theory of sport expertise'. Thus, as we describe below, the bioecological model should be used to provide methodological guidance for identifying relevant constraints that affect the development of athletes. To our knowledge, the bioecological model is unique in the literature in offering an holistic, longitudinal and contextual overview of human development.

Bioecological model of human development

The bioecological model is predicated on the interaction of four key elements which constrain human development (see Figure 1). These elements are the *process*, *person*, *context* and *time* (PPCT) (see Krebs 2009).

Insert Figure 1 near here

Within the bioecological model, the *process* is deemed to be a principal constraint on human development (Krebs 2009). Bronfenbrenner and Morris (2006) stated, 'this construct encompasses particular forms of interaction between organism and environment, called proximal processes, that operate over time and are posited as the primary mechanisms producing human development' (795). Proximal processes can generate both positive and negative effects on a developing individual. For example, young talented athletes attending an elite sports academy may thrive in that process or may find the experience traumatic without the requisite psycho-behavioural attributes and drop-out altogether (Abbott et al. 2005). Bronfenbrenner (1995) pointed out, 'what is most revealing about proximal processes, however, is not the gains in predictive power that they provide, but their substantive and theoretical significance as the mechanisms of organism-environment behavioural

interaction…' (626). A contextualised historical analysis recognises these proximal processes and their evolution over time, as non-linear idiosyncratic interactions between athlete and environment, which co-constrain skill development. Clearly each individual has the capacity to influence proximal processes through their unique experience and attributes.

The second component of the Bioecological Model is the *person*, analysed by means of his/her biopsychological characteristics developed during person-environment interactions (Bronfenbrenner and Morris 1998). As a specific example, (Stattin and Magnusson 1990) illustrate person-environment interactions by assessing the implications of the biological maturation rate for the developmental process of females. They showed that the behavioural patterns (social adaptation) of post-pubescent girls were related to factors such as age of menarche and association with older, working boys. The authors acknowledge that to understand the role of biological factors on personal development one must also consider mental factors and environmental factors simultaneously.

The third component of the bioecological model is *context*. In human development, context is emphasised as a joint function of characteristics of the person and the environment. It 'encompasses the physical, social, and cultural features of the immediate settings in which human beings live (e.g. family, school, and neighbourhood) as well as the still broader contemporary and historical context in which an individual is born (Moen 1995). Steinberg et al. (1995) recognised the importance of context in analysing parenting style on youngsters' development. They suggest that although authoritative parenting "works", in that adolescents typically fare better when their parents behave this way, it works better in some contexts than others. In certain ecologies, proximal processes outside the control of parents may entirely overwhelm the benefits of authoritative parenting (Steinberg, Darling, and Fletcher 1995).

Bronfenbrenner conceptualised the environment in terms of nested systems of four levels: microsystem (e.g. family support), mesosystem (e.g. training facility), exosystem (e.g. demography), and macrosystem (.e.g. national historical context) (see Krebs 2009). These systems can be conceived of as a fitting concentric structure, each containing the other, forming the ecological environment (see Figure 1).

The microsystem is the innermost level in which the developing person is directly involved in activities, roles, and interpersonal relationships with the immediate physical, social and symbolic features of their environment. In a microsystem, the mechanism of proximal process functions to initiate development, but its quality depends on structure and content of the microsystem (Bronfenbrenner et al. 1998). To exemplify, interactions between family, school, clubs, and neighbourhood in a particular society will shape the quality of a child's development. Domingues & Gonçalves (2012) demonstrated how the bioecological model can be used to help influence how environmental practices and significant others operate over time to shape sport experiences. In contrasting social and youth football club settings, they observed that sport can be a social mechanism of change which can reduce anti-social, delinquent behaviours and develop close relationships between athletes, coaches and significant others.

The mesosystem is a system of microsystems. When a person transits from one microsystem to another, a mesosystem is created. A mesosystem entails interrelations emerging between two or more settings containing the developing person. In other words, interactions of a person in one place, (e.g., workplace) are influenced by interaction with other contexts, such as the family (see Bronfenbrenner 1979; Krebs 2009).

The exosystem comprises the settings in which the developing person participates, including at least one which does not contain that person, but in which events occur that

indirectly influence the person's development (Bronfenbrenner 1979; Krebs 2009). Three important exosystems that are likely to indirectly affect the development of children and youth are the parents' workplace, and the family social network, and neighbourhood-community. In line with these ideas, it's worth noting that previous researchers in skill acquisition have reported how certain characteristics of a neighbourhood community, such as population size of a city, may influence expertise acquisition in sport (see Carlson 1988).

