Beliefs of time orientation from an indigenous African perspective: Possible implications for climate change adaptation

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It all starts here ™

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"I'm a traveller of both time and space"[1]

As the ignorant girl[2] walked through the trees, diffidently following the voice[3] in her head, she stumbled upon the glorious god, Thor[4]. He could sense that she was in dire need of motivation in order to continue on her life-changing journey and thus decided to rhythmically strike and beat Mjölnir[5] to guide her on her way.

With thunderbolts[6] and lightning[7] crashing around her, she hastily continued on her journey. Stumbling, falling and crawling with a bruised mind and torn flesh – ever fearful that she might not survive.

After what seemed like an eternity, the trees started to dwindle… finally clearing into an open meadow. It was only then, with the sunlight[8] hitting her dirty face, that her journey made sense…

Finally, she could see the forest from the trees.

ABSTRACT

Climate change may be one of the biggest threats to human survival and it is imperative that humans adapt their behaviour in order to mitigate the effects thereof. In South Africa, some communities are vulnerable to climate change and should therefore be the focus of climate change adaptive strategies. Based on cultural diversity and societal differences, it is valuable to investigate a vulnerable community's worldview in order to tailor climate change adaptive strategies for said community.

A community's worldview, and consequently culture, will influence the risk perception of the group. If the group does not identify a risk as threatening enough, there will be a lack of motivation to adapt to this risk, which in turn may have detrimental effects. One such aspect of a community's culture that will greatly influence the group's risk perception, is its time orientation.

To date, no research focusses on the time orientation of peri-urban communities in South Africa or how those beliefs may influence the relevant community's adaptive behaviour towards climate change. This vacuum in research served as motivation for the study in which three peri-urban South African communities were identified to investigate the relationship between the communities' cultural time orientation, climate change and adaptation.

A comprehensive literature review is presented to provide a theoretical foundation for the study. Based on the literature review, a context specific concept, namely *Afro-polychronism*, is proposed. This concept aims to formulate the characteristics of polychronism, *Ubuntu* and African time orientation (as formulated by John Mbiti in 1969) into one concept to better describe the cultural time orientation of the indigenous South African communities present in this study.

In this study, Q-methodology was used during the research process. Semi-structured interviews were conducted after respondents were identified by means of random purposive sampling. Based on the recorded and transcribed semi-structured interviews, a Q-set of 40 Q-sort statements were identified.

The respondents were then requested to arrange these statements in a free-distribution manner on a Q-sort diagram based on the provided Likert scale. Subsequently, they were requested to arrange the statements in a forced-distribution manner. The statement distributions were recorded and entered into the PQMethod software.

The PQMethod software analysed the data and produced various statistical data. Based on the factor arrays produced for each Q-sort statement, several interpretation and conclusions were made regarding the respondents' attitudes and opinions pertaining to time orientation, climate change awareness and causality.

It became clear that the respondents are in fact aware of climate change based on their present and past experiences. A lack of motivation to adapt to the change is nonetheless prevalent. This can be ascribed to their collectivistic time orientation whereby limited emphasis is allocated to future occurrences.

To attempt alteration of the community's risk perception, it is recommended that the community-based disaster risk management approach should be implemented in order to tailor awareness information based on the community's beliefs and culture. By providing community-specific disaster risk reduction strategies, the community may be more inclined to identify with the risks, consequently motivating adaptive behaviour.

In multicultural South Africa it cannot be assumed that various communities will have the same time orientation and this study motivates further studies to investigate the cultural time orientation and beliefs of communities, as these may influence climate change adaptation.

Key words: adaptation, Afro-polychronism, climate change, community-based disaster risk management, indigenous South African perspective, risk perception, time orientation, Q-methodology.

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CHAPTER 1: INTRODUCTION

1.1   Introduction

The Intergovernmental Panel on Climate Change (IPCC, 2012:557) defines climate change as:

> A change in the state of the climate that can be identified (e.g. by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forces, or to persistent anthropogenic changes in the composition of the atmosphere or in land use.

According to Adger *et al.* (2011:765) societies can be disrupted by climate change in multiple ways, for example food security and availability; affected livelihood; and decreasing health and wealth. Societies' capability to produce appropriate responses to climate changes will be challenged by the severity and complexity of the climatic changes experienced (Adger *et al.*, 2011:758). Climate change adaptation can be regarded as the adjustment of systems in response to climate variations (Smit & Pilifosova, 2001:879).

Due to the inevitability of climate change, O'Brien (2000:1) calls for countries to conduct assessments to determine or predict how it will be affected by climate change and what adaptive measures might be needed. One aspect to be assessed is the vulnerability of the country as this refers to "the state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt" (Adger, 2006:268). It should however be noted that O'Brien *et al.* (2003:3) also explain that vulnerability can be a difficult concept to define considering the fact that threats, climate changes and the capacity to cope may differ across regions.

Climate change is a crucial concern within the South African context (Ziervogel *et al.*, 2014:605). The South African region has high levels of vulnerability and according to Griffin (2012) it is due to the high levels of poverty as a great percentage of the South African populace is subjected to destitute living conditions. Informal settlements, comprising inadequate housing structures (without protection against natural elements), are erected in localities where extreme weather conditions are prevalent (Griffin, 2012). Due to South Africa's high level of vulnerability, climate change can therefore amplify current problems like "inadequate living conditions" (Griffin, 2012), disease, poverty and food availability (Department of Environmental Affairs, 2015).

Vulnerability does not only differ across regions, but also within local communities where some groups have a disposition to be more vulnerable to climate change and adaptation than others

(O'Brien *et al.*, 2003:25). It is of great importance that the most vulnerable communities are identified (thereby providing context) in order to appropriately evaluate and address their climate change adaptation capacity (O'Brien *et al.*, 2003:2).

Adger *et al.* (2009:340) argue that context is imperative when trying to understand vulnerability, climate change adaptation and the possible limits to adaptation. It is important to understand the context wherein changes, with reference to climate change, take place, as well as the effects on sociocultural adaptation. Context, in this dissertation, refers to specific regional conditions, ethnic origins and sociocultural groups.

Within the framework of climate change, cultural studies are important due to the increasing need for global and local mitigation regarding climate change (Lorenzoni & Hulme, 2009:383). Several authors (Adger *et al.*, 2013; Rayner cited by McNeeley & Lazrus, 2014:506) concur that the understanding of culture is significant when addressing climatic change through policies and the planning of strategies for mitigation and adaptation.

The culture of a community provides the research context when investigating climate change and adaptation. The concept of *time* is deemed a sociocultural notion that forms part of a society's character (Babalola & Alokan, 2013:147). Offe (2001:64) agrees that a correlation between societal time orientation and the society's social and cultural characteristics exists.

Previous research attempted to develop a cross-cultural gauge of time perspectives (Brodowsky & Anderson cited by Legohérel *et al.*, 2009:96). The notion of time perspective and its possible effects has however not received detailed attention regarding an (indigenous) African context (Dissel, 2007:18; Mbiti, 1969:16; Offe, 2001:60). Differences between time perspectives amongst cultural groups, that form part of the (relatively collectivistic) African cultural context, has furthermore not yet been clarified (Dissel, 2007:20; Wallman, 1992:2).

Dissel (2007:42) emphasises the need for more qualitative research on time perspectives to possibly highlight cultural contexts when studying "time perspective in the African context". Related to the notion of time is the viewpoint on future timeframes (hereafter *future view*) of indigenous societies. This will be of importance, since the significance of future consideration cannot be assumed to be equally prominent across all cultures (McInerney, 2004:142; Wallman, 1992:2).

Various influences shape and customise time perspective and orientation (Zimbardo & Boyd, 1999:1271) and time may even be regarded as the "bases on which all cultures rest and around all activities revolve" (Hall, 1990:179). Adger *et al.* (2009:344) state that the actions of societies and its members will be formed by deeply rooted collective cultural beliefs.

McNeeley and Lazrus (2014:506) affirm that cultural worldviews, formed by social interaction, will greatly influence the manner in which people identify the risk caused by climatic change. The type of risk a person focuses on will be influenced by the individual's level of social involvement and the cultural group they belong to (Olteda *et al.*, 2004:5, 16). Some level of risk (or threat), albeit minuscule, must be experienced in order to motivate people to consider the positive consequences of their action and ability to mediate the perceived threat (Schwarzer, 1992:235). Grothman and Patt (2005:202) agree that risk perception will establish and encourage the motivation needed to adapt. The likelihood of being influenced by the effects of climatic change is expressed by risk perception (Grothman & Patt, 2005:202).

In other words: decisions concerning adaptation will be influenced by the beliefs or perceptions of risk held by a society. This anticipation of risk can limit the society's adaptation, for example if the society believes that the risk does not justify action (Adger *et al.*, 2009:350). Risk perception and adaptation ability are shaped by information on climate change, as communicated by mass media and social agents (Grothman & Patt, 2005:205).

With this in mind, the 2011 *National Climate Change Response White Paper* of South Africa encourages the "enhancing (of) public awareness and understanding of climate change causes and impacts to promote participation and action at all levels" (Department of Environmental Affairs, 2011:10). This can be done by changing behaviour through choices that prioritise community awareness, education and training (Department of Environmental Affairs, 2011:15). The motivation behind this community awareness and education is "to empower all South Africans to make informed choices that contribute to an economy and society that is resilient to climate change" (Department of Environmental Affairs, 2011:15).

In this study, beliefs regarding time orientation from an indigenous South African perspective are investigated to determine possible implications for climate change adaptation. Recommendations for community awareness regarding climate change and adaptation are also provided.

1.2   Problem statement

Cultural time orientation, as experienced within a particular indigenous South African context, may have a major influence on the future perspective of communities in peri-urban South Africa. This specific concept of time orientation is predominantly past- and present-orientated with marginal emphasis on the future. This time orientation and future view will dramatically influence the risk perception of the community. Climate change must be acknowledged and foreseeable risks must be perceived in order to motivate behavioural change and adaptation. Therefore, the beliefs surrounding time orientation influence the future view of communities in peri-urban South Africa and this may have implications for climate change adaptation.

1.3   Hypothesis

The fundamental beliefs surrounding time orientation in the indigenous South African context are concrete, past- and present-orientated, with less emphasis on the future. This may therefore influence the community's ability to adapt to climate change, since adaptation requires cognition of the influence of current actions and behaviours on future events and outcomes.

1.4   Research questions

The following research questions are derived from the problem statement:

1. What are the beliefs associated with time orientation in peri-urban South Africa?

2. What is "climate change adaptation"?

3. What are some of the possible influences of beliefs surrounding time orientation on the future view of three communities in peri-urban South Africa?

4. What recommendations for community awareness regarding climate change adaptation can be made?

1.5   Research objectives

The objective of this study is to:

1. describe beliefs associated with time orientation in peri-urban South Africa;

2. perform a conceptual analysis of "climate change adaptation";

3. investigate some of the possible influences of beliefs concerning time orientation in three communities in peri-urban South Africa, based on the communities' future view on climate change adaptation; and

4. provide recommendations to raise community awareness regarding climate change adaptation.

1.6   Methodology

Research design is described as a strategy comprising the actions to be executed during the research (Mouton, 2001:55). This includes the types of enquiries that provide direction for the research (Creswell, 2014:247). The outline of the design and methods for this study comprise a review of relevant literature followed by Q-methodological research.

1.6.1 Literature review

A literature review provides the necessary means for a comprehensive rumination on available literature on a topic which illuminates "the strengths and weaknesses within the overall body of knowledge" and assists in identifying knowledge gaps (Louwrens, 2014:ix). The review aids the contextualising process and the establishment of a steadfast academic research framework.

An extensive and in-depth literature review has been conducted by means of thematic analysis which provided an understanding of theories and concepts relating to the themes studied during the execution of this study. Thematic research included worldviews, indigenous South African culture, beliefs, time orientation, climate change, vulnerability, risk, climate change adaptation and community awareness.

1.6.2 Empirical research

Empirical research refers to the experimentation process and observation in order to gain research knowledge. The opinions of respondents regarding time orientation and climate change adaptation were investigated by means of Q-methodology. In the following sections attention is given to the research methodology, research design, sampling, instrumentation, data collection, and data analysis.

1.6.2.1 Research methodology

For the purpose of this study, a Q-methodological approach has been used, since it provides better possible answers to the proposed research questions. It must be noted that even though the approach is mixed in nature, it is not the same as using a mixed-method approach. This can be attributed to certain characteristics of the main instrument (Q-method) used in the study that cannot be specified as qualitative, quantitative or mixed method. (The Q-method is discussed in more detail in **Chapter 3**).

When conducting research of a mixed nature, various research designs are at the disposal of the researcher and attention is given to the qualitative research designs most applicable to the research.

1.6.2.2 Research design

According to Creswell (2014:247), a research design necessitates types of enquiries that will provide direction for the research. The purpose of this research is to investigate the belief system of a specific community with regard to time orientation and climate change. The main research method used was Q-methodology, which has both qualitative and quantitative properties. When utilising this method, qualitative data is quantified where after correlations between variables are investigated. Therefore, cross-sectional design is the most appropriate

research design for this study.

Bryman (2012:58, 711) explains a cross-sectional research design as "the collection of data on more than one case… and at a single point in time in order to collect a body of quantitative or quantifiable data in connection with two or more variables… which are then examined to detect patterns of association.".

1.6.2.3 Sampling

Becker (1998:67) is of the opinion that sampling represents an immense challenge in several types of research methods. He explains that scientific initiatives try to find facts or evidence that applies to categories of items by examining small units of analysis. For Tashakkori and Teddlie (2003:715) sampling entails the selection of analysis units from a population in such manner that it maximises the researcher's ability to provide answers to proposed research questions.

For optimisation of the study regarding time orientation from an indigenous South African perspective, it was imperative in the first phase of data collection to use the purposive random sampling method. Tashakkori and Teddlie (2009:342) adequately define purposive random sampling as:

> taking a random sample of a small number of units from a larger target *population*. The random nature of this sampling procedure is characteristic of *probability sampling*, whereas the small number of cases generated through it is characteristic of *purposive sampling*.

Three peri-urban communities were identified as the population from which samples were randomly drawn. (The study's sampling is discussed in more detail in **Chapter 3**).

1.6.2.4 Instrumentation

The key instrument applied to the research is Q-methodology. Q-methodology was created by William Stephenson to enable the researcher to study subjectivity in an objective manner (Ramlo & Newman, 2011:186) and consists of an assortment of both quantitative and qualitative aspects (Ramlo & Newman, 2011:186; Stenner, 2011:193) that "combines the strengths of both qualitative and quantitative research traditions" (Dennis & Goldberg, 1996:104). Even though Q-methodology is more strongly represented by qualitative aspects, it can be regarded as "a unique hybrid of qualitative and quantitative research methods" (Ramlo & Newman, 2011:186).

Stenner and Stainton (Stenner, 2011:203) coined the term *qualiquantology* in order to encapsulate the hybrid characteristics of Q-methodology They state that:

hybridity ought to be discomforting, since any genuine hybrid represents a significant reformation in the bodies that are brought together in forming it. Hybridity pierces the boundaries of identity and opens up the difference of otherness. By contrast, merely adding a qualitative dimension to a quantitative study or vice versa does not constitute hybridity and may be far from discomforting (Stenner & Stainton, 2004:101).

This seemingly paradoxical and discomforting characteristic of the Q-method, together with qualiquantology, served as motivation to rather use a research methodology mixed in nature, compared to the clear categorisation of the mixed-method approach.