The last level of the nested system is the macrosystem which embraces all the possible linkages amongst microsystems, mesosystems and exosystems. This system was defined by Bronfenbrenner (2005) as 'the overarching pattern of micro, meso-, and exosystems characteristics of a given culture, subculture or other broader social context'. As such the macrosystem level includes a range of putative influences (such as political, economic, and sociocultural) upon the developing individual which are undeniably present but rarely considered within the context of motor learning. For example, the broad macrosystem dimension may help us to describe and interpret historical playing styles, cultures and stratifications that characterise certain sports and nations (e.g., New Zealand rugby union, Brazilian football, Australian rules football, Indian cricket, American basketball, Russian gymnastics, and Nordic winter sports).

The final component of the Bioecological system is *time*, which permits an analysis of both '…the historical period through which a person lives [and the] …timing of biological and social transitions as they relate to the culturally defined age, role expectations, and opportunities occurring throughout the life course' (Bronfenbrenner 1995, 641). Bronfenbrenner and Morris (1998) classified time into three levels: micro-time, meso-time and macro-time. These different timescales distinguish between the rapid discontinuities associated with certain momentary proximal processes (micro), the regular periodicity of

303 other interactions over days, weeks and months (meso), in contrast to the more gradual
304 evolution of other episodes that may occur over a lifespan (macro).

305 **Methodological Foundations of Contextualised Skill Acquisition Research**

306 To summarise so far, contextualised skill acquisition research can be conceived of as a
307 general framework to identify and classify key constraints on an athlete's development.
308 Although many scholars have attempted to apply the bioecological model in new research
309 designs (see Moen et al. 1995), the model has seldom been used to examine skill acquisition
310 processes (Krebs 2009). It is possible that a lack of familiarity with qualitative research
311 methods has hindered application of Bronfenbrenner's model, particularly in sports science
312 (Mullineaux, Bartlett & Bennett, 2001). However, according to Krebs (2009, p. 123)
313 "Bronfenbrenner's bioecological model offers a possibility to use new research designs to
314 conduct better investigations to assess the athlete's personal attributes". In a similar line of
315 focus, Salmon and Timperio (2007) highlighted that more multilevel study designs that
316 incorporate various dimensions (i.e., PPCT) of Bronfenbrenner's model are needed. Gabbard
317 and Krebs (2012) go one step further providing two examples on how the PPCT model might
318 be applied by motor learning researchers. The first suggested line of research concerns
319 environmental influences on fundamental motor skill ability and later physical activity level
320 in children. The second line of enquiry addresses the relationship between motor
321 development and cognitive ability (for further details see Gabbard and Krebs 2012).

322 More pertinent to the examples used in this article, Araújo et al.'s (2010) study
323 exemplifies how to perform qualitative research to investigate the role of ecological
324 constraints on the development of Brazilian footballers. Findings were interpreted and
325 organised by the nested contextualised systems of Bronfenbrenner's model. For instance, the
326 following constraints identified as *unstructured practice environment* (micro), *training*

quality (micro) and *family support* (meso), *birth of location* (exo), and *poverty* (macro) were organised under the scope of the different systems of Bronfenbrenner's model.

However while Araújo et al. (2010) provide an important contribution on how to address and investigate socio-cultural constraints influencing expertise development, their scope was limited by an empirical design which only included a document analysis form of inquiry. As such, it lacks on explaining how the environment is connected with individual and vice-versa. This paper proposes a framework that addresses this issue by relating the different environmental dimensions (e.g. the macrosystem) with individual's lived experiences. To achieve that, we propose an extensive thorough investigation by using other forms of qualitative inquiries such as interview and participant-observation. Thus, contextualised skill acquisition research follows the initial steps taken by Araújo et al. (2010) but extends that work by using the bioecological model to organise prospective findings from different aspects of qualitative research inquiry (see further details on the ethnographic section below). Next, we shall demonstrate how the bioecological model can be applied to identify constraints that affect development of expertise of perceptual motor skills of Brazilian football players.

Researcher as a Tool and as a Bricoleur

As discussed earlier, direct and active involvement of researchers is a key characteristic of interpretivism. The researcher's personal background needs to be acknowledged so 'the audience can better understand the topic, the setting, or the participants and the researcher's interpretation of the phenomenon' (Creswell 2009).

An example taken from the first author's current doctoral programme is helpful to consider at this point. As such the narrative of this article will temporarily transit to the first person. In my PhD research programme, I (first author) aim to adopt the contextualised skill

acquisition approach to examine the development of football players in Brazil. As a Brazilian myself, I understand that my personal, cultural, and historical experiences inevitably shape how I approach fieldwork, interact with participants, and interpret findings. Throughout my analysis, my background will be acknowledged so that readers understand the dialogic interpretation of the empirical findings emerging from field notes (participant-observation) collected at different venues as well as from interviews conducted with players, coaches and other relevant people. To make sense of their understanding of how football players in Brazil acquire relevant perceptual-motor skills, I inductively explore their views and subsequently attempt to develop a theory or patterns of meanings. In doing so, my secondary aim is to offer a methodological and epistemological framework for investigating effects of socio-cultural-historical constraints on skill acquisition.

To achieve this aim, I need to proceed as a *bricoleur*. In qualitative research terms, a bricoleur implies a qualitative researcher who can draw coherently from multi-disciplinary perspectives, distinct theoretical and philosophical orientations, and various methods of inquiry in order to interpret a complex phenomenon generated by complex variables, such as those evidenced in socio-cultural studies (see Denzin et al. 2005).

Bricolage supports an adequate multi-method approach that can inform the parameters of interpretive inquiry. In the context of Brazilian football these include: music; dancing; social inequalities; education; and even corruption that are embedded in Brazilian culture. These socio-cultural constraints are important because they affect skill acquisition within Brazilian football, leading players to infuse their movement coordination processes with unique characteristics such as the idea of playing with *ginga* (sway), flamboyance and flair. Thus, my principal challenge is how to analyse and integrate these constraints that anecdotally have been at the root of the development of the skills of Brazilian football players?

To effectively conduct such an analysis, it is necessary to employ a multi-qualitative approach that offers suitable theoretical and methodological insights to excavate linkages between socio-cultural environmental forces and cultural and corporeal practices of Brazilian footballers. Further, such analyses have to be historically contextualised so that meaningful interpretations of the acquisition of expertise in football can be made in Brazil. Contextualised skill acquisition research requires a bricolage that intertwines epistemological and methodological concepts from the following: Bronfenbrenner's bioecological model of human development, ethnography, and the coherence theory of truth.

Ethnographic Strategy of Inquiry

In its most basic sense, ethnography refers to a 'sketch' of life in its everyday lived context. Ethnographic strategies t are influenced by Paul Willis' (2000) notion of *'the ethnographic imagination'*, which involves the subjectivity and bias of the researchers; practical criticism, rather than being only descriptive; and analysis of lived everyday culture from different sources. As Willis (2000) pointed out '… [the] ethnographic imagination is relevant to the production of all kinds of intellectual work. Non-field-based writing and intellectual work can certainly inform the crafts and methods of ethnography' (113). Thus, under the umbrella of the ethnographic imagination, methods of data collection and analysis consider 'the importance of maintaining a sense of the investigator's history, subjectivity and theoretical positioning as a vital resource for the understanding of, and respect for, those under study' (Willis 2000, 113).

To describe the ethnographic data collection methods undertaken by the first author, it is appropriate once more to adopt the first person narrative. I shall highlight the methods employed for my doctoral studies: contextual analysis (conducted prior to field-work in Brazil); participant-observation, and unstructured interviews (conducted during field-work in

Brazil). These three methods are complementary and interrelated meaning that they do not follow a one-way linear path in the analysis. Rather, it was a nonlinear, non-sequential research process based on the notion of *reflexivity* described by Dowling (2008). From this view, I had to reflexively move back and forth between the methods, theories and paradigms in order to adjust and in turn enhance the quality of empirical procedures. Each of these methods are discussed below beginning with contextual analysis which is predominantly informed by written texts (document analysis) regarding the social history of Brazilian football as well as the general history of Brazil.

Contextual Analysis

Contextual analysis investigates the socio-cultural context in which a phenomenon has been historically constructed. The historical, economic, political, socio-cultural context in which acquisition of football expertise in Brazilian players occurs is significant for this investigation. Indeed, the *historical contextual analysis* was required to reconstruct a number of socio-cultural and political-economic sites of articulation – that is, how these pressures and contexts interact to shape patterns – of Brazilian football in order to inform the participant observation and interview methods. From a methodological viewpoint, such analysis has been useful in informing what data should be collected in the field. In contrast, given the exploratory nature of the present research, emerging data from fieldwork may also be used to inform what should be added or changed to the contextual analysis as the research proceeds.

Participant Observation

Fieldwork in the form of participant-observations, or sometimes only observations, was performed in São Paulo, Brazil in 2011. Through my contacts as a former player in this region and current football agent, I gained access to a professional football club called Paulista FC, a football school affiliated with São Paulo FC, and to a football pelada in a

favela called Vila Ana. I also took notes from children playing informal football in parks and streets of my hometown Jundiai.