Previte *et al.* (2007:137-140) briefly summarise the Q-methodological study in the subsequent stages:

The discourse to be investigated must firstly be identified. From the wider discourse a "concourse" must be isolated. Here the concourse refers to the collection of statements about a theme of interest. From the identified concourse a Q-sort statement set, containing identified representative statements, is developed (Previte *et al.*, 2007:137-140). From here the respondents in the groups will place the Q-sort statements in a particular order on a grid or diagram with a Likert scale – this process is called Q-sorting (Previte *et al.*, 2007:137-140). The unique ordering of the statements is then subjected to factor analysis "to reveal the way groupings of people think similarly or divergently" (Paige, 2014:639).

When using semi-structured questionnaires in Q-methodology, the reliability must be established to ensure the trustworthiness of the research findings. Here measure reliability refers to data consistency and accuracy with regard to the representation of constructs to be measured (Tashakkori & Teddlie, 2009:333).

1.6.2.5 Data collection

During Phase 1 of the research, three interventions with equal amounts of participant units (η = 30 per site) were conducted at different research sites in the North-West province of South Africa (Jouberton, Ventersdorp and Ikageng). A semi-structured interview was conducted with each respondent, whereby two open-ended questions were asked. This ensured the relative cultural homogeneity of the respondents.

Thereafter the participant groups were reduced by means of random selection to form the participating units (η = 15 per site) during the second phase of the research. Phase 2 in the research process comprised the identification and selection of 40 Q-sort statements for the conducted semi-structured interviews conducted in the first phase.

In conjunction with the identified Q-sort statements, the Q-sorting diagram was administered to a second set of respondents as selected in Phase 2. The respondents were required to freely distribute the Q-sort statements as desired on the Q-sorting diagram based on the Likert scale provided.

During Phase 3, the respondent groups (all of whom participated in Phase 1) were reduced by means of random selection (η = 8 per site). The Q-sorting diagram was administered again and the respondents were instructed to distribute the Q-sort statements based on the forced-distribution method.

After the Q-sorting on the diagrams (Phases 2 and 3), the position of the statements was captured in order to facilitate the analysis of data. An extensive computer analysis of the Q-sort data was done to provide research information that assisted in answering the research questions.

1.6.2.6 Data analysis

Software analysis of the Q-sort data provided the necessary research data to assist in answering the proposed research questions by interpreting the findings.

1.7   Ethical considerations

When conducting research with people, ethical principles must be adhered to at all times since failure to do so can harm social research. Ethical clearance (NWU-00334-14-A7) for the SANCOOP: Climate & Beliefs Project was obtained after approval from the applicable ethics committee at the North-West University, South Africa for the period 7/11/2014 to 16/11/2019.

1.8   Limitations and delimitations

In South Africa there are eleven official languages and a prominent limitation was created by language barriers. During the research, interpreters were present to communicate with the respondent groups when the researcher was unable to communicate with the group in their preferred language.

Due to the language barrier and the use of interpreters, some of the information presented by respondents might have been interpreted incorrectly or got lost during interpretation. To overcome this language barrier, all interview transcripts and interpretations were quality checked by professionals to ensure the validity of the data.

It must be noted that some of the research respondents were illiterate, which challenged the information gathering methods. To overcome this, the instruments used when conducting field research were designed in such a sensitive manner to avoid possible discrimination based on

the literacy level of the respondents. During Phases 2 and 3, the researchers read the statements to the illiterate respondents who were given the opportunity to make their own interpretations.

1.9 Significance of the study

The literature review highlighted that similar research regarding the proposed themes has not yet been conducted. This gap in research led to the conclusion that the lack of, or link to, time orientation from an indigenous South African perspective and its impact on climate change adaptation, is a problem worth investigating.

Within the context of climate change, cross-cultural studies are of great importance (Lorenzoni & Hulme, 2009:383) and this research may influence future research focusing on the comparison amongst different cultures in South Africa to establish whether parallels between different cultural beliefs and climate change adaptation exist. The same research design may also be applicable to the beliefs of communities in developing countries and the manner in which those beliefs influence climate change adaptation.

1.10 Chapter layout

This mini-dissertation is written in article format and consists of five chapters and one article. The article was prepared and submitted for publication to the peer-reviewed academic journal, International *journal of disaster risk reduction*.

Chapter 1 serves as a general orientation for the study and presents the problem statement, hypothesis, research questions and objectives, methodology, the study's ethical considerations, various limitations, the significance of the study, and lastly the chapter layout.

Chapter 2 presents a literature review in order to contextualise the academic framework.

In this mini-dissertation, **Chapter 3** is presented in article format, with the title: "Cultural time orientation beliefs and its influences on climate change adaptation". The article is prepared for submission to *The international journal of disaster risk reduction* (*IJDRR*) for publication.

Annexure 4, 5 and 6 are the permission letters from the various co-authors stating that the article may be submitted as part of the dissertation submitted in *partial* fulfilment of the requirements for the degree *Magister Artium* in Development and Management. Annexure 7 is the author guidelines provided for submission of an article to *IJDRR*.

Chapter 3 comprises the academic article which contains the following sections:

In *Section 1* an introduction and overview is given to provide the necessary contextualisation and focus of the study. A hypothesis is presented.

Section 2 consists of a literature review which provide theoretical grounding by focusing on specific concepts and theories which include worldview and culture, the indigenous South African perspective, time orientation, polychronism, Mbiti's African time perspective, Afro-polychronism, and perceived risk and climate change adaptation.

Section 3 focuses on the empirical research of the study. The sampling, data collection, and data analysis are discussed.

Section 4 comprises the study's results and the subsequent interpretations and discussions pertaining to the research results.

Section 5 forms the conclusion of the article whereby the the link between the theoretical background, the results, and the interpretations are summarised.

Chapter 4 consists of a more detailed account of the results, findings and conclusions made for each objective.

Chapter 5 is made up of a major conclusion, followed by the discussion of the limitations of the study, and recommendations for future research.

CHAPTER 2: LITERATURE REVIEW

2.1   Introduction

The purpose of this chapter is to provide background to the first two research questions as derived from the problem statement formulated in Chapter 1. The questions are:

What are the beliefs associated with time orientation in peri-urban South Africa?

What is "climate change adaptation"?

In order to do this a literature review was conducted following a thematic approach which revealed that no similar research regarding the proposed themes has been conducted to date. This led to the exploration of the link between time orientation from an indigenous South African perspective and the possible ways in which it influences climate change adaptation.

Complications with the initial literature study included the linguistic terms *Western perspective* (which encapsulates concepts like *Western time* and *Western* or *Eurocentric cultur*e) and *African perspective* which are too generalising and in some cases untenable. The following problematic questions arose from the preliminary study: *What is the scope of* Western *foci and does it cover everything and everyone considered contemporary or non-traditional? Can the generalising concept of* Western perspective *be applied to the diverse multicultural nation of South Africa? Is it possible to attribute the characteristics of* African *culture or perspectives to multiple countries and diverse societies on the African continent?*

To avoid possible confusion and minimise any philosophical concerns regarding the problematic generalisation caused by linguistic terms like *Western* and *African perspective*, the terms *contemporary culture*[9] and *indigenous*[10] *South African culture* are used instead. It must be noted however that contemporary and indigenous South African culture are used as working points of reference with regard to the time perspectives as discussed in this study, due to the fact that a worldview and its resulting time perspective are ultimately subjective and prone to change (Adam, 1995:1960).

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[9] For the purpose of this dissertation the term "contemporary" refers to   current practices that have recently emerged and that are not part of the oral tradition or indigenous knowledge of the communities.

[10] For the purpose of this dissertation and to provide clarity, the term "indigenous" refers to the black African races, such as Pedi, Setwana, Xhosa, etc. In this study focus is allocated to some of the local black informal settlement (peri-urban) communities of the North West province of South Africa that are still traditionalistic to some degree even though they seem to appropriate certain westernized practices. .

Chapter 1 is divided into four sections to provide a transparent representation of various concepts that are related to each other. These sections are: 1) *Orientation*; 2) *Worldviews, perspective and culture as interlinked concepts;* and *Time orientation*; 3) *Climate change; Perceived risk; Adaptation;* and *Community Awareness*; and 4) *Conclusion*.

The first section provides a brief literature orientation and illustrates South Africa as a diverse multi-cultural nation in which research pertaining to cultural temporal orientation is limited.

The second section aims to encapsulate various interlinked concepts. Here the concepts *worldviews*; *perspectives and culture* are further supported by an analysis of the terms *contemporary culture;* and *indigenous South African culture*. This section is concluded by the description of the concept *time orientation*, which in turn is substantiated by the terms *monochronic, linear time orientation as present in contemporary culture*; and *polychronic, circular time orientation as present in the indigenous South African culture*.

Subsequently, section 3 aims to describe the concept *climate change* by providing applicable context through the description of *climate change in South Africa*. In a similar manner the concept *vulnerability* is contextualized by explaining *South Africa's vulnerability to climate change*. Lastly, the concepts *perceived risk*; *adaptation* and *community awareness* are analysed in order to complete section 3.

The chapter concludes with a brief overview to illustrate how the concepts of sections 2 and 3 relate to each other in a logical manner.

2.2   Orientation

South Africa is a country with a highly diverse cultural landscape, which can complicate cultural studies on local or regional level. Nevertheless, a proposed indigenous South African culture has been identified and the seminal academic contribution of Mbiti (1969) regarding this theme, is used as reference framework. These proposed indigenous cultural ideas (specifically time orientation and collectivism) have been investigated in the three communities of Ikageng, Jouberton and Ventersdorp (peri-urban areas in the North-West province, South Africa).

Previously conducted research attempted to develop a cross-cultural gauge of time perspectives (Legohérel *et al.*, 2009:96). The notion of time perspective and its possible effects has however not received detailed attention with regard to an (indigenous) African context (Dissel, 2007:18; Mbiti, 1969:16; Offe, 2001:60) as found in South Africa. Furthermore, differences between time perspectives amongst cultural groups, that form part of the (relatively collectivistic) African cultural context, have not been clarified (Dissel, 2007:20; Wallman, 1992:2). Dissel (2007:42) stresses the need for more qualitative research on time perspectives to possibly highlight cultural context as well as exclusive cultural elements when studying the

time orientation found within the African context. Research on the future view of indigenous societies is important, instead of assuming that future consideration is equality important across all cultures (McInerney, 2004:142; Wallman, 1992:2).

Time can be considered a resource from which other futures can originate (Milojevic, 2005:15). It seems reasonable to assume that a sense of purpose for the future (for example future view) is important in motivating individuals to engage in activities perceived to be instrumental in achieving valued future outcomes (McInerney, 2004:141). However, it may seem that poverty and the associated survival struggle, might leave people in vulnerable circumstances where the only possible focus is on survival in the present. The present time orientation relates to their perseverance ability in challenging situations where they are presented with minimum resources (Dissel, 2007:38).

Milojevic (2005:14) acknowledges that time and future views will have a practical impact on individual and social existence. Diverse (cultural) perceptions of time will lead to differential societies (Milojevic, 2005:14). Applied to environmental issues, time perceptions contribute to societal development in line with the conservation principle, while other societies develop in accordance with the profit principle (Milojevic, 2005:14).

Within the context of climate change, cross-cultural studies are of great importance considering its omnipresent properties, as well as the increasing need for global and local mitigation regarding climate change (Lorenzoni & Hulme, 2009:383). Several authors (Adger *et al.*, 2013; Gerlach & Rayner, 1988; Kahan & Braman, 2006; O'Riordan & Jordan, 1999; Rayner cited by McNeeley & Lazrus, 2014:506) concur that an understanding of culture (including time orientation) is very important when addressing climatic change through policies and planning strategies of mitigation and adaptation.

2.3 Worldview, perspective and culture as interlinked concepts

Like many philosophical terms, agreement on the precise meaning of the concept *worldview* eludes us. Kraft (1979:53) describes *worldview* as the main organisation of reality concepts to which individuals, belonging to a certain sociocultural group, agree upon and from which their set of values originates. A worldview influences every aspect of anthropological life, especially the individual's interpretation of reality (Kraft, 1979:53). For Olthuis (1989:2) a worldview can be regarded as a framework of fundamental or basic beliefs through which we reflect on the world and our place in it. Otÿele (1991:5) extends the definition of a worldview when he describes it as "one's total understanding or conception of reality as a whole both in its physical and non-physical dimensions.".

Due to the subjectivity of worldviews it is (specifically for this mini-dissertation) necessary to differentiate[11] between the indigenous South African perspective as a broadly collectivistic worldview and the contemporary[12] perspective as a rather individualistic worldview. This differentiation will help to clarify aspects of the indigenous South African perspective that were studied.

When considering Hiebert's (1998:171) description of culture being "systems of belief and practices that are built upon the implicit assumptions that people make about themselves, about the world around them and about ultimate realities" it becomes clear that the concept of culture overlaps greatly with the concept of worldview.

Olteda *et al.* (2004:17) define culture as "the uniquely human capacity to classify experiences, encode such classifications symbolically, and teach such abstractions to others". Culture is handed down from generation to generation – a process by which the younger generation is compelled by their predecessors to adapt the customary way of life (Olteda *et al.*, 2004:17). The adaptation of established habits will for example conceivably provide restrictions that "limit the behavior repertoire available to members of a certain group in a way different from individuals belonging to some other group" (Berry *et al.*, 1997:10). Douglas (1978:8) agrees that the (cultural) group is characterised by the demarcation of the prescribed behaviour of its members.

Cultural norms, like the notion of the self and others (and the relation between them); time perspective and orientation; and space, will influence interaction between people, which in turn will shape behavioural attitudes. These cultural notions will also provide a basis of reference for the evaluation of problem resolutions (Legohérel *et al.*, 2009:96).

Masina (cited by Milojevic, 2005:15) asserts that certain cultures will focus on the advancement and accomplishment of the optimal individual, while other cultures will focus on the growth and improvement of the society. The first cultural focus can be regarded as characteristic of individualism, while the second is characteristic of collectivism.

When trying to comprehend how people react and the ideologies (found in culture) that influence behaviour, it is important to focus on individualism and collectivism as "levels of identity" (Jackson, 2010:100). McKnightly (2015:44) however warns that viewing collectivism and individualism as opposing concepts may create conflict when members of the groups

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[11] The differentiation may be too simplistic, but it creates a point of departure for the progression towards a more responsible viewpoint.

[12] The use of the term *contemporary* can be problematic as some may argue that we are no longer part of the contemporary era. The era following the contemporary era has however not yet been identified and therefore the time orientation of the contemporary era is still applicable. The term *contemporary* will thus be utilised.

attempt to demonstrate the prevalence of each approach. No preference is therefore given to either worldview and they are discussed in a neutral manner.

2.3.1 Contemporary culture

Individualism can be considered a prominent characteristic of contemporary culture. When exploring individualism, the main measuring unit is the individual person. Individuals can exist outside a community and communities are made up of individuals. McKnightly (2015:51) encapsulates the concept of individualism when he states that it is "a cultural value that emphasises individual achievement, competition, personal freedom and autonomy – a perspective in which the needs of the individual are placed above the needs of the group".

McKnightly (2015:27) epitomises the concept of individualism when he describes it by means of three primary emphases: 1) a sense of autonomy; 2) the need to be differentiable from other individuals; and 3) the use of individual cognition as the unit of reasoning and analysis when contemplating life. Secondary emphases within individualism can be derived from the individual's focus on the autonomous self in preference to the group (McKnightly, 2015:28). Goals, successes and satisfactions are pursued for the sake of the individual and not for the betterment of the group (McKnightly, 2015:28). This behaviour is in contrast with collectivism whereby individual pleasure can emanate from the prosperity of the group (McKnightly, 2015:28).