The parameters used around the chosen locations for data collection were based on contemporary commentaries regarding the '*History of Brazilian football*', which shows that many successful players emerged from underprivileged suburbs around Brazil. Before they were scouted and sent to a club, they used to make and improvise their own playing field, whether it was on the street, waste ground, or beach (see Goldblatt 2006; Taylor 1998).

To be able to scrutinise the topic and generate rich and relevant evidence, I was prepared to collect data from whatever and whoever provided an opportunity, be it from structured or non-structured settings, professional or non-professional people related to football. However, fieldwork practice was limited by the funding available and also by accessibility in Brazil. In this sense, growing up in the city of Jundiai, province of São Paulo, I was privileged to gain access to football professionals and clubs in the local area that would not have occurred in other regions. There, I started with two key *gatekeepers* (i.e. contacts) who helped to "open the door" to this world by introducing me to the right people. Through a *snowball sampling technique* (i.e. one person indicates other(s)) accessibility was further expanded (see Patton 2002).

Open-Ended Unstructured Interview

Concurrently with the participant observation fieldwork, a *face to face unstructured open-ended interview technique* was undertaken. In order to maximise the exploration of this topic, I asked open-ended questions, eliciting the views and opinions of participants (see Denzin, et al. 2000; Patton 2002). As an example, when the topic of socio-cultural such as dance, poverty (etc.) was brought into the discussion, I then asked: "Tell me about how you perceive the relationship between dance and Brazilian football?" Depending on the response received,

I could be more specific and probe further: "Tell me about how you perceive the effect of samba on the development of skills of Brazilian football players?" As such the broad macro-level dimension of samba as a socio-cultural constraint in Brazil can be explicitly linked with each individual's lived skill experiences. Bear in mind that, as explained above, such topics and lines of questioning were informed by the historical-context analysis performed prior to the field work in Brazil.

Given the open-ended nature of this study, the amount of data collection required to make this study coherent was based on the parameters of '*point of saturation'* or the point where new information no longer emerges (Lincoln and Guba 1985). This is important because, if the amount of data is insufficient, then important information may be missed, providing an incomplete exploration of the topic. On the other hand, if data were oversaturated, then redundant information will be displayed (see Patton 2002).

Evaluation in the form of Coherence Theory of Truth

Having described some of the methods that can be used to conduct a contextualised skill acquisition research study, our final task is to explain how the quality of the research can be evaluated. Paradigmatic differences that influence the way that research is conducted result in different ways of evaluating the quality and adequacy of research. With regard to the evaluation of the positivist research paradigm, key gauges are validity and reliability. Validity is the degree to which a test or instrument measures what it purports to measure. Whereas, reliability refers to acceptable agreement between repeated tests made under similar conditions (Thomas and Nelson 2001). In order to achieve valid and reliable research, positivists adhere to a correspondence theory of truth, by which 'true statements are those that are judged to have accurately reflected the qualities and characteristics of what are out there' (Sparkes 1994, 23). Thus, 'reality' can be understood by the correct application of

formalised methods, such as, highly structured questionnaires, essential in ensuring validity and reliability. This application permits the separation of personal opinions from the object of study (Sparkes 1992).

In qualitative research evaluation criteria are underpinned by the interpretive paradigm, in which validity and reliability are substantively reframed in a subjective epistemology. That is, the researcher is observing and interviewing participants in their natural settings, and given that he or she is the main tool, there are no reliability and validity coefficients for the researcher (Brow 1988, cited in Sparkes 1992).

In order to evaluate research, interpretivists adhere to a coherence theory of truth whereby "the basis of truth or trustworthiness is social agreement; what is judged true or trustworthy is what we can agree, conditioned by time and place, is true or trustworthy" (Sparkes 1992, 30). Within a coherence theory of truth, one event can have many co-existing interpretations so that a richer and broader view of a culture is given (Sparkes 1994). However, this multiple interpretation might be challenging for researchers studying culture to agree on the most correct interpretation (Sparkes 1994, 14). Such a problem falls within the notion of relativism, which generally challenges the notion of the legitimacy of a single reality or absolute truth. From a relativist researcher's point of view, truth of a phenomenon is subjectively constructed by the writer and ultimately by readers of the research.

Despite these issues, the coherence theory of truth is best equipped for purposes of the interpretive paradigm and qualitative philosophical assumptions of this research approach. In applying the coherent theory of truth as an attempt to ensure the quality and adequacy of research, this approach draws upon an eclectic body of theoretical informants and research strategies, including the concept of contextualisation, ethnographic strategy of inquiry

highlighted by methods of participant observation and interviews, and the bricoleur as the main research instrument.

The credibility of the research can be enhanced by contextualising a phenomenon, in this case Brazilian football, back and forth in time and viewing it from different contexts and perspectives. In my work, I will be able to explore and articulate its complex linkages and generate one or multiple-interpretations of the phenomenon. Subsequently, agreements about the truth underlying the development of expertise of Brazilian football players rely on how coherently and consistently I can interpret the findings. However, none of the interpretations are assumed to be value-free or uninfluenced by the writer and reader's assumptions and background.

To further enhance the quality and adequacy of the research under the proposed coherence theory of truth, it will be important to understand a phenomenon from the local people's perspective. Such a negotiation is what Saukko (2005) calls dialogic validity. To achieve this aim, I have read and interpreted various texts, but have also paid close attention to Brazilian football culture as a contested terrain (Hall 2002). My study draws on an ethnographic strategy of inquiry in which I was not only observing but also participating in the local meaning of life in Brazilian football culture. In addition, through unstructured open-ended interviews, participants' voices and interpretations were dialogically considered (Davis 2008). In practical terms, useful example of criteria for interpretive work are embedded in the questions listed in Table 2 (Denzin 1989).

Insert Table 2 about here

Additionally, under the scope of coherence theory of truth, this research will ensure credibility by drawing from the notion of reflexivity. According to Dowling (2008), reflexivity can be described as '…qualitative researchers' engagement of continuous

examination and explanation of how they have influenced a research project (747)'. With this in mind, throughout the development of this project I have continuously questioned the methodological decisions made so that, if necessary, I can adjust my research focus without necessarily losing the purpose of it. For example, under constant thorough investigation and reflective actions, a multi-methodology approach has been employed to explore the present research.

Finally, in order to make the notion of reflexivity meaningful, it is crucial to take into consideration one of the key aspects of qualitative methods of inquiry: the researcher him/herself. As can be seen, the researcher has a key role in making ontological, epistemological and methodological decisions, and his/her experience and background inevitably influences the analysis and interpretation of the research. The role and background of the researcher has to be acknowledged in advance so readers can interpret the researcher's interpretation of the practice and beliefs of others, and make their own "truth" conclusions. Accordingly, I have reflected, examined, and as highlighted earlier, explained how my Brazilian background and subsequent experience living overseas may influence the way that I will dialogically/dialectically interpret this research.

Discussion and Conclusions

In this article we have proposed a novel research framework (contextualised skill acquisition research) that has considerable potential for analysis of socio-cultural constraints upon skill acquisition. We signalled the need to extend beyond positivist research philosophies in order to investigate unconventional variables in motor learning. We also justified why the interpretive paradigm and its qualitative research tools are best suited this purpose. Bronfenbrenner's Bioecological model has considerable value to help decide what factors and processes to consider and how best to organise material into suitable levels. To underpin

543 the parameters of this approach, we provided an account of the subjectivist focus of the study,
544 the function of the multi-method approach employed, and a researcher's role as a bricoleur
545 for dialogical interpretations. Finally, we explained the coherence theory of truth as the
546 evaluation criteria employed to maximise the quality or credibility of findings. We also
547 discussed the process of reflexivity, in which researchers need to continuously reflect and
548 analyse all phases of research so that epistemological and methodological adjustment can be
549 made as a means to raise a meaningful interpretation.

550 Overall, it is proposed that this framework will contribute to the epistemological,
551 theoretical and methodological knowledge across the sub-disciplines of motor learning and
552 sociology. In particular the approach provides researchers with the tools/rationale to link
553 different systems within which an individual develops. As such an enriched understanding of
554 the individual's lived experiences within the broader social, geographical, historical (etc.)
555 context can be reached. In practical terms, the proposed approach may benefit understanding
556 of processes of skill acquisition, talent identification and athlete development. The
557 limitations, however, suggest that practical implications of the framework may not be directly
558 obvious to teachers, coaches and professionals alike. Indeed to influence either social or
559 cultural influences on the learner is not a simple process due to the extended timescales over
560 which such variables act. Moreover, results viewed from interpretive paradigms can have
561 multiple interpretations and unlike traditional research in motor learning, results cannot be
562 generalised. It is our hope that this article will provoke feedback, discussion and possibly
563 inspire others to consider the contextualised skill acquisition research framework in the
564 future.

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Figure 1. Illustration of Bronfenbrenner's bioecological model. N.B.: In relation to the context, only microsystems are physically located. The others are "events or forces" that influence the person and the particular microsystem under analysis. The mesosystem encompass other microsystems frequented by the person. The exosystem comprises the microsystems that indirectly influence the person and the microsystem under analysis. The macrosystem embraces the overarching patterns of the micro-, meso, and exosytems contexts of a given culture. Further than the person and the context, the bioecological model comprises time and process. Process expresses the characteristics of person-context interactions over time. Additionally, person and context change over time (Based on ideas of Araújo, et al., 2010).