Jackson (2010:100) highlights a prevalent ideology of individualism when he argues that specifically outlined personal space, wherein individual units are independent of each other, is of great importance. Every person has an obligation towards himself/herself to develop an autonomous identity and strive for personal goal achievement through individual actions (Jackson, 2010:100).

To be able to distinguish between the contemporary culture (characterised by individualism) and the indigenous South African culture, it is cardinal to emphasise collectivism as part of the indigenous South African culture. The differentiation is later connected to the time perspectives of both cultures in **Sections 2.4.1** and **2.4.2**.

2.3.2 Indigenous South African culture:

The investigation of the indigenous South African culture is relevant when considering that:

> most Africans still retain most of their values: they still converse in their own language…
> [they still have] African food, and Africans' worldviews, and value systems remain
> noticeably different from those of the West (Matthews, 2004:379).

In an attempt to better understand the concept of indigenous South African culture and the time perspective, it is important to highlight collectivism as an aspect that will influence behaviour.

For Hofstede (1994:260), the concept of collectivism signifies:

> a society in which people from birth onwards are integrated into strong cohesive in-groups, which throughout people's lifetime continue to protect them in exchange for unquestioning loyalty.

In large parts of the world (including Africa and Asia), people's epistemic behaviour is more collectivistic rather than focused on individualistic thinking (Elmer, 1962:136). A collectivistic decision can only be made if the group has been consulted – independency is considered disrespectful (Elmer, 1962:136). Actions and behaviour must be in accordance with the traditions, values and expectations of the (cultural) group (Elmer, 1962:136).

The concept of *Ubuntu* is important when investigating collectivism as an African cultural aspect. *Ubuntu* encourages compassion and social communal interchange, and is embodied by the Xhosa proverb "Ubuntu ungumuntu ngabanye abantu" meaning, "You do not live for yourself, you live for others" (Anderson, 2013:380). As illustrated by the proverb "No man is an island", it can be deduced that the individual can be perceived as a "being-in-relation" (Otÿele, 1991:9). Mbiti (1969:297) concurs with the proverb "I am because we are, and since we are, therefore, I am" when he explains indigenous South African culture as a collective society. Elmer (1962:136) concludes that collectivism is a formidable collective philosophy whereby a person's existence is only made possible through others in the group. The concepts *circularity* or *holism* can also be attributed to collectivism. Jackson (2010:100) explains societies, groups and families as naturally holistic entities.

It has hereby been demonstrated that a prominent aspect of collectivism is group-specificity (Jackson, 2010:100). Communal responsibility, to ensure betterment and growth of the group, coincide with another characteristic of collectivism, namely interdependency (Jackson, 2010:100). Members of a group or society will share roles, obligations and responsibilities with others in order to achieve group objectives (Jackson, 2010:100). McKnightly (2015:50-51) abbreviates the concept of collectivism when he describes it as:

> a cultural value that prizes the concepts of sharing, cooperation, interdependence, and duty to the group. A perspective in which the needs of the group are placed above the needs of the individual.

People are unconsciously influenced by their assumptions about the nature and significance of time. These assumptions are interlinked in the cultural worldview of the group or society

(McKenzie, 1973:77). The culture or group (whether individualistic or collectivistic in nature), of which a person is part of, will affect his/her attitude towards time.

2.4 Time orientation

Adam (1995:1960) states that being subjected to time is essential to human existence. Time orientation is shaped and customised by various influences (Zimbardo & Boyd, 1999:1271) and time may even be regarded as the "bases on which all cultures rest and around all activities revolve" (Hall, 1990:179). These factors which impact the sense of time include social class, individual perceptions, education, religion, culture, family influences and historical periods (Offe, 2001:55). Culture can therefore be regarded as a prevalent factor that will influence a person's time orientation.

The term *time orientation*, as described by Zimbardo and Boyd (1999:1271), refers to the time perspective selected by an individual or group and includes the structure of time (past, present, future) and the subjective attitude towards time. The focus on past, present and future with regard to time orientation can be influenced by an individual's cultural time perspective (Zimbardo & Boyd, 1999:1271).

For Offe (2001:55, 58) the concepts of future and time cannot be separated from the cultural frame of reference from which they originate and are affected by the cultural group's worldview (Milojevic, 2005:15). The subjective value and meaning assigned to time is therefore context specific (Adam, 1995:1960). Offe (2001:55, 64) concurs that a correlation between societal time (and future) orientation, and the society's social and cultural characteristics, exist.

Due to context-dependent time perspectives, different societies and their perceptions, organisation and structuring of time have been dichotomised "into traditional and modern (societies) in which the time perception of the former is constructed through its opposition to the dominant image of our western time" (Adam, 1995:1960). Booth (1975:88-89) warns against the possible pitfall where traditional cultures (and societies) are considered "unchanging".

According to Zimbardo and Boyd (1999:1271) time perspective is a subconscious process whereby subjective experiences are allocated to different time frames, thus providing significance and order to those events. Dissel (2007:17) affirms that time perspective is useful "in encoding, storing and recalling experienced events". The development and setting of expectancies and goals are also influenced by subjective time perspective. Subjective thinking and reasoning is dependent on the individual's social and physical context (Grothman & Patt, 2005:205). Dissel (2007:17-18) claims that the focus of subjective beliefs and actions concerning the time structures of past, present or future will be influential with regard to a person's judgments, choices and behaviour.

Zimbardo and Boyd (1999:1284) concur by attributing behaviour to people's time orientation. They are of the opinion that individuals who are deeply past-orientated will be efficient with regard to acceptance of commitments and obligations. They may, however, be inflexible when confronted by transformation (Zimbardo & Boyd, 1999:1284). Individuals with a dominant present orientation will be more inclined to find momentary enjoyment and therefore find it challenging to plan realistic goals and postpone gratification (Zimbardo & Boyd, 1999:1284). Lastly, future-orientated individuals may be exceedingly prone to forgo present-day satisfaction and gratification, while being capable of adhering to long-term responsibilities (Zimbardo & Boyd, 1999:1284).

Milojevic (2005:14) claims that there are three metaphors for time, namely spiral, circular and linear (arrow-like). These metaphors influence the concept of future and the understanding thereof across different cultures (Milojevic, 2005:14). If the dominant time perception (monochronic, linear time orientation as present in the contemporary culture) remains unchallenged, "the discourse remains controlled and managed by dominant social and cultural frameworks of meaning" (Milojevic, 2005:15). Differing time perspectives (or orientations) can propagate new descriptions regarding possible futures (Milojevic, 2005:15).

For the purpose of this study, consideration is given to "circularity, holism, and continuity" in reference to the time orientation of a society and in contrast with a societal time orientation of linearity, disjunction and discontinuity (Imani, 2012:101). Attention will only be given to the time metaphors described as circular and linear.

2.4.1 Monochronic, linear time orientation as present in contemporary culture

The concept of future, as linked to the linear course of time, was born into Western societies during the Enlightenment and is considered independent of divine influence and individual explanation (Offe, 2001:57). Time constitutes the independent experiences of individuals and can be neutrally understood and measured based on onward moving, linearity, precision and clock time (Ancona *et al.*, 2001:645). This is characteristic of the contemporary time perspective.

For the anthropologist, Edward T. Hall (Hall & Hall, 1987:17), the concept of (contemporary) linear time can be understood as something that can be inexpensively bought, earned, saved and sold at a costly price (Hall & Hall, 1987:17). Time can be deconstructed into minute pieces, and if not carefully managed, it can be lost (Hall & Hall, 1987:17). In contemporary individualistic culture, time can be compared with an arrow or line from the present extending into the past and future in an equal manner. This extension is categorised into units of minutes, hours, days, weeks, months and years (Booth, 1975:81).

Due to its linear properties, every moment can only be experienced once (Offe, 2001:57). Time is void and must therefore be filled with events (Offe, 2001:57). "Future" as perceived in linear time can be conceptualised as the eternal flow of time (Offe, 2001:57). This flow is detached from events and the occurrence of events cannot influence it (Offe, 2001:57).

To find a place in linear time, the independent individual must feel that he/she has temporal continuity – he/she must reason in the present that he/she will exist in the future (Kirsch, 1988:193). Lowenthal (1992:30) supports this statement when stating that "in planning ahead we try to make something of ourselves". Monochronic, linear time perspectives, as presented in the contemporary culture, motivate individuals to be present and future-orientated. These individuals are cognisant of the relation between present activities and future results (Dissel, 2007:17). They also tend to think more about their future; have well-developed visions of their future and are future goal-orientated (Dissel, 2007:17). This is evident in the motivation and goal-orientation focused on the betterment of the individual and not the group (McKnightly, 2015:28).

2.4.2   Polychronic, circular time orientation as present in the indigenous South African culture

According to John Mbiti, an eminent African philosopher, the African time concept is of great importance when investigating the African worldview (1969:5). The African interpretation of time forms an innate part of the African identity as it represents "a social cultural reality" (Babalola & Alokan, 2013:143). Understanding the African time perspective may shed light on the behaviour, beliefs and opinions of African people in traditional and modern settings, as this idea of time greatly influences their *modus vivendi* or "way of living" (Mbiti, 1969:16, 19, 27).

Both Mbiti (1959:16) and Offe (2001:60) draw attention to the fact that minimal studies regarding the African concept of time (and the future) have been conducted. For the purpose of this mini-dissertation, the African worldview, as stipulated by Mbiti, and its time perspective will be applied to the indigenous South African communities selected for the research.

In African countries like Cameroon, Tanzania, Malawi and South Africa (to name a few based on the personal experience of the researcher) the term *African time* is used by people to imply a time aspect which is rather prominent in the behaviour of Africans. Dissel (2007:41-42) states that the term refers to an asseveration held by Africans that actions should not be rushed in order to adhere to deadlines and that anything can be done at a later stage. These terms are more often than not used in a light-hearted manner, but it suggests frustrations caused by cross-cultural time perspectives that differ from one another (Dissel, 2007:41-42). The preconceived idea that Africans are always late is based on differences in the time orientation of

other cultures (Dissel, 2007:42; Mbiti, 1969:19). This generalising impression is biased in nature and cannot be verified by research (Dissel, 2007:42).

For Kudadjie (1996:142) and Mbiti (1969:19) the following dissimilarities between the time perspectives of contemporary culture and African culture are of great importance: Firstly, time is not the instructor of man, but rather a tool to be used, and can be created as man wishes (Mbiti, 1969:19). For the time-enslaved contemporary culture, time is equivalent to money, a commodity to be bought, sold and utilised (Mbiti, 1969:19; Hall & Hall, 1987:17). Secondly, time from an African perspective has meaning attributed to it in terms of experienced events (Mbiti, 1969:16-17, 19), unlike the contemporary perspective where time is identified as a numerical moment (Mbiti, 1969: 19). Lastly, it must be mentioned that *contemporary time* values time as a product, whereas *African time* focuses on "time-consuming but enduring relationships" (Kudadjie, 1996:142). Time can be regarded cyclical and not linear as proposed by the contemporary time perspective.

African time perspective can also be described as polychronic for it is characterised by the coinciding happenstance of events with a high level of participation of people (Hall & Hall, 1987:17). Focus is not on the adherence to schedules, but on the completion of transactions between people (Hall & Hall, 1987:17). The time focus on the transaction between people can be attributed to the collectivistic group orientation of the indigenous South African culture.

Dickson and Ellingworth (1969:159) concur with Mbiti (1969:16) that, from an indigenous African time perspective, time can be regarded as the sum of events already experienced. This aspect of time coincides with the ideas of Heraclitus (cited by McKenzie, 1973:77) who claimed that the world can be understood as the sum of events. This experienced sum of events constitutes *actual time* (Mbiti, 1969:16-17). Actual time embodies present events as well as events of the past (Mbiti, 1969:16-17). The movement of actual time is backwards, rather than forward (compared to the contrasting contemporary perspective of time movement) (Mbiti, 1969:16-17). It can thus be said that priority will not be set on future events (especially events more than two years in the future), but rather on events in the past and present (Mbiti, 1969:16, 17, 20).

Future events that will likely and inevitably occur or "fall in the rhythm of natural phenomena" are categorised as *potential time* (Mbiti, 1969:16). The future cannot however constitute time, for uncertain events of the future have not been experienced yet (Mbiti, 1969:16). Mbiti (1969:20) describes the African concept of future as a time aspect (beyond two years from the present) as "silent and indifferent" for "people can neither plan for the distant future nor 'build castle in the air'" (Mbiti, 1969:23). Future is therefore also referred to as *no-time* (Mbiti, 1969:16). It is very important to note that when stating that the African time perspective is two-dimensional, Mbiti does not reject the concept of future view from an African perspective (1969:28). To clarify: he

proposes that the future cannot be perceived as more than two years forward from the present (Mbiti, 1969: 20). The future as *no-time* can hence not constitute a dimension of time.

Accordingly, it can be said that time is a two-dimensional manifestation where an extended past, and a present, can be experienced, but with almost no linear extending future per se (Dickson & Ellingworth, 1969:159; Mbiti, 1969:17). The contrasting contemporary concept of time as linear, with its unbounded past, present and future, is alien to the practical African time orientation (Mbiti, 1969:16).

Due to the strong correlation between the allocation of time and events, indigenous African societies will not have much use for numeric calendars in a cultural context (Mbiti, 1969:18). A more appropriate calendar to be used is a phenomenon calendar whereby "the events or phenomena constituting time are reckoned or considered in their relation with one another and as they take place" (Mbiti, 1969:18). Mbiti (1969:20) illuminates the concept of a phenomenon calendar by explaining that the months of the year are named in accordance with prevalent events and weather conditions as experienced during that month.

Mbiti (1969:27) blames the "invasion of modern technology" and the "western-type education" for the birth of a future time expansion for the indigenous African time perspective. However, regardless of the rapid changes taking place and the discarding and alteration of cultural ideas, it is incorrect to conclude that all remnants of the traditional beliefs, language, or behaviour held by a people will be eradicated (Mbiti, 1969:x).

2.4.2.1 Afro-polychronism

Based on the description of *Ubuntu* (polychronism as found in the African perspective) and the cultural time characteristics presented by Mbiti (1969), cultural aspects found in the African perspective, such as time orientation, may not be separable from polychronism due to the importance of the holistic group. Therefore, the context specific concept *Afro-polychronism* is proposed of which the formulation is discussed in more detail in **Chapter 3: Article** and **Chapter 4**, **Section 4.3.1**.

2.5   Climate change

The Intergovernmental Panel on Climate Change defines the concept *climate change* as:

> a change in the state of the climate that can be identified (for example using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity (UNFCC, 2011:1).

In the past the earth's climate changed gradually over extensive periods (millions of years) and the biological systems of our planet had ample time to adjust and adapt to changing weather (Department of Environmental Affairs, 2011:8). However, due to various anthropogenic development and behaviour that contribute to the drastic increase of greenhouse gasses (GHG), the rate of climatic alterations is escalating substantially (Van Niekerk, 2011:48) and this post-haste climatic change puts strain on the adaptation of the biosphere, as it cannot adjust in time (Peterson, *et al.*, 1997:2).

These straining climate changes will have disastrous climatic effects, for instance, by posing threats to natural environments, endangered species and ecological systems (Peterson, *et al.*, 1997:2). Climatic changes will also bear impact on all human populations, especially the poor and most vulnerable, by unsettling agricultural practice, which in turn will significantly affect food production, availability and security on a domestic level (O'Brien & Wolf, 2010:247).