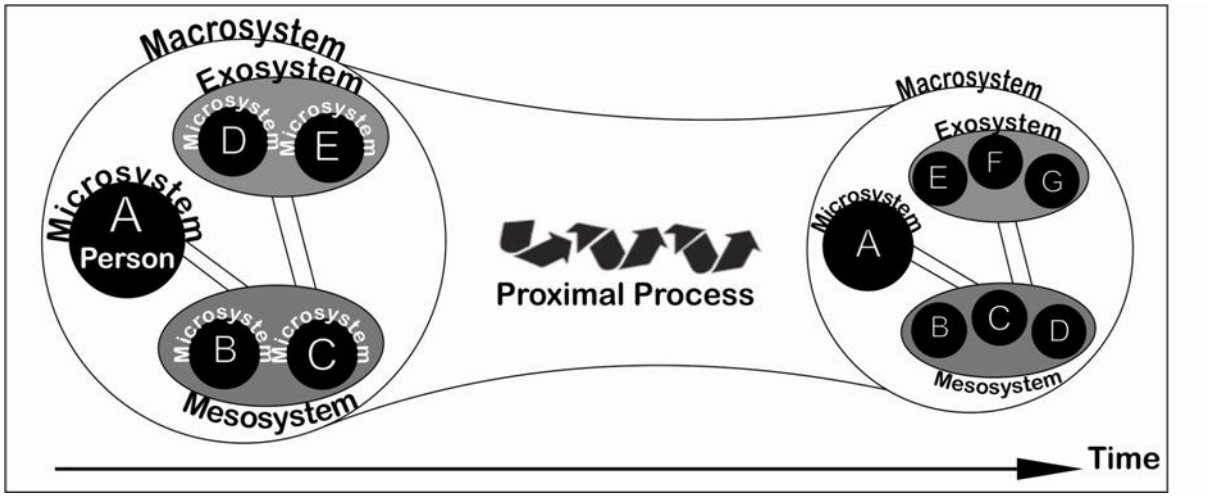

Table 1. The philosophical, theoretical and methodological basis of contextualised skill acquisition research. N.B.: for explanatory purposes it is necessary to describe constructs and concepts as independent, however several concepts and ideas in the table are closely linked. Rather than attempting to capture such complex and important relationships through a simplified figure we recommend consulting the suggested sources of evidence and background reading for further clarification.

Construct	**Concept**	**Suggested evidence & background information**
Philosophical influences	Interpretive paradigm	Internal-idealist ontology: *Denzin (1989); Sparkes (1992)* Subjectivist epistemology: *Andrews (2008)*
	Holistic model of skill acquisition	Constraints-led approach, e.g., *Davids, Button & Bennett (2008); Handford et al., (1997); Newell (1985)*
Theoretical underpinnings	The athlete and environment conceptualised as a complex, dynamic system	Dynamical systems theory, e.g., *Kelso (1995)* Ecological psychology, e.g., *Gibson (1979)*
	Field-based study	Representative design, e.g., *Brunswik (1955); Pinder et al., (2011)*
	Sensitive to socio-cultural influences	Bioecological model of human development e.g., *Bronfenbrenner (2006); Moen, Elder & Lüscher (2005)*
Methodological tools	Bricolage	e.g., *Denzin & Lincoln (2005); Creswell (2009)*
	Ethnography, multi-method	e.g., contextual analysis, observation, field notes, interviews. For overviews, see: *Patton (2002); Silverman (2006)*
	Versatility and reflexivity	e.g., *Dowling (2008); Fawcett (2008)*
	Evaluation and coherence	e.g., *Sparkes (1992; 1994)*

Table 2. Examples of inclusion criteria to be cross-referenced against information generated in interpretive research (Denzin 1989, 81).

	Inclusion criteria
1.	Do they illuminate the phenomenon as lived experience?
2.	Are they based on thickly contextualised materials?
3.	Are they historically and relationally grounded?
4.	Are they processual and interactional?
5.	Do they engulf what is known about the phenomena?
6.	Do they incorporate prior understandings of the phenomena?
7.	Do they cohere and produce understanding?
8.	Are they unfinished or inconclusive?

Rebuttal letter

Once more we thank the Editor and reviewers for inviting us with the opportunity to revise and resubmit our article. The questions raised by the reviewers prompted us to make the following changes to the manuscript:

1) Inclusion of Figure legends and Table titles which were missing in the last submission.
2) Clarification and additional references to support the rationale in the Introduction for an interdisciplinary approach in PE and kinesiology.
3) More detail and references in the section on Bronfenbrenner's bioecological model to elucidate the important role of this framework.
4) Clarification of the nonlinear/non-sequential processes suggested in the methods as well as an example open-ended question.
5) Discussion of ways to link the broader (macro) context with individual skill experiences.