2.5.1 Climate change in South Africa

Although Africa contributes the least to greenhouse gasses, the continent is extremely impacted by climate change when considering that it has low coping capacities with regard to climatic changes (Department of Environmental Affairs, 2011:5, 8). Beg *et al.* (2002:129,132) concur that developing countries will experience highly adverse effects of climatic change due to their vulnerability and low adaptation capacity.

The International Energy Agency calculated the emissions of carbon dioxide per capita for countries in the world in 2008. Compared to other countries, South Africa has the ninth largest carbon footprint (Department of Environmental Affairs, 2015). South Africa is a prominent contributor of GHG into the atmosphere due to its level of development (Department of Environmental Affairs, 2015), yet still has exceptional levels of vulnerability due to the socio-economic milieu (Department of Environmental Affairs, 2011:8).

South Africa is not exempt from the rising temperatures associated with climate change. According to Griffin (2012), the country experienced a considerable upward inclination in temperature during the last 60 years. In coastal areas a further rise in temperature of 1-2°C can be anticipated, together with a rise of 3-4°C in interior areas by 2050. By 2100 the increasing temperature forecast for coastal areas is 3-4°C and 6-7°C in interior areas (Griffin, 2012). Various sectors in South Africa will be greatly affected by climate change due to global warming. These sectors, as stated in the *National Climate Change Response White Paper*, are "human health, agriculture, other water-intensive economic sectors such as the mining and electricity-generation" (Department of Environmental Affairs, 2011:8-9).

As stated in the *National Climate Change Response White Paper* (Department of Environmental Affairs, 2011:22), 39% of South Africa's population (more than nineteen million South African citizens) reside in rural regions. Commercial farming with low populace concentrations covers 80% of South Africa's informal areas (Department of Environmental Affairs, 2011:22). Defunct agricultural sectors, that once were considered "homelands", constitute the remaining 20% of densely populated informal regions (Department of Environmental Affairs, 2011:22). The bucolic citizens are financially poor and heavily reliant on metropolitan provision and social aid (from the government) for monetary income in support of their livelihood (Department of Environmental Affairs, 2011:22).

The underrepresentation of informal and peri-urban regions by weather observation systems, regardless of the prediction that they will be firstly and most negatively affected by climatic change, is one of the challenges faced by citizens living in informal settlements (Department of Environmental Affairs, 2011: 23). The impact of climatic change is not limited to the environment, but also influences communities and households. A community's vulnerability and adaptation can be linked to its economic, sociocultural and political contexts (UNICEF, 2011:30).

2.6   Vulnerability

According to Adger (2006:268) the concept *vulnerability* refers to the "state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt". Van Niekerk (2005:9) elaborates by stating that vulnerability can be regarded as the degree to which a "community will degrade when subjected to a specified set of hazardous conditions".

2.6.1   South Africa's vulnerability to climate change

Factors that make South Africa exceptionally vulnerable to the effects of extreme weather patterns (like floods and drought) associated with climate change include low and fluctuating rainfall patterns in greater parts of South Africa and the importance of fisheries and agriculture for food sustainability and security (Department of Environmental Affairs, 2015). Climate change can greatly exacerbate existing problems like inadequate living conditions, transmittable disease, poverty and food availability and accessibility (Department of Environmental Affairs, 2015).

O'Brien *et al.* (2003:2) state that vulnerability to climatic change will differ across regions and social groups. South Africans, living in poverty, are some of the lowest contributors of GHG (Department of Environmental Affairs, 2015), yet they are affected the most due to their

vulnerability (Department of Environmental Affairs, 2011:8). In support Griffin (2012) provides various reasons for South Africa's high vulnerability:

> Firstly, a large proportion of the population live in impoverished circumstances, where informal settlements are set up in locations that are vulnerable to extreme weather events, and lack of adequate housing structures to offer sufficient protection against rain, wind and cold. In addition, there is a high incidence of disease, which places impoverished people at further risk. Much of South Africa experiences low and variable rainfall, with access to safe drinking water posing a problem in some communities.

The South African government acknowledges the possible impact climate change will have on the health and financial status of South Africa's citizens, especially people living in informal and peri-urban areas due to their heightened vulnerability (Department of Environmental Affairs, 2015; UNICEF, 2011:81). South Africa's elevated levels of poverty will also challenge nationwide development (Beg *et al.*, 2002:129).

Kulatunga (2010:309) is of the opinion that culture can increase or reduce a community's vulnerability towards hazards. Risk perception is for example influenced by a community's cultural beliefs (Kulatunga, 2010:311) and a community's vulnerability is influenced by its members' perceived risk.

2.7   Perceived risk

Risk perception or perceived risk can be defined as "a subjective judgment about the felt likelihood of encountering hazards when objective information is minimal" (Gierlach *et al.*, 2010:1539).

McNeeley and Lazrus (2014:506) affirm that cultural worldviews, formed by social interaction, include beliefs about nature (climate) and society. This will greatly influence the manner in which people identify risk caused by climatic change (McNeeley & Lazrus, 2014:506). The type of risk a person focuses on, will be influenced by the individual's level of social involvement and the cultural group he/she belongs to (Gierlach *et al.*, 2010:1540; Olteda *et al.*, 2004:5,16) as well as discrepant internal factors that are in contrast with the objective reality of actual risk (Gierlach *et al.*, 2010:1539).

Wildavsky and Dake (1990:42) state that culture has the ability to "predict and explain what kind of people will perceive which potential hazards to be how dangerous". A cultural group's risk perception will be influenced by the rational ascribed to previous hazardous events in order to promote group unity (Gierlach *et al.*, 2010:1541).

Some level of risk or threat, although minuscule, must be experienced to motivate people to consider the positive consequences of action and their ability to mediate the perceived threat (Schwarzer, 1992:235). Grothman and Patt (2005:202) agree by maintaining that risk perception will establish and encourage the motivation needed to adapt. The apparent likelihood of being influenced by the effects of climatic change is expressed by risk perception (Grothman & Patt, 2005:202).

2.8   Adaptation

Smit and Pilifosova (2001:879) encapsulate the concept of adaptation when they state that:

> adaptation refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to changes in processes, practices and structures to moderate potential changes or to benefit from opportunities associated with climate change. […] It also refers to the "condition of being adapted".

Traditionally, communities reactively change their behaviour in response to changes in the experienced climate. However, many communities are now not only conscious of past and present climatic change, but are also anticipating future climatic change and are adjusting their behaviour (Adger *et al.*, 2005:77) in order to lessen community vulnerability. For Ziervogel *et al.* (2014:606) this adaptation is critical when considering South Africa's "socio-economic developmental needs and threatened ecosystem services".

The South African government compiled the *National Climate Change Response White Paper* as a reaction to climate change (Department of Environmental Affairs, 2011:5). It represents the envisioned process of transformation for South Africa, with its immense carbon footprint, into a society that can be considered resilient to climate change (Department of Environmental Affairs, 2011:5). Adaptation strategies regarding climate change applicable on a local level, are the adjustment of lifestyle behaviour and supplementing income and improving livelihood (UNICEF, 2011:8, 16).

Even though uncertainty regarding South Africa's climate change is prevalent, two characteristics are clear: change in climate will take place and immediate action is required in order to mitigate the impact of climatic change (UNICEF, 2011:11). The impact of adaptive behaviour may not be visible immediately, but it will greatly influence the impact of climate change on future generations (Department of Environmental Affairs, 2011:49).

A community must be willing to take adaptive actions and the adaptation process requires constant behaviour adjustment (Adger *et al.*, 2005:78; UNICEF, 2011:54). The South African Department of Environmental Affairs (2015) stresses that it is the responsibility of fellow South

Africans to raise awareness among each other regarding the behavioural changes needed during the constant adaptation process.

In order to raise awareness about climate change and its impact on South African citizens, information communication regarding climate change (via mass media and social agents) can greatly influence a community's perceived risk and adaptive capacity (Grothman & Patt, 2005:205). Community awareness and education are therefore of utmost importance to promote adaptive behavioural change.

2.9   Community awareness

The *National Climate Change Response White Paper* encourages the "enhancing (of) public awareness and understanding of climate change causes and impacts to promote participation and action at all levels" (Department of Environmental Affairs, 2011:10). This can be done by implementing various informative "education, training and public awareness programmes" with regard to climate change (Department of Environmental Affairs, 2011:10).

Informing the community about climate change, and the possible risks they are exposed to, can facilitate behavioural change as an instrument to motivate adaptation (Department of Environmental Affairs, 2011:6, 15). The cognisance of the impact of climatic change might for example influence the community's behavioural choices. These behavioural changes have the potential to lower a community's vulnerability with regard to climate change. Environmentally friendly behavioural changes will however only take place if alternative behavioural choices are available and if it is convenient to implement such behaviour (Department of Environmental Affairs, 2011:39).

2.10   Conclusion

Being mindful of one's personal worldview will facilitate the expansion thereof and encourage the process of acceptance towards a multitude of worldviews. The opportunity to broaden one's own worldview to accommodate others' opinions will motivate tolerance as a virtue. The consciousness of a multitude worldviews therefore carries importance and will benefit (post)modern multicultural civilisations due to the understanding of the diversity of anthropological worldviews found in different cultures (Nilsson, 2013:77).

Matsumoto and Hee Yoo (2006:234) emphasise the importance of culture as a "variable to be integrated in theory and research on all aspects of human behavior". Culture (which includes worldviews and time orientation) will provide demarcation for actions to be taken by the community. It is therefore of great importance to investigate different cultures (and the cultural group's time orientation) in order to understand a community's adaptation capacity with regard to climate change.

The peri-urban communities of Ikageng, Jouberton, and Ventersdorp have high levels of vulnerability to climate change. In order to motivate the members of these communities to adjust their climate change inducing behaviour, the risks of climate change must be communicated to them. The process of raising community awareness can attempt to address this problem. It must however be noted that community members' cognisance of the risks faced by the community will only motivate behavioural change if realistic alternative behavioural options are presented.

In conclusion, Chapter 2 provided theoretical background needed to address Objective 1: "Describe beliefs associated with time orientation in peri-urban South Africa", and Objective 2: "Perform a conceptual analysis of "climate change adaptation".

CHAPTER 3: ACADEMIC ARTICLE

Cultural time orientation beliefs and its influences on climate change adaptation

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ABSTRACT

Climate change is one of the greatest challenges humankind faces and adaptive behaviour is imperative in preventing and mitigating such change. Worldview and culture are determinants of behaviour and an eminent cultural belief is that of time orientation. To date, no research focuses on time orientation from an indigenous South African perspective or the manner in which this belief may subsequently effect a community's adaptation toward climate change. This study involves three peri-urban communities in South Africa in order to investigate the interrelation between cultural time orientation, climate change, and adaptation by means of Q methodology.

Respondents' subjective perspective pertaining to climate and beliefs were obtained by means of semi-structured interviews. Based on the interviews, Q-sort statements were identified and Q-sorted firstly in a free-distribution manner and secondly in a forced-distribution manner on a Q-sort grid. The placement of statements was captured and quantitatively analysed by means of PQMethod software. The correlation between Q-sort statements was interpreted based on the produced factor arrays. It became apparent that the communities are aware of climate change, yet little to no efforts are currently made to adapt to the climatic change. This absence of motivation to adapt may be attributed to the limited emphasis put on future events as determined by their cultural time orientation and the collectivistic trait found in Afro-polychronism.

As it cannot be assumed that time orientation will be the same across all cultures, this study aims to contribute to the understanding of cultural time orientation and its impact on climate change adaptation behaviour. It is concluded that time orientation from an indigenous South African perspective may in fact influence the relevant communities' climate change adaptation.

Keywords: adaptation, Afro-polychronism, climate change, community-based disaster risk management, indigenous South African perspective, risk perception, time orientation, Q-methodology.

1. Introduction

The notion of time is a sociocultural perception that forms part of a community's worldview [5]. Time can be deemed as the "bases on which all cultures rest and around all activities revolve" [12]. The actions of a community's members will be determined by its collective cultural beliefs [3] and its time orientation [35].

McNeeley and Lazrus [22] assert that beliefs (such as time orientation) will affect the manner in which community members identify risks caused by climate change. A level of risk must be experienced in order to encourage cognition of possible mitigating behaviour and its effects [30]. The community's time orientation will determine whether the risk warrants the needed mitigating and/or adaptive behaviour. The lack of justification of actions due to the level of risk perceived can impede the community's ability to adapt to climate change [3].

Climate change is defined as "a change in the state of the climate that can be identified (e.g. by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer" [15]. The negative effects of climate change are an inevitable reality and the potential disastrous impact on Africa could be immense due to the continent's limited coping capacities [31] and high levels of vulnerability [6].

Adger [2] attempts to clarify vulnerability as "the state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt". Defining the concept *vulnerability* can however be complex when considering that climatic changes, risk and coping capacities are region-specific [25].

In various regions and local communities, several groups may have an inclination to be more vulnerable to climatic change and less capable to adapt thereto [25]. It will therefore be meaningful to contextually identify vulnerable communities in order to determine appropriate adaptation capacities [25]. Contextually, a community's level of vulnerability and adaptation capacity relate to its political, economic and sociocultural background [33]. For the purpose of this study the culture of the three communities provides the necessary context.

The aim of the research was to investigate the cultural time orientation of three peri-urban communities in the North-West province of South Africa to determine its impact on climate change adaptation. The hypothesis presented states that time orientation from a South African perspective focuses on the past and present with a diminutive future view. This time orientation may influence the community's adaptation to climate change when considering that adaptation requires an acknowledgement of the consequences of present behaviour on future events.

2. Theoretical grounding

To construct a theoretically sound background of the interlinking concepts pertaining to time orientation from a South African perspective and the possible impact thereof on climate change adaptation, a review based on applicable concepts is presented.

2.1. Worldview and culture: interwoven concepts

A worldview can be defined as the subjective perception and systematic organisation of reality. Members of a sociocultural group agree on this reality and their beliefs originate from the communal worldview [17]. Culture is described as "systems of belief and practices that are built upon the implicit assumptions that people make about themselves, about the world around them and about ultimate realities" [14], thus linking culture and worldview.

Cultural beliefs are transgenerational [27] and serve as demarcation of group member's prescribed behaviour [9]. Behavioural attitudes are guided by the interaction between community members and this interaction will in turn be influenced by various cultural beliefs – one such belief being time orientation [19].

When considering the subjective nature of worldviews, it is important to identify the indigenous South African perspective as holding a holistic worldview and collectivistic culture, since this will influence group behaviour.

2.2 Indigenous South African perspective: holistic and collectivistic

Collectivism is a prominent cultural characteristic in South Africa and the concept of *Ubuntu* can be used as clarification. Ngcoya [24] states that "*Ubuntu* stresses the importance of community, solidarity, caring and sharing. This worldview advocates a profound sense of interdependence and emphasizes that our true human potential can only be realized in partnership with others". Therefore, communal interchange and compassion is integral in *Ubuntu* as highlighted by the Xhosa proverb "*Ubuntu ungumuntu ngabanye abantu*" meaning "You do not live for yourself, you live for others" [4].

The term *holism* can be ascribed to collectivism as explained by *Ubuntu*, whereby communities are naturally integrated and holistic entities [16]. An individual is a "being-in-relation" [28] and his/her existence is defined and made possible by other community members [10]. Based on the collectivistic nature of *Ubuntu*, the individual will, for example, cease to "exist" socially and culturally when outside of the group. Based on the collectivistic nature, where the individual forms part of a holistic community, it can be deduced that the community will determine the individual's cultural notion of time.

2.3   Time orientation

The concept *time orientation* denotes the perspective of time as chosen by a group or individual [35]. Time orientation, including the future view held by an individual, cannot be separated from its originating cultural reference and this is shaped by the group's worldview [26]. Included are the subjective perceptions of time as well as the structure allocated to time: past, present and future [35]. An individual's cultural perspective of time will influence the focus on various time structures, whether it is past, present, future or a combination of these views [35]. The subjective meaning of time is therefore context specific [1].

Encapsulated in the concept of time are the beliefs regarding future occurrences. Since future considerations differ across cultures, it will be valuable to investigate a community's future view [21], [34]. This study focuses on the polychronic and holistic time orientation found in indigenous South African culture.

2.4   Polychronism

Polychronism is a time orientation description whereby multiple tasks are concurrently carried out by various group members [13]. Focus is placed on time-consuming, yet meaningful, relations between members of a group with less emphasis on adherence to schedules [13]. The emphasis allocated to quality human relationships and interaction is ascribed to the obvious collectivistic trait of polychronism.

Polychronism is noticeable in various population groups (Mediterranean, Japanese, Latin American, Far East and African) [13], but, when applied to the African perspective, it encompasses more than a mere description of time orientation since it also includes various cultural characteristics like *Ubuntu*.

2.5   Mbiti's African time perspective

Professor John Mbiti attempted to formulate African time orientation in his book *African religions and philosophy* [20]. This African time orientation includes various distinct characteristics that illustrates its contrast to contemporary time orientation. Firstly, time can be created by humans and is seen as a tool to be utilised [20]. Humans are not subjected to and ruled by time, and it cannot be seen as a commodity as is the case with contemporary time orientation [20]. Secondly, meaning and value are ascribed to time based on shared experiences [20]. Time can furthermore not be classified as a numerical instance [20]. Afro-polychronism is rather characterised by "time-consuming but enduring relationships" [18]. Lastly, African time orientation can be regarded as concrete and cyclical (renews daily) [20] and not finite ("time running out") as is perceived by contemporary time orientation.

Due to the circular nature of Afro-polychronism, time is regarded as the totality of experienced events [8]. This sum of events represents past and present instances, with the flow of time being in a backward direction from present to past. This forms the concept *actual time* as defined by Mbiti [20]. Limited importance is assigned to future events due to the primary focus on *actual time* as represented by past and present events [20].

Future events can be divided and described by two terms: *potential time* and *no-time* [20]. Inevitable events or occurrences that "fall in the rhythm of natural phenomena" delineate *potential time* [20]. Due to the fact that indefinite future events have not yet been experienced, it cannot represent time and this idea of the future is described as *no-time* [20].

African time orientation is considered to be two-dimensional, since the future cannot represent time [20]. It must however be noted that the concept of future is not entirely rejected. The future view can be considered near-sighted, as it can only be formed by events no more than two years into the future [20]. *No-time* can therefore not represent a dimension of time [20].

Moreau [23] describe Mbiti's African time orientation with the analogy of a person standing in a river, facing downstream. The current of the river represents the flow of time. Therefore, the person's view of time consists of his peripheral context and of whatever has gone past him (downstream). The "future" is merely what might be perceived in his peripheral view (upstream) and therefore unseen time has insignificant meaning for the person (Mbiti's *no-time*). The upstream water (future) will "pass when and how it passes, and then it will become of consequence" [23]. Significance is only allocated to the time that is currently passing and already passed, visible in this peripheral context (Mbiti's *actual time*). Debris floating in the passing water represents inevitable natural phenomena in the cycles of nature (Mbiti's *potential time*).

Instead of moving upstream (toward the future), the person rather stands still, patiently waiting for the upstream water (future) to reach him. He is aware that, ultimately, the upstream water will reach him and therefore he finds it unnecessary to focus on it, as this will not speed up the flow of the river [23]. In contrast to this African time orientation, the contemporary time orientation can be represented by a person swimming upstream in the river [23].

2.6   Afro-polychronism in the indigenous South African culture

African time orientation (as described by Mbiti) cannot be separated from polychronic South African culture (*Ubuntu*). Offe [26] concurs that a community's time orientation cannot be alienated from its fundamental worldview and culture. The more context specific concept of Afro-polychronism is introduced in order to distinguish it from polychronism as applied to other population groups that, to some extent, may share similar temporal traits, but have different

cultural qualities as opposed to the prominent cultural trait of *Ubuntu*.

The interpretation of time inherent to the indigenous South African worldview (represented by Afro-polychronism), is significant as it epitomises "a social cultural reality" [5] which may clarify the behaviour of communities as it influences the daily actions of some indigenous South African groups.

Temporal orientation, imbedded in culture, not only influences all human behaviour [12], but also perceptions. Therefore, the time orientation encapsulated by Afro-polychronism, will affect the community's structure of reality (worldview), and subsequently the risk that will be perceived regarding climate change [22].

2.7   Perceived risk and climate change adaptation

Risk perception is "a subjective judgment about the felt likelihood of encountering hazards when objective information is minimal" [11]. Culture, including time orientation, will influence the community's risk perception regarding climate change [22]. Some level of risk pertaining to climate change must be perceived to facilitate cognisance of the positive effects of adaptive behaviour [30] in order to motivate behavioural modifications with regard to climate change adaptation.

3. Empirical research

Q-methodology[13] was followed for the empirical investigation of the study. It was utilised for its combination of qualitative and quantitative processes in order to systematically identify subjective perspectives pertaining to Afro-polychronism and climate change adaptation. Q-methodology is exceptionally useful in any investigation of human attitudes and perspectives as it incorporates statistical analysis by means of software and is "grounded in modern philosophical and scientific principles" [7].

3.1   Sampling

Samples from the identified target population were randomly selected from three peri-urban communities (Ikageng, Jouberton and Ventersdorp) in the North-West province of South Africa. These communities were identified based on their peri-urban status. In South African peri-urban areas low economic status is prevalent [31]. The communities were also identified based on the assumption that peri-urban communities may be more inclined to uphold elements of a traditional worldview compared to urban communities that might assimilate aspects of

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[13] Refer to the following articles for a description and additional information about Q-methodology:
  a)   Stephenson, W. 1993/1994. Introduction to Q-Methodology. *Operant subjectivity*, 17(1/2):1-13.
  b)   Brown, S.R. 1993. A primer on Q methodology. *Operant Subjectivity*, 16(3/4):91-138.

contemporary culture more readily. This traditional worldview is cardinal when investigating Afro-polychronism as well as the impact thereof on adaptation to climate change.

Purposive random sampling was utilised to identify respondents. The sampling method can be defined as "taking a random sample of a small number of units from a larger target population. The random nature of this sampling procedure is characteristic of probability sampling, whereas the small number of cases generated through it is characteristic of purposive sampling" [32].

The research was divided into three phases. During the first phase, contact sessions with identical sample sizes ($\eta = 30$ per site) were conducted with the three communities. For the purpose of Phase 2, the original sample sizes were reduced to $\eta = 15$ per site by means of random selection. For the third research phase, respondents were again randomly selected from the original sample ($\eta = 30$ per site). The final sample sizes were $\eta = 8$ per site.

3.2   Data collection

For Phase 1 of the research, semi-structured interviews with the respondents were conducted at the different locations. During these interviews the following two open-ended questions were asked: *What do you think about the climate?* and *Do you think it will be possible to change your beliefs about the climate?* The responses were recorded, transcribed and translated, and formed the concourse from which the set of 40 representative Q-sort statements (or Q-sample) was identified and selected[14].

During Phases 2 and 3, the respondents sorted the statement set by means of Likert scaling. The Likert scale ranges are *Strongly Agree* (+3), *Agree* (+2), *Slightly Agree* (+1), *Neutral* (0), *Slightly Disagr*ee (-1), *Disagree* (-2), and *Strongly Disagree* (-3). For the free-distribution used in Phase 2, no distribution diagram was used. The diagram for the forced-distribution is represented by Figure 1. and was utilised during Phase 3. Hereby the respondents were requested to limited the statements (according to the diagram) to the prescribed amount per Likert scale range.

After the Q-sorting sessions (in both Phase 2 and 3), the placements of the Q-statements on the Q-sorting diagram were recorded for factor analysis (which produced 5 factor arrays) in order "to reveal the way groupings of people think similarly or divergently" [29].

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[14] For a clarification of the factors used, refer to Appendix A for the complete Q-statement set.

Figure 1: Forced Distribution Diagram.

Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

3.3   Data analysis

The PQMethod software program (version 2.35) was used for data analysis and provided the statistical results and factor arrays on which interpretations and conclusions are based.

4. Results and discussion

For the purpose of this article the relevant results (based on the forced-distribution Q-sort in Phase 3) are presented due to the fact that the research pertaining to cultural time orientation (Afro-polychronism) and its impact on climate change adaptation formed part of a bigger project (SANCOOP: Exploring the relationship between belief systems and climate change adaptation). Deductions are made based on the relevant factor arrays (cf. Appendix B and Appendix C) of Q-sort statements and the correlation between the factor arrays of various Q-sort statements.

Out of the 40 Q-sort statements created, 12 statements were identified to facilitate the investigation of Afro-polychronism and the possible impact thereof on climate change adaptation. Table 1.1 represents the relevant Q-sort statements pertaining to collectivism, time orientation, climate change awareness and climate change causality.

Table 1.1: Q-sort statements pertaining to Afro-polychronism and climate change adaptation.

Q-sort statements pertaining to collectivism in Afro-polychronism
Q-sort statement #27:
"We can solve climate problems when we stand together and unite."
Q-sort statement #35:
"In order to change our beliefs about the climate, we must sit down and discuss the matter."

Q-sort statement #22:
"Young people can help older people catch up with new knowledge about the climate."
Q-sort statements pertaining to time orientation in Afro-polychronism
Q-sort statement #18:
"The climate was not better when I was younger."
Q-sort statement # 19:
"We can solve environmental problems by returning to the ways of the past."
Q-sort statement # 1:
"The climate is a natural part of the world we just have to accept and live with."
Q-sort statements representing climate change awareness
Q-sort statement #4:
"The climate is not changing."
Q-sort statement #5:
"There is something wrong with the climate."
Q-sort statements representing climate change causality
Q-sort statement #12:
"The climate is affected by the behaviour of people."
Q-sort statement #13:
"Increasing population growth causes climate change.
Q-sort statement #14:
"Climate change is caused by technology."
Q-sort statement #15:
"Climate change is related to the burning of fossil fuels and pollution."

4.1 Results and interpretations of Q-sort statements related to collectivism in Afro-polychronism

As a point of departure to investigate Afro-polychronism and its impact on adaptation to climate change, it is of great importance to establish whether Afro-polychronism (more specific the collectivistic trait) is in fact represented by respondent's worldviews.

The factor arrays produced for Q-sort statement #27 indicated that respondents strongly agreed in Factors 1 and 4 with the statement *We can solve climate problems when we stand together and unite*. Concurrently, based on the factor arrays of Factor 1, the respondents agreed with Q-sort statement #35 (*In order to change our beliefs about the climate, we must sit down and discuss the matter*).

From a semantic point of view, the respondents may have interpreted the term *we* as representative of their community specifically, rather than humanity as a collective. It is deduced that Q-sort statements #27 and #35 are highly correlative as they both ranked high in Factor 1. Both Q-sort statements also represent collectivism in Afro-polychronism based on the collectivistic focus on quality interpersonal relationships and the shared responsibility of the group to ensure the improvement thereof.

The last Q-sort statement relevant to Afro-polychronism, with which the respondents strongly agreed within factors 2 and 5, is Q-sort statement #22 (*Young people can help older people catch up with new knowledge about the climate*). Deductively, this strong agreement also illustrates the collective relationship orientation and group responsibility in Afro-polychronism.

Based on the factor arrays, Q-sort statements #27 and #35 both ranked high in Factor 1, with Q-sort statement #22 ranking high in factors 2 and 5. The lack of correlation between the high ranking factors of Q-sort statements #27 and #35 compared to Q-sort statement #22, may indicate that the collectivistic representation of Q-sort statement #22 differs from Q-sort statements #27 and #35.

Q-sort statement #22 focuses on the relationships between generations. The neutral ranking in Factor 1 may be explained by cultural respect allocated to elders as is prevalent in the African perspective. Here the respondents, for example, reacted neutrally when faced with the statement *Young people can help older people catch up with new knowledge about the climate*. This is most probably due to the generational respect aspect.

4.2 Results and interpretations of Q-sort statements related to the time orientation in Afro-polychronism

Three Q-sort statements (#18, #19 and #1) pertaining to time orientation were identified from the semi-structured interviews. The interpretation of the Q-sort statements' factor arrays might be indicative of the temporal view held by the respondents.

Based on the factor arrays, respondents indicated (on the Likert scale diagram) that they "strongly disagree" and "disagree" with Q-sort statement #18 (*The climate was not better when I was younger*) in Factors 1 and 3. It is deduced that, according to the respondents' interpretation, the climate was in fact better in the past. Here the time orientation is focused on the past which coincides with the view that time is constituted by present and past experiences and that it moves in a backward direction as represented by Mbiti's concept of *actual time* [20].

For the Q-sort statement #19 (*We can solve environmental problems by returning to the ways of the past*), Factors 2 and 4 significantly representative of the respondents' like-minded opinion. By agreeing that solutions for environmental issues can be addressed by referring to past

behaviour, the Q-sort statement represents the two-dimensional concept of *actual time.* The focus is thus not placed on future solution finding, which is indicative of *no-time* where events that have not yet occurred cannot make up time and should therefore be disregarded.

Respondents strongly agreed with Q-sort statement #1 in Factor 2, thus supporting the opinion that *The climate is a natural part of the world we just have to accept and live with*. Based on the two-dimensional perception of time in Afro-polychronism, natural events that are bound to happen cannot be included in *no-time*. These uncontrollable, but foreseen, phenomena constitute *potential time* and though not stated unambiguously, Q-sort statement #1 may be supportive of this temporal conceptualisation.

Derived from the interpretations based on the relevant time orientation Q-sort statements, it is deduced that Q-sort statements #18 and #19 are representative of *actual time* and that Q-sort statement #1 is corresponsive to *potential time* as conceptualised in Afro-polychronism. This indicates that Afro-polychronism is, to some extent, present in the worldviews of the respondents.

4.3   Prominent factors representative of Afro-polychronism

The correlation of factor arrays between Q-sort statements pertaining to collectivism and time orientation indicates the factors that may be significantly representative of Afro-polychronism in some of the respondents' worldviews (as presented in Table 1.2).

Table 1.2: Correlation between factor arrays of collectivistic and time orientation Q-sort statements

Afro-polychronism: Collectivistic statements	
Q-sort statement	*High-scoring factor array per statement*
#27: "We can solve climate problems when we stand together and unite."	Factor 1 Factor 4
#35: "In order to change our beliefs about the climate, we must sit down and discuss the matter."	Factor 1
#22: "Young people can help older people catch up with new knowledge about the climate."	Factor 2 Factor 4 Factor 5
Afro-polychronism: Time orientation statements	
Q-sort statement	*High-scoring factor array per statement*
#18: "The climate was not better when I was younger."	Factor 3 Factor 1

# 19: *"We can solve environmental problems by returning to the ways of the past."*	Factor 2 Factor 4
# 1: *"The climate is a natural part of the world we just have to accept and live with."*	Factor 2

In Table 1.1, Factors 1 and 4 can (based on the factor arrays) be considered significantly representative of the Q-sort statements expressing collectivism and time orientation in Afro-polychronism which indicates its prevalence.