The changes to the manuscript are clearly marked in highlighted text. A more detailed point-by-point response to each reviewer also follows this letter. We should point out that due to space limitations imposed by the journal we have been unable to act upon all of the reviewers' suggestions but hope that the changes we have made sufficiently address the concerns raised.

Reviewer: 1

1) More comprehensive explanation of Figure 1

The authors have tried to explain Figure 1 in the main body of the manuscript. However, I was hoping that more detailed reference to what Figure 1 really means can be provided.

It appears that the legends for Figure 1 and Tables 1/2 were not included in the original submission. We apologise if this was our oversight (and not an upload error), the explanations of the Tables and Figure are now included in the latest revision.

2) Additional reference to support statement

Can the authors provide more references to support the statement made in line 51?

Thank you for drawing our attention to these useful references and our slight misinterpretation of Physical Cultural Studies. We have made subtle changes to the text to reflect the different positions of the works that Reviewer 2 recommended to us. This new information is highlighted on pg. 3:

"We are not the first to propose a potential solution for these limitations of kinesiology and physical education (e.g., Ingham, 1997; Andrews, 2008). Andrews et al. (2013) paint an explicitly socially critical vision for kinesiology – under the aegis of Physical Cultural Studies as: "an interdisciplinary field ground within a critical curriculum of the corporeal that draws on a range of exciting and innovative methodologies that can provide the languages of,

and possibilities for, a politically progressive, socially just, and democratic citizenry." Although not grounded in critical paradigms and political projects in precisely the same way, we too envisage future possibilities in which biophysical sciences and socio-cultural sciences may be inextricably linked. We acknowledge that our tentative contribution to the development of this new paradigm is to build bridges across the methodological boundaries between sociology and motor learning in the first instance, rather than offering a unifying approach for the whole field."

3) Further clarification on nonlinear and non-sequential research process

How would the authors define these nonlinear and non-sequential processes? Do you follow any pre-set parameters to determine how to do these?

These 'reflexive' processes in which qualitative researchers may need to switch between different aspects of the research process are described comprehensively by Dowling (2008). There are no pre-set parameters to determine how to research with reflexivity, indeed by definition one must respond to key issues as they emerge. One might argue that one parameter that is adopted within our approach of '*point of saturation'* is pre-set, however one cannot determine that point in advance instead one must carefully interpret the findings ongoingly to identify it.

4) 'eho'

What does this mean? Line 376

It should have read 'who' - this has been corrected.

5) Provide some sample questions

Could the authors provide some examples of such open-ended questions? Line 382.

A sample open-ended question is now provided in this section.

6) Leverage on past studies of similar nature

Can the authors provide more examples (past studies) that have used very similar design to what you intend to do? Are there any specific detailed study to provide as an example? This will give the reader a better idea of what has been previously done that you are proposing in your work.

As we point out in the article relatively few studies to date have adopted the interdisciplinary philosophy and range of methods that we propose. That said we have added references from the motor development literature that utilise Bronfenbrenner's model and certain aspects of the ethnographical approach that we advocate (e.g……). Araújo et al.'s (2010) study is probably the most pertinent example that we can offer and whilst not without its limitations, we have discussed their work at length (pg.13-14).

Reviewer: 2

1. The major issue centers on the lack of engagement with the various dimensions of Bronfenbrenner's ecological systems model. I was fully expected the macros/meso/micro systems to be discussed within the differing scalar contexts of Brazilian soccer culture, but this was rather overlooked. Some systems were alluded to, however, not in sufficient depth or detail. I think a paragraph on each would greatly embellished the contextualized nature of the approach, and of this example.

Additional details in the main text and to Figure 1 have been provided. It was not the aim of this article to provide a comprehensive overview of Bronfenbrenner's bioecological model (suitable references are provided in that regard). Instead our intentions were to overview the main concepts within the model and then allude to how it may provide a supporting framework when analysing information from a contextualised skill acquisition approach. The word limit of the journal meant that we could not add more detail regarding the different scalar contexts of Brazilian soccer culture but that will certainly be a primary objective in forthcoming publications.

2. I was wholly lost and confused by the tables/figures, and was never quite sure to which the text was referring.

This was an oversight on our behalf. The legends for the Figure and Tables were not included in the original submission and this has now been addressed in the latest revision. We have also rechecked the manuscript to ensure that the references to tables and the figure are clear and accurate.