In reference to the Appendix B and C, Q-sort statement #27 (ranked at +3) is supportive of the fact that respondents strongly agreed with the statement. Q-sort statements #27 and #35, which represent collectivism, ranked higher in Factor 1 compared to the other factors.

Q-sort statements #27 and #35 signifies Afro-polychronic collectivism (which is considered inseparable from time orientation). Even though Q-sort statements #18 and #19 (pertaining to Afro-polychronic time orientation) did not rank high in Factor 1 as opposed to Q-sort statements #27 and #35, it does not indicate the statements' irrelevance in Factor 1, but rather that these two statements also loaded in other factors.

Based on the factor arrays of each statement and the prominent factors thereof, together with the interpretations of Appendix B and C, it can be deduced that Factors 1 and 4 meaningfully embodies collectivism and time orientation found in Afro-polychronism as embedded in the worldviews of the respondents.

4.4 Results and interpretations of Q-sort statements related to climate change awareness

Before the influence of cultural Afro-polychronic time orientation on climate change adaptation can be interpreted, it must first be established whether the respondents are indeed aware of climate change. Awareness can influence the risk perception of the group, which in turn may motivate adaptive behavioural change. Two Q-sort statements (#4 and #5) are representative of climate change awareness.

Q-sort statement #4 ranked significantly in Factors 3 and 4, based on the strong disagreement with the statement *The climate is not changing*. The respondents, to a lesser degree, also disagreed with the statement in Factors 1, 2, and 5.

A prominent ranking of Q-sort statement #5 is found in Factors 4 and 5, whereby the respondents agreed that *There's something wrong with the climate*. The respondents' opinions indicate that they are currently aware of climate change and the present timeframe, namely *actual time*, is supported by this cognisance of climate change. This opinion may be based on

present and past experiences of climatic change and is supported by the two-dimensional Afro-polychronic time orientation where time flows backward from the present to the past as characterised by *actual time*.

4.5 Results and interpretations of Q-sort statements related to climate change causality

In conjunction with the Q-sort statements relating to climate change awareness, four Q-sort statements (#12, #13, #14 and #15) were identified in order to measure the respondent's opinions regarding causes of climate change.

By stating that *The climate is affected by the behaviour of people* (Q-sort statement #12), focus is placed on possible anthropogenic actions as contributor to climatic change. Interestingly, the highest ranking factor array was marked by disagreement in Factor 2. The respondents thus indicated that they are of the opinion that human behaviour does not affect the climate.

A possible explanation of the disagreement may be that Q-sort statement #12 implies causality with the term *affect* which might have been interpreted in terms of the future. Behavioural impacts in the future may be less obvious in reference to Afro-polychronism's *no-time*, since limited credit and emphasis are allocated to future occurrences. Another semantic reason for the disagreement can be ascribed to the open-endedness of the term *behaviour*. Without reference to specific anthropogenic behaviour, the respondents might have been inclined to disagree.

Alternatively, the non-specific nature of the term *people* might have been interpreted as meaning no particular group of humans. Based on Afro-polychronic collectivism, it might be likely that the respondents could not identify with the behaviour of people not considered part of their own community. This enables the respondents to dissociate themselves as contributors to climatic change.

Subsequently, Q-sort statement #13 states that *Increasing population growth causes climate change*, implying that an increasing population will lead to increased human behaviour contributing to climatic change. When considering the factor arrays of Q-sort statement #13, a high ranking in Factor 4 indicates that the respondents disagree with the statement.

The focus of the statement is on population growth as a contributor to climatic change and not on the specific actions of groups, which may explain the respondents' disagreement. The respondents might have been unable to identify with the term *population* based on the Afro-polychronic collectivistic group orientation. *Population* might have been interpreted as consisting of various groups, thus enabling the respondents to distance their group from the concept. It

might also be that the respondents deem population growth as a positive occurrence due to Afro-polychronism's emphasis on quality and timely interpersonal relationships in the group.

Q-sort statement #14 states that *Climate change is caused by technology*, thus suggesting that technology (scientific advances, modern inventions and optimal industrialised practices) contributes to climate change. The factor arrays of Q-sort statement #14 scored negatively and neutral in all factors. This may be explained by the reflections some respondents made regarding technology: *"This is modern technology, cell phones and other things" (transcript RM-02-Jouberton-P2)* and *"No. How by technology? Because technology is things like phones, and they are not related to the climate" (transcript IM-02-Jouberton-P2)*.

Seemingly, technology does not represent scientific advance and efficient modern industrial processes. Instead it is regarded as concrete and tangible daily objects, like cellular phones. The objectification of technology could clarify why the respondents are of the opinion that use of technology do not affect climate change. Semantically, the concept *technology* may also have been interpreted as progress and advancement into the future. Afro-polychronism dictates that future events cannot constitute time and therefore this notion of technology is in contrast with the two-dimensional time orientation where temporal flow is in a backward direction from the present to the past. Progress (created by technology) symbolises the changeable future events that is labelled as *no-time*. This objectification of technology places it in the present as a tangible item, and thus dissociates it from the Afro-polychronic temporal view.

The anthropogenic Q-sort statement #15 states that *Climate change is related to the burning of fossil fuels and pollution*. Derived from the statement factor arrays, the respondents strongly agreed with the statement in Factors 3 and 4. This significant agreement with Q-sort statement #15 is contradictory to the respondents' agreement with Q-sort statement #12, which states that *The climate is affected by the behaviour of people*. By acknowledging that fossil fuels and pollution contribute to climate change, it indicates a dissociation of direct human behaviour on climate change.

Here the use of fossil fuels and creation of pollution, as perceived by the respondents, are laid at the door of industrial activities, thus excluding specific groups' behaviour as contributors. By implying that factories burn fossil fuels and consequently create greenhouse gasses that lead to increased pollution which affects the climate, the collectivistic respondents are able to distance themselves and their group from having responsibility.

During the semi-structured interviews, automobiles are also mentioned as burners of fossil fuels. Utilising public transport is common practice for many of the respondents due to their socio-economic status which makes it impossible to own private transport. This may provide clarity as to why the respondents dissociate as contributors to climate change, since they are

not driving the public transport vehicles. The pollutants can therefore be regarded as outsiders who are not included in the respondents' group by differentiating public transport passengers from the people accountable for driving or owning public transport vehicles.

4.6 Prominent factors representative of climate change awareness and causality

By correlating the factor arrays of the Q-sort statements representing climate change awareness and causality, the factors that significantly represent the climate change awareness and causality attitudes of respondents can be recognised (see Table 1.3).

Table 1.3: Correlation between factor arrays of statements based on climate awareness and causality

Climate change awareness statements	
Q-sort statement	*High scoring factor array per statement*
#4: "The climate is not changing."	Factor 2
	Factor 3
	Factor 4
#5: "There is something wrong with the climate."	Factor 4
	Factor 5
Climate change causality statements	
Q-sort statement	*High scoring factor array per statement*
#12: "The climate is affected by the behaviour of people."	Factor 1
	Factor 4
	(Note that respondents merely "slightly agreed" with the statement in the abovementioned factors).
#13: "Increasing population growth causes climate change.	Factor 1
	Factor 2
	Factor 5
	(Note that respondents merely "slightly agreed" with the statement in the abovementioned factors).
#14: "Climate change is caused by technology."	Factor 2
	Factor 4
	(Note that respondents "disagreed" with the statement in the abovementioned factors).

#15: *"Climate change is related to the burning of fossil fuels and pollution."*	Factor 3
	Factor 4
#16: *"The climate is influences the growth of crops and the production of food."*	Factor 1
	Factor 4

Factor 4 is identified (in Table 1.3) as expressive of the Q-sort statements relating to climate change awareness and the causes of climate change.

Both Q-sort statements #12 and #13 ranked meagrely in the factors by marginally agreeing with the relevant statements. According to the Likert scale utilised, the respondents did not definitively agree with any of the given factors and therefore their inexplicit attitudes, reflected by the Q-sort statements, are too weak to include in the factor correlation between the Q-sort statements representative of climate change awareness and causality.

The *Factor interpretation crib sheet of Factor 4* (cf. Appendix C) ranked at +3 for Q-sort statement #15, which is indicative of the significant representation of the respondents' attitude regarding the statement. Compared to the other factors, both Q-sort statements #5 and #15 ranked meaningfully in Factor 4.

It is therefore deduced that Factor 4 is representative of the respondents' attitudes regarding climatic change awareness and causality.

4.7   Factors 1 and 4 as representative factors

During the Q-sort analysis of the data collected for the project, five factors were produced that representatively demonstrates attitudes regarding climate and beliefs. These five factors account for 58% of the variation in the Q-sort sample. Factor 1 contributes 20% to the variance, Factors 2, 3 and 4 10% respectively and Factor 5 6%.

Based on the analysis of factor arrays, Factor 1 and Factor 4 are significantly representative of the Q-sort statement relevant to Afro-polychronic collectivism and time orientation. Even though Factor 1 ranked high in one of statements linked to climate change causality, it is Factor 4 that predominantly represents the Q-sort statements linked to climate change awareness and causality.

Factors 1, as representative of Afro-polychronism (collectivism and time orientation) and Factor 4, as representative of climate awareness and causality, therefore weightily constitute 30% of the sample variance.

4.8   Recommendations based on the identified need for climate change awareness

It is clear that some of the respondents are aware of climate change and its causes. During the semi-structured interviews, some of the respondents did however identify the need for information regarding climate change and causality in order to motivate adaptive behavioural change. The lack of cognisance of the consequences of anthropogenic behaviour pertaining to climate change is illustrated by a respondent:

> *"What I could say – many people they don't understand, once you've thrown the paper around the field, around the window, that causes the climate. Once maybe you're burning the fire around the environment you are doing the climate. People are not aware of that. But once maybe you could take the people and sit down and motivate them to try to learn more about it, maybe it could solve the problem." (transcript – 04-SS-Jouberton).*

This quote illustrates that information to raise awareness regarding climate change is identified as a possible solution to motivate change in the community's behaviour.

Based on the recognised need and the fact that a community's culture will greatly influence behavioural change, it is proposed that the community-based disaster risk management (CBDRM) approach should be implemented. The participatory nature of this approach will enable the community to become part of the knowledge-sharing process. This approach also promotes the inclusion of the community with regard to the gathering of information pertaining to the specific culture of the community and the climate change risks faced by community members.

By including the community, the information provided to raise climate change awareness and consequently motivate behavioural change, can be based on the cultural views of the community. The tailoring of disaster risk reduction information may enable the community to more easily identify with the information which will motivate them to take ownership of the disaster risk reduction process.

5.   Conclusion

Afro-polychronism, as an embedded part of the worldview held by some of the respondents in peri-urban South African communities, is supported by the results of the factor array analysis. It focuses on both collectivism and the indigenous South African time orientation. This worldview influences the risk perception of the respondents and the consequential motivation for behavioural change. It is clear that the respondents are aware of climate change, but even though cognition are allocated to some causality of climate change, it is apparent that the respondents dissociate themselves as contributors to such change. This dissociation can be attributed to the collectivistic nature of Afro-polychronism.

Afro-polychronic time orientation is present- and past-orientated, and this temporal view is supported by the respondents' opinion that the climate was better in the past and that solutions for climate change can be found by returning to the ways of the past. Possible solutions and adaptive strategies for climate change is clearly not situated in the future, since future occurrences cannot constitute time in Afro-polychronic terms.

Afro-polychronic cultural time orientation can be considered influential on climate change adaptation. Climate change awareness may not provide enough motivation for communities to adapt their behaviour and it is therefore imperative to investigate and include a community's worldview when implementing climate change adaptation strategies based on the fact that the culture of a community will dictate the behaviour of said community.

APPENDIX A: Q-STATEMENT SET

1. The climate is a natural part of the world we just have to accept and live with.
2. The climate is complicated.
3. The climate is unpredictable.
4. The climate is not changing.
5. There is something wrong with the climate.
6. Climate change is not a sign that the world is ending.
7. Natural disasters happen when nature wants to reshape itself.
8. The climate is determined by God.
9. Climate change is not punishment for the sins that people commit.
10. Climate change is caused by the fighting of the ancestors.
11. Traditional healers cause the climate to change.
12. The climate is affected by the behaviour of people.
13. Increasing population growth causes climate change.
14. Climate change is not caused by technology.
15. Climate change is related to the burning of fossil fuels and pollution.
16. The climate is influences the growth of crops and the production of food.
17. People are trying to make money, that's why they are damaging the environment.
18. The climate was not better when I was younger.
19. We can solve environmental problems by returning to the ways of the past.
20. The next generation will be influenced by our current behaviour towards nature.
21. We must act now to prevent the climate problems of the future.
22. Young people can help older people catch up with new knowledge about the climate.
23. We have the right to know about climate issues that affects us directly and indirectly.
24. Educating people about climate change will anger the ancestors and cause bad luck.
25. It is not the duty of the government to inform people about climate change.
26. We can address climate problems by drafting laws that protect the environment.
27. We can solve climate problems when we stand together and unite.
28. It is possible for humans to control the climate through technology.
29. Using sustainable technology is not good for the climate.
30. It is difficult to care about climate change because of economic pressures.
31. The climate does not play an important role in our lives.
32. We do not have to respect the environment.
33. It is difficult to educate people about climate change because of their beliefs.
34. It is possible to change my beliefs when someone else tells me to.
35. In order to change our beliefs about the climate, we must sit down and discuss the matter.

36. My beliefs can change if I see in reality that things are different from my beliefs.

37. My beliefs about the climate can change when mechanisms are in place to protect us.

38. I am open to change my beliefs, because I learn new things all the time.

39. It is not possible to change my beliefs.

40. The climate influences how people feel emotionally and that may cause changes in their beliefs.

APPENDIX B: Factor Interpretation Crib Sheet of Factor 1

Items Ranked at +3	
9	Climate change is not punishment for the sins that people commit.
16	The climate influences the growth of crops and the production of food.
27	We can solve climate problems when we stand together and unite.

Items Ranked Higher in Factor 1 Array than in Other Factor Arrays		
2	The climate is not complicated.	0
4	The climate is not changing.	-1
6	Climate change is not a sign that the world is ending.	1
7	Natural disasters happen when nature wants to reshape itself.	2
9	Climate change is not punishment for the sins that people commit.	3
12	The climate is affected by the behaviour of people.	1
13	Increasing population growth causes climate change.	1
14	Climate change is not caused by technology.	0
16	The climate influences the growth of crops and the production of food.	3
21	We must act now to prevent the climate problems of the future.	2
27	We can solve climate problems when we stand together and unite.	3
29	Using sustainable technology is not good for the climate.	-1
31	The climate does not play an important role in our lives.	-1
35	In order to change our beliefs about the climate, we must sit down and discuss the matter.	2
36	My beliefs can change if I see in reality that things are different from what I believe.	2
37	My beliefs about the climate can change when I feel less vulnerable.	0
40	The climate influences how people feel emotionally and that may cause changes in their beliefs.	1

Items Ranked Lower in Factor 1 Array than in Other Factor Arrays		
3	Climate change is caused by the fighting of the ancestors.	0
8	The climate is determined by God.	-2
10	Climate change is caused by the fighting of the ancestors.	-3
11	Traditional healers cause the climate to change.	-3
22	Young people can help older people catch up with new knowledge about the climate.	0
24	Educating people about climate change will anger the ancestors and cause bad luck.	-3
26	We can address climate problems by drafting laws that protect the environment.	0
30	It is difficult to care about climate change because of economic pressures.	-1

Items Ranked at -3	
10	Climate change is caused by the fighting of the ancestors.
11	Traditional healers cause the climate to change.
24	Educating people about climate change will anger the ancestors and cause bad luck.

APPENDIX C: Factor Interpretation Crib Sheet of Factor 4

Items Ranked at +3	
15	Climate change is related to the burning of fossil fuels and pollution.
23	We have the right to know about climate issues that affect us directly and indirectly.
27	We can solve climate problems when we stand together and unite.

Items Ranked Higher in Factor 4 Array than in Other Factor Arrays		
2	We do not have to respect the environment.	0
5	There is something wrong with the climate.	2
6	Climate change is not a sign that the world is ending.	1
12	The climate is affected by the behaviour of people.	1
15	Climate change is related to the burning of fossil fuels and pollution.	3
17	People are trying to make money, that's why they are damaging the environment.	2
18	The climate was not better when I was younger.	-1
21	We must act now to prevent the climate problems of the future.	2
23	We have the right to know about climate issues that affect us directly and indirectly.	3
27	We can solve climate problems when we stand together and unite.	3
30	It is difficult to care about climate change because of economic pressures.	1
34	It is possible to change my beliefs when someone else tells me to.	0
37	My beliefs about the climate can change when I feel less vulnerable.	0

Items Ranked Lower in Factor 4 Array than in Other Factor Arrays		
1	The climate is a natural part of the world we just have to accept and live with.	-1
3	The climate is unpredictable.	0
4	The climate is not changing.	-3
13	Increasing population growth causes climate change.	-2
14	Climate change is not caused by technology.	-2
28	It is possible for humans to control the climate through technology.	-1
29	Using sustainable technology is not good for the climate.	-3
31	The climate does not play an important role in our lives.	-3
32	We do not have to respect the environment.	-3
33	It is difficult to educate people about climate change because of their beliefs.	-2
35	In order to change our beliefs about the climate, we must sit down and discuss the matter.	1
36	My beliefs can change if I see in reality that things are different from what I believe.	0
38	I am open to change my beliefs, because I learn new things all the time.	0
40	The climate influences how people feel emotionally and that may cause changes in their beliefs.	-1

Items Ranked at -3	
4	The climate is not changing.
29	Using sustainable technology is not good for the climate.
31	The climate does not play an important role in our lives.
32	We do not have to respect the environment.

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CHAPTER 4: RESULTS, FINDINGS AND OBJECTIVE CONCLUSIONS

4.1   Introduction

The comprehensive literature review presented in Chapter 2 led to the identification of various gaps in available academic works regarding the link between time orientation from an indigenous South African perspective and the possible effects thereof on adaptation to climatic change. The qualiquantological approach[15], as proposed by Q-methodology, was chosen as research method. This study formed part of an international collaboration (SANCOOP: Climate and Beliefs Project) between the University of Oslo in Norway and the North-West University in South Africa which facilitated the production of various conclusions and recommendations based on the research findings.

Chapter 1 and 2 provided the necessary orientation and academic framework for this study. Chapter 3 consists of an academic article which illustrated the contextual focus of the study; followed by a literature review to highlight relevant concepts; the Q-methodology as applied to the research questions; and a discussion on the data analysis and research findings. The article is concluded by a brief summary of the research conclusions and recommendations.

This chapter gives an overview of the hypothesis and research objectives stated in Chapter 1, presents the results, findings and conclusions of each objective and concludes with a re-evaluation of the hypothesis.

4.2   Hypothesis and research objectives

The following hypothesis is deduced from the literature review – especially the interactions between the concepts *culture*, *beliefs*, *risk perception* and *behaviour adaptation* (cf. **Section 1.3**):

> The fundamental beliefs surrounding time orientation in the indigenous South African context are concrete and past- and present-orientated with less emphasis on the future. This may influence the community's ability to adapt to climate change, since adaptation requires an appreciation of the influence of current actions and behaviours on future events and outcomes.

Derived from the hypothesis, the objectives of the study are fourfold. Firstly, to describe the time orientation beliefs as found in the indigenous South African context. Secondly, to analyse the concept *climate change adaptation* in order to provide the necessary background. Thirdly, to determine time orientation beliefs' possible influences on climate change adaptation. Lastly, to

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[15] Qualiquantology refers to a research method that is mixed in nature without the clear categories of qualitative and quantitative methods as found in the mixed method approach (cf. **Section 1.6.2.4**).

formulate recommendations to increase community awareness with regard to climate change adaptation.

4.3 Results, findings and conclusion of Objective 1

In this section, the results of Objective 1 are discussed. The discussion is based on the Q-methodological results generated from the literature review and research Phases 1 and 3.

4.3.1 Literature analysis and concept formulation

A literature analysis on the interlinked concepts of *worldview*, *perspectives and culture*; and *time orientation* is given in Chapter 2. The worldview most prominent in this literature review is the indigenous South African perspective as found in the peri-urban communities investigated.

When investigating this worldview, it is of importance to focus on time orientation from an African perspective (Mbiti, 1969:5) due to the fact that this time orientation represents "a social cultural reality" (Babalola & Alokan, 2013:143). The literature analysis supportively illustrates that the worldview forms a group's culture and this will influence beliefs regarding time orientation (and climate change). This deduction is maintained by Hall (1990:179) when he states that time forms the "bases on which all cultures rest and around all activities revolve".

A prominent temporal description allocated to time orientation is polychronism. The concept polychronism refers to the conducting of multiple proceedings and tasks simultaneously combined with a high level of group participation (Hall & Hall, 1987:17). Weight is concretely allocated to meaningful and successful transactions between community members and schedule adherence is of less importance (Hall & Hall, 1987:17). This focus on quality human interaction can be accredited to the collectivistic trait prominent in polychronism.

It must be noted that polychronism can be used to describe the temporal beliefs of various population groups, including Africa and Asia (Elmer, 1962:136), regardless of the fact that these populations have vastly unique cultures. This is because the term denotes a concrete experience of time (as related to concrete human action) and not an abstract notion (related to a physical aspect irrespective of human subjectivity).

For the purpose of this study it is of importance to attempt to describe the culture of indigenous South African communities, as well as their time orientation, from a broader African perspective. It will be of value to briefly revisit the cultural term *Ubuntu* (South African collectivism) as found in Afro-polychronism.

Ubuntu (cf. **Section 2.3.2**) is a holistic group idea found in collectivism, which accentuates interdependency between members of a community. This interdependence signifies the sharing of roles and responsibilities between various group members in order to facilitate community

growth and progress (Jackson, 2010:100). Due to the interdependency and focus on group improvement, it can be said that the individual is defined by means of their existence as part of the group. The cultural Ubuntu saying "You do not live for yourself, you live for others", (Anderson, 2013:380) illustrates this notion.

The work of John Mbiti (1969) supports *Ubuntu* and polychronism. Mbiti agrees that various cultural aspects, like *Ubuntu*, illustrates the time orientation from an African perspective. The time orientation from the African perspective (Mbiti ,1969) is two dimensional in nature. Focus is on the present and past, with less emphasis on future occurrences. The only frames that can constitute time is the past and present and these are referred to as *actual time*. *Actual time* flows backwards from the present to the past which is in contrast with the contemporary time orientation where time flows forward from the past to the present to the future.

According to Mbiti (1969), future events, specifically more than 6 to 24 months in the future, cannot be regarded as an actual time frame and is aptly named *no-time*. Natural phenomena that will occur indefinitely cannot be discarded and this time frame represents *potential time*.

Based on the description of Ubuntu (polychronism as found in the African perspective) and the cultural time characteristics presented by Mbiti, cultural aspects found in the African perspective cannot be separated from polychronism due to the importance of the holistic group. Offe (2001:55,58) concurs that time orientation cannot be alienated from the underlying cultural worldview. It must therefore be noted that the concept *Ubuntu* is context specific.

Due to the inseparability of polychronism and the unique temporal beliefs prominent in the African perspective, a new term *Afro-polychronism* is proposed to encapsulate both polychronism and the time orientation found in the African perspective from other polychronic groups. This stems from the fact that polychronism, as applied to the African populace, cannot be applied to other polychronic population groups due to the unique cultural traits imbedded in the African perspective which is context specific (Terblanché-Greeff, *et al*., 2016).

4.3.2 Results and findings for Objective 1 based on research Phase 1

During the first phase of the research individual semi-structured interviews were held with the respondents. Two questions were posed to the respondents and open discussions were held based on these questions. The questions were: *What do you think about climate?* and *Do you think it will be possible to change your beliefs about the climate?* The interviews were recorded and transcribed.

As discussed in Chapter 1 (cf. **Section 1.6.2.3**) a small sample size is preferred and adequate when using Q-methodology. It was therefore possible to derive conclusions based on statements made by specific respondents.

Based on the transcribed interviews, some statements were identified in support of *Afro-polychronism*:

> *"Basically we are talking culturally, so culture is a strong part of the people's lives because it influences people's views and values as well as their loyalties, so talking of culture, well, we all know that culture. We are talking about a group of people who are working together in reaching a common goal…" (01-KM-Jouberton).*

In this statement the importance of culture is highlighted and also supported by the collective group idea. Considering the academic works of Hall (1987) and Mbiti (1969) it can be said that community collectivism is a defining characteristic of polychronism, whereas the mention of culture may affirm the importance of Afro-polychronic cultural traits. Some respondents supported the significance of culture and community relations found in Afro-polychronism.

> *"I think the first tip is to know your culture before learning other people's culture. You should also learn not to judge people according to their culture so that they can feel comfortable around the community. You shouldn't judge or undermine anyone, you shouldn't only consider your opinions, should learn to listen to other people and value their opinions, objectives and criticisms. That will help to build a relationship between community members and leaders." (01-KM-Jouberton).*

Another key aspect is the fact that time orientation and culture are interlinking concepts.

> *"So, ja… it challenges-- That why when you come to us, you tell us about climate change, it won't be easy for us to believe you. Because based on how we grew and how we were taught-- that, ah, ah, ah-- this is the cultural way. Because of, we see nature differently, as (than) the white man. You understand? To us, I think would be that nature, it can tell the future based on natural things that happens. You understand?" (04-AB-Jouberton).*

From the African perspective natural events that will occur definitely is called *potential time*. This is depicted by the abovementioned comment that nature will predict future events. However, it must be noted that incalculable future events cannot constitute time and is called *no-time* (Mbiti, 1969:16).

4.3.3 Results and findings for Objective 1 based on research Phase 3

Grounded on the semi-structured interviews, 40 representative Q-sort statements were identified by means of the Q-sort methodology (cf. **Annexure 1** for a complete list Q-sort statements). During research Phase 3, the statements were presented to the respondents and they were requested to arrange the statements according to a forced-distribution method on a Likert scale grid ranging in seven intervals from "strongly agree" to "strongly disagree". The

arrangement of statements done by the respondents were captured and analysed using PQMethod software. The resulting statistical factor arrays are discussed in accordance with the correlating statements that highlight the collective and time orientation traits found in Afro-polychronism. The Q-sort statements that link to collectivism and time orientation in Afro-polychronism are:

Q-sort statement #27: *"We can solve climate problems when we stand together and unite."*

Q-sort statement #35: *"In order to change our beliefs about the climate, we must sit down and discuss the matter."*

Q-sort statement #22: *"Young people can help older people catch up with new knowledge about the climate."*

Interpretations of these Q-sort statements is discussed below.

4.3.3.1 Q-sort statements: collectivistic traits found in Afro-polychronism

Even though 40 Q-sort statements were identified, three statements focused specifically on the collectivistic attributes found in Afro-polychronism, namely Q-sort statements #27, #35 and #22.

4.3.3.1.1 Factor arrays and correlation of Q-sort statements #27, #35 and #22

The factor arrays of each statement are presented in table form and interpretation and comparisons will follow accordingly. Due to the close relation between Q-sort statements #27 and #35, the factor arrays for each statement will be provided in table form, followed by a discussion based on these two related statements. Lastly, Q-sort statement #22's factor array will be given, followed by the correlation between the Q-sort statements related to collectivism in Afro-polychronism.

Table 4.1: Factor arrays of Q-sort statement #27

Q-sort statement #27:				
"We can solve climate problems when we stand together and unite."				
Factor arrays				
Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
3	1	1	3	0
Strongly agree	Slightly agree	Slightly agree	Strongly agree	Neutral

The factor arrays for Q-sort statement #27 scored high in Factors 1 and 4 due the fact that the respondents strongly agreed that *We can solve climate problems when we stand together and unite*.

Table 4.2: Factor arrays of Q-sort statement #35

Q-sort statement #35:				
"In order to change our beliefs about the climate, we must sit down and discuss the matter."				
Factor arrays				
Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
2	1	1	1	1
Agree	Slightly agree	Slightly agree	Slightly agree	Slightly agree

Factor 1 scored high based on the factor arrays of Q-sort statement #35. The participant predominantly agreed with the statement that *In order to change our beliefs about the climate, we must sit down and discuss the matter*.

In both Q-sort statements #27 and #35 the term *we* might have been interpreted as the community which the respondents form part of. Based on this, the Q-sort statements #27 and #35 strongly represent Afro-polychronic collectivism. Here the focus on interpersonal relations takes precedence over scheduled time. These quality relationships also indicate a collective community mentality wherein the holistic concept of *Ubuntu* (cf. **Section 2.3.2**) is prevalent. Interdependency is a characteristic of both *Ubuntu* and *Afro-polychronism*, whereby the group must act together in order to facilitate growth of the group.

Statements #27 and #35 correlate closely with each other. This interdependency is emphasised by *We can solve climate problems when we stand together and unite* (Q-sort statement #27) and *In order to change our beliefs about the climate, we must sit down and discuss the matter* (Q-sort statement #35).

Table 4.3: Factor arrays of Q-sort statement #22

Q-sort statement #22:				
"Young people can help older people catch up with new knowledge about the climate."				
Factor arrays				
Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
0	3	1	2	3
Neutral	Strongly agree	Slightly agree	Agree	Strongly agree

By strongly agreeing to the Q-sort statement that *Young people can help older people catch up with new knowledge about the climate*, the factor arrays for this statement scored high in

Factors 2 and 5. The respondents also indicated that they "agree" with the statement, thus explaining the high score in Factor 4.

The implicated relationship between youth and older people may point to the collectivistic traits of Afro-polychronism where roles of community members are shared and responsibility is considered interdependent of each other.

Table 4.4: Correlation between collectivistic statements based on factor arrays

Afro-polychronism: collectivistic statements	
Q-sort statement:	*High scoring factor array per statement:*
#27: "We can solve climate problems when we stand together and unite."	Factor 1 Factor 4
#35: "In order to change our beliefs about the climate, we must sit down and discuss the matter."	Factor 1
#22: "Young people can help older people catch up with new knowledge about the climate."	Factor 2 Factor 4 Factor 5

Q-sort statements #27 and #35 both scored high in Factor 1, whereas Q-sort statement #22 scored high in Factor 2, 4, and 5.

The correlative scoring in Factor 1 for both Q-sort statements #27 and #35 may be due to the collectivistic nature of the statements. Q-sort statement #22 also corresponds with Q-sort statements #27 and #35, however, the collectivistic link might be less prevalent. Q-sort statement #22 focuses specifically on the relation between generations and indicates interdependence by stating that *Young people can help older people*...