3. The reference to Physical Cultural Studies is slightly awry. Ingham (1997) certainly advocated a "whole field" approach, whereas Andrews (2008), and for that matter Silk and Andrews (2011) and Andrews et al (2013) were less ambitious in their inter-disciplinary vision.

Thank you for drawing our attention to these useful references and our slight misinterpretation of Physical Cultural Studies. We have made subtle changes to the text to reflect the different positions of the works that Reviewer 2 recommended to us. This new information is highlighted on pg. 3:

"We are not the first to propose a potential solution for these limitations of kinesiology and physical education (e.g., Ingham, 1997; Andrews, 2008). The words of Andrews et al. (2013) paint a utopian vision for kinesiology as: "an interdisciplinary field ground within a critical curriculum of the corporeal that draws on a range of exciting and innovative methodologies that can provide the languages of, and possibilities for, a politically progressive, socially just, and democratic citizenry." Indeed, we too envisage a future in which biophysical sciences and socio-cultural sciences are inextricably linked. We acknowledge that our tentative contribution to the development of this new paradigm is to build bridges across the sub-disciplines of sociology and motor learning in the first instance, rather than offering a unifying approach for the whole field."

4. There could have been a little more detail regarding the outlining of precisely what new forms understanding this contextualized approach to skill acquisition elicited. This is alluded to in numerous places, I simply felt the rationale for the project would be stronger if these were made more explicit.

Some of the new forms of understanding that the contextualised approach to skill acquisition can elicit are now explicitly discussed in the Introduction and final section of the article. For example, the following text has been added to the conclusion section (pg 23):

"In particular the approach provides researchers with the tools/rationale to link different systems within which an individual develops. As such an enriched understanding of the individual's lived experiences within the broader social, geographical, historical (etc.) context can be reached."

5. Personally (and I am certainly not expecting the authors to change this, its just an observation I feel I needed to make), I much prefer the notion of context to constraints, as the latter seems to deny the possibility of enabling factors? This, of course, could be because I am not familiar with skill acquisition research or rhetoric, I just felt context was a more open category?

Thank you for your suggestion. This is a common misconception of the constraints concept (i.e., that they serve only to restrict movements whereas in fact they too enable movement to occur). As the constraints-led approach is such an important theoretical and philosophical influence on our work we have chosen to stick with this concept with the inclusion of additional clarification to the enabling nature of constraints (highlighted footnote pg. 2):

"Constraints are the range of factors that can both limit, and facilitate, the organisation of human movement coordination. Constraints can be broadly categorised into three types, namely; Task, Environmental, and Organismic. The constraints-led approach forms a multidisciplinary and holistic foundation upon which an understanding of motor behaviour can be constructed (Davids, Button, & Bennett, 2008)."

6. In their description of Bronfenbrenner's ecological systems model, the authors have categorized the macro system (pp. 11-12) in a manner which privileges the immediate sporting context, overlooks the social, political, economic, and technological contexts with which sport is dialectically related. Later in the discussion, these contextual dimensions are referred to in the Brazilian context (though in a rather vague and ambiguous way), but here they are not mentioned.

Thank you for drawing our attention to this important point, it was not our intention to privilege any one context over any others. Additional details in the main text and to Figure 1 have been provided as suggested (e.g., p. 12 & 14). Due to space limitations it was not possible to provide further detail with regard how these contextual dimensions are manifest in the Brazilian context. We have another manuscript in preparation that will achieve this purpose.

7. Another key relationship that is presently under-developed is that between the broader (macro-context) and lived/embodied/skill experience. How do we connect these different, yet clearly interrelated dimensions? The authors did not really provide an framework for linking them. Yes, they identified the necessary linkages, but is there a more nuanced way of thinking through the specifics of these relations? How do we connect these two, quite different, forms of data?

This is a useful observation and we have attempted to provide suggestions about how to link disparate forms of data in the revised submission. For example by adding an example of one open-ended question (Reviewer 1's request) we also used the opportunity to elaborate in more detail how a broad macro-level context can influence and be linked to an individual's lived experiences and beliefs (pg. 19).

"As an example, when the topic of socio-cultural such as dance, poverty (etc.) was brought into the discussion, I then asked: "Tell me about how you perceive the relationship between dance and Brazilian football?" Depending on the response received, I could be more specific and probe further: "Tell me about how you perceive the effect of samba on the development of skills of Brazilian football players?" As such the broad macro-level dimension of samba as a socio-cultural constraint in Brazil can be explicitly linked with each individual's lived skill experiences. Bear in mind that, as explained above, such topics and lines of questioning were informed by the historical-context analysis performed prior to the field work in Brazil."

8. A few of the references (i.e. Saukko, 2005; Hall, 2006) could not be found in the reference list.

Apologies for this oversight, the missing references have now been added.