Even though Q-sort statement #22 is also representative of Afro-polychronic collectivism, it did not score high in Factor 1 like Q-sort statements #27 and #35. This may be explained by the transgenerational respect facet of the African perspective found in the statement. Conton (1966:21) elaborates on the respect allocated to elders in the African perspective:

Africans generally have deep and ingrained respect for old age, and even when we can find nothing to admire in an old man, we will not easily forget that his grey hairs have earned him right to courtesy and politeness.

4.3.3.2 Q-sort statements: time orientation in Afro-polychronism

From the 40 Q-sort statements identified, three statements emphasised time orientation as presented in Afro-polychronism:

Q-sort statement #18: *"The climate was not better when I was younger."*

Q-sort statement # 19: *"We can solve environmental problems by returning to the ways of the past."*

Q-sort statement # 1: *"The climate is a natural part of the world we just have to accept and live with."*

4.3.3.2.1 Factor arrays and correlation of Q-sort statements #18, #19, and #1

The factor arrays of Q-sort statements #18, #19 and #1 are presented and discussed to indicate the possible correlations between these temporal statements as found in Afro-polychronism.

Table 4.5: Factor arrays of Q-sort statement #18

Q-sort statement #18:				
"The climate was not better when I was younger."				
Factor arrays				
Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
-2	-1	-3	-1	-1
Disagree	Slightly disagree	Strongly disagree	Slightly disagree	Slightly disagree

Q-sort statement #18 is posed in the negative form, and respondents predominantly indicated that they "strongly disagree" and "disagree" with this statement. High scoring factor arrays were found in Factors 1 and 3.

The disagreement signifies the opinion that the climate was better when they were younger. The focus of climate is thus past-orientated which supports Mbiti's notion that the present and past constitutes time and that temporal flow is backwards from the present to the past. The backward flow of time is presented by the concept *actual time* (Mbiti, 1969:16-17). This is in contrast to the contemporary temporal view that time flows forward from the present to the future.

Table 4.6: Factor arrays of Q-sort statement #19

Q-sort statement # 19:				
"We can solve environmental problems by returning to the ways of the past."				
Factor arrays				
Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
-1	2	-2	1	-3
Slightly disagree	Agree	Strongly disagree	Slightly agree	Strongly disagree

For the Q-sort statement *We can solve environmental problems by returning to the ways of the past*, factor arrays scored significant in both Factors 2 and 4. This was based on the respondents' agreement with the statement. This Q-sort statement also supports the two-dimensional concept *actual time* and the weight assigned to the past by stating that the solutions to environmental problems can be found in past behaviour. Future occurrences more than two years from the present make up *no-time* and for Mbiti events that has not yet happened cannot constitute time and should therefore be ignored (Mbiti, 1969:16).

Table 4.7: Factor arrays of Q-sort statement #1

Q-sort statement #1:				
"The climate is a natural part of the world we just have to accept and live with."				
Factor arrays				
Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
0	3	-1	-1	1
Neutral	Strongly agree	Slightly disagree	Slightly disagree	Slightly disagree

Scoring high for Q-sort statement #1 is Factor 2 based on the analysed factor arrays. Hereby respondents indicated that they strongly agree with the statement that *The climate is a natural part of the world we just have to accept and live with*.

Mbiti (1969:16) does not include inevitable natural phenomena that can happen in the future in the concept *no-time*. Foreseeable natural events, like climatic change, make up the concept *potential time*. Though not explicit, the concept *potential time* can be supported by Q-sort statement #1 due to the uncontrollable and anticipated nature of climate.

In conclusion: Q-sort statements #18 and #19 concurs with *actual time* as found in Afro-polychronism, whereas Q-sort statement #1 corresponds with *potential time*.

Table 4.8: Correlation between time orientation statements based on factor arrays

Afro-polychronism: time orientation statements	
Q-sort statement	*High scoring factor array per statement*
#18: "The climate was not better when I was younger."	Factor 3 Factor 1
# 19: "We can solve environmental problems by returning to the ways of the past."	Factor 2 Factor 4
# 1: "The climate is a natural part of the world we just have to accept and live with."	Factor 2

Scoring high in Factor 1 is Q-sort statement #18, followed by Q-sort statement #19 which is Factor 2 and 4, and Q-sort statement #1 scoring high in Factor 2.

Even though there is not a correlation between the prominent Factors representative of Q-sort statement #18 and #19, both statements provide support to the concept of *actual time*. Q-sort statement #1 is represented by Factor 2. This occurrence may be explained by the fact that Q-sort statement #1 illustrates *potential time* instead of *actual time*.

Nonetheless, it must be noted that although Q-sort statements #18 and #19, and statement #1 indicate different temporal concepts, it all supports the time orientation as found in Afro-polychronism.

4.3.3.3 Factor arrays and correlation of Q-sort statements pertaining to collectivism and time orientation in Afro-polychronism

Based on Table 4.9 the correlation between collectivistic and time orientation Q-sort statements (based on factor arrays) is discussed and the most prominent factors that may be representative of Afro-polychronism is presented.

Table 4.9: Correlation between collectivistic and time orientation statements based on factor arrays

Afro-polychronism: collectivistic statements	
Q-sort statement	*High scoring factor array per statement*
#27: "We can solve climate problems when we stand together and unite."	Factor 1 Factor 4
#35: "In order to change our beliefs about the climate, we must sit down and discuss the matter."	Factor 1

#22: "Young people can help older people catch up with new knowledge about the climate."	Factor 2 Factor 4 Factor 5
Afro-polychronism: time orientation statements	
Q-sort statement	*High scoring factor array per statement*
#18: "The climate was not better when I was younger."	Factor 3 Factor 1
# 19: "We can solve environmental problems by returning to the ways of the past."	Factor 2 Factor 4
# 1: "The climate is a natural part of the world we just have to accept and live with."	Factor 2

As illustrated in Table 4.9, Factor 1 is representative (based on the factor arrays) of selected the Q-sort statement relevant to Afro-polychronic collectivism and time orientation. Based on the *Factor interpretation crib sheet of Factor 1* and the *Factor interpretation crib sheet of Factor 4* (cf. **Annexures 1 & 2**), the Q-sort statement #27 where ranked at **+3** indicating that the respondents strongly agreed with this statement. Items pertaining to collectivism that ranked higher in Factor 1 array than in other factor arrays, were Q-sort statements #27 and #35.

These statements clearly represent Afro-polychronic collectivism (which cannot be separated from time orientation). The fact that Q-sort statements #18 and #19 (representative of time orientation in Afro-polychronism) did not rank higher in Factor 1 (based on the *Factor interpretation crib sheet of Factor 1*) does not indicate that these statements are irrelevant in Factor 1. It merely indicates that these Q-sort statements also featured in other factor arrays.

It is therefore deduced that Factors 1 and 4, to a degree, represent Afro-polychronic collectivism and time orientation.

4.3.4 Conclusion based on results and findings for Objective 1:

Various beliefs associated with collectivism and time orientation from an African perspective as grounded in *Afro-polychronism* were identified by the literature analysis, the qualitative statements taken from the semi-structured interviews and the factor analysis resulting from the factor arrays identified.

The literature review led the formulation of the context specific concept *Afro-polychronism*, based on its embedded and inseparable collectivistic and time orientation traits. *Afro-polychronism* embodies both the collectivistic nature and time orientation, making it a fitting concept that can be specifically applied to the African perspective. By doing this, unique African polychronism can be differentiated from other polychronism populations.

Quotes taken from the semi-structured interviews that were conducted during Phase 1 of the research indicated some collective and temporal traits found in the represented communities. Based on the opinions formulated during the semi-structured interviews, 40 Q-sort statements were identified.

From the 40 Q-sort statements identified during Phase 3, six statements supported the collectivistic nature and time orientation of Afro-polychronism. From the factor array analysis, it became apparent that 4 out of the 6 Q-sort statements scored high in Factors 1 and 4. It may therefore be concluded that Factors 1 and 4 represent Afro-polychronism based on its embedded collective and time orientation traits.

Based on these processes and findings, the objective was addressed by describing beliefs related to time orientation in peri-urban South Africa.

4.4   Results, findings and conclusion of Objective 2

In order to illustrate the effective execution of Objective 2, the relevant results, findings and conclusions are subsequently discussed.

4.4.1 Literature analysis

To conceptually analyse *climate change adaptation*, a thematic analysis of various contributing concepts was conducted by means of a literature review. The concepts pertaining to climate change adaptation are *climate change*; *vulnerability*; *perceived risk* and *adaptation*.

Greenhouse gasses caused by anthropocentric activities are a main contributor to the rising of global temperature. The Earth's ongoing changing weather patterns are referred to as climate change. Climatic change is evident in South Africa and affects the country harshly. In 2015, five of the nine provinces in South Africa were declared disaster areas due to drought conditions, currently making arid South Africa one of the 30 driest nations globally (Department of Water and Sanitation, 2015). Peri-urban communities in South Africa are especially vulnerable to the effects of climatic change due to substandard living conditions and economic challenges.

Zubair (2004:4) is of the opinion that the understanding of climate change and the vulnerability of a society is equally important. Henceforward the concept of vulnerability of a community can be described as "the conditions determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards" (ISDR, 2004:16). In order to decrease a community's level of vulnerability, changes in behaviour must be implemented which will strongly depend on the community's risk perception.

Risk perception refers to the subjective belief of the likelihood and intensity of exposure to possible hazards. If this belief holds that the likelihood and consequential intensity of a risk is

minuscule, the motivation to adapt behaviour, in order to lessen the risk faced, will be lacking.

Some level of risk or threat must be perceived to motivate members of community to take adaptive measures. Adaptation to the risk caused by climate change is imperative to mitigate a community's vulnerability. Here, adaptation refers to the reactive behaviour in response to climatic change. Adaptive behaviour can also be based on anticipated climate change.

The concept "climate change adaptation" refers to adopted behavioural changes that will facilitate the adaptation to present and anticipated change in climate in order to mitigate a community's vulnerability and promote the community's capacities.

4.4.2 Conclusion based on the literature review for Objective 2

The fact that the climate is changing and that South African communities are highly vulnerable, makes the cognition of climate change risk very important. This risk judgment can be used to motivate adaptive behaviour in response to climate change and the inevitable future effects thereof.

The literature review presented in **Sections 2.7 to 2.9** and **Section 4.4.1** analysed the concept "Climate Change Adaptation" in detail by focusing on the contributing terms "Climate change", "Vulnerability", Risk perception", and "adaptation". By doing this Objective 2 was effectively attended to.

4.5   Results, findings and conclusion of Objective 3

In order to address Objective 3, reference will be made to various preceding sections that analysed the concepts *Afro-polychronism* and *climate change adaptation* as these sections provide a theoretical frame for the successful execution of Objective 3. This will be followed by an analysis and discussion of data obtained during research Phases 1 and 3.

4.5.1   Literature analysis and concept formulation

This analysis provided the academic foundation used to analyse the data of research Phases 1 and 3. It also provided support to the findings and conclusions of Objective 3.

4.5.2   Results and findings for Objective 3 based on research Phase 1

During Phase 1 of the research it became clear that changes in the climate is recognised. Explanations provided by the respondents regarding the causes of climate change during the semi-structured interviews were valid, but sometimes unsophisticated. Prominent reasons for the change in climate patterns were however assigned to certain anthropogenic actions and the development of technology. Consequently, the identified anthropogenic actions and technology,

as they pertain to the recognition of climate change, are discussed:

"… Winter is not like in the past, but it's too hot especially this January, we can even die because of this warmth. That's climate change." (04-KM-Jouberton).

The participant described climate change based on experienced weather changes. The following semi-structured interview statement illustrates the point:

"I can say the climate, we experience it, many changes a lot, sometimes it's hot, sometimes it's cold, sometimes it's both in a limited time, not like before. So many – it's caused by – manmade, so you can say it's a greenhouse or it's caused by carbon dioxide and it changes to a greenhouse atmosphere..." (02-SS-Ventersdorp).

It is also noted by the participant statement that greenhouse gasses, per implication global warming, can be attributed to the changes in weather patterns. In concurrence, the subsequent participant states that factories, fossil fuel usage and automobiles are also contributors:

"Before, things were normal, because the grass were always staying green for certain period, until the season changes. So now because of the experience, there is a lot of technology around so it affects the climate by – And I can say by – mmm – a lot of things change. There are factories who is using a lot of fossil fuels and there's a lot of building around, there are lot of gases coming from a lot of cars, mainly. So back then, those things were not there." (02-SS-Ventersdorp).

From these interview samples, it becomes clear that the respondents have a basic idea that the climate is in fact changing and also of the possible contributors. Observations that the climate is changing, is based on present and past experiences of weather occurrences. This reference to both the past and the present can be explained by the African temporal belief that the sum of events construct time (Dickson & Ellingworth, 1969:159; Mbiti, 1969:16). In other words: weather events are in relation with other events that happen simultaneously and therefore constitutes time and temporal frameworks (Mbiti, 1969:18).

Together with the observations that the climate is in fact changing, notable reasons for the observed change in climate change were assigned to some anthropogenic actions and the development of technology. These, as well as the possible influences of Afro-polychronism on climate change adaptation, are discussed in **Section 4.5.3**.

4.5.3 Results and findings for Objective 3 based on research Phase 3

40 Q-sort statements were identified from the semi-structured interviews. From the Q-sort statements set, two statements represented climate change awareness:

Q-sort statement #4: *"The climate is not changing."*

Q-sort statement #5: *"There is something wrong with the climate."*

Even though Q-sort statement #4 is stated in the negative form, it is still applicable and these correlating statements clearly embody the climate change and the awareness thereof as discussed in **Section 4.2.1**.

4.5.3.1 Q-sort statements: climate change awareness

Based on the Q-sort statements that were identified during Phase 3 of the research, it became clear that the community is aware of climate change. To demonstrate this, the factor arrays of the applicable Q-sort statements are presented as follows:

4.5.3.1.1 Factor arrays and correlation of Q-sort statements 4 and 5

Grounded on the following factor arrays, interpretations and comparisons on Q-sort statements #4 and #5 concerning climate change awareness are presented:

Table 4.10: Factor arrays of Q-sort statement #4

Q-sort statement #4:				
"The climate is not changing."				
Factor arrays				
Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
-1	-2	-3	-3	-1
Slightly disagree	Disagree	Strongly disagree	Strongly disagree	Slightly disagree

The high scoring factor arrays 3 and 4 of Q-sort statement #4 indicate that respondents predominantly "strongly disagreed" with the statement that *The climate is not changing* in Factors 3 and 4. Factors 1, 2 and 5 also represent ranges of disagreement in concurrence with Factors 3 and 4.

This signifies that respondents are in fact aware of climatic change as currently experienced. The time orientation signified by this Q-sort statement and the cognisance that the climate is in fact changing, supports *actual time* in Afro-polychronism as it refers to the present time frame. *Actual time* is made up by present events that flow backwards to the past.

Supportive of Q-sort statement #4 is Q-sort statement #5 (*There is something wrong with the climate*).

Table 4.11: Factor arrays of Q-sort statement #5

Q-sort statement #5:				
"There is something wrong with the climate."				
Factor array				
Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
0	-1	1	2	2
Neutral	Slightly disagree	Slightly agree	Agree	Agree

For Q-sort statement #5, the prominent scoring factor arrays were Factors 4 and 5. Even though the statement *There is something wrong with the climate* is rather non-specific, respondents still agreed with the statement, resulting in a higher score in Factors 4 and 5, compared to the scoring of Factors 1, 2 and 3.

The present view that there is something wrong with the climate supports *actual time* and this corresponds with the statement that the climate is changing.

Due to the correspondence between Q-sort statements #4 and #5, it will be of value to investigate the correlation based on factor arrays (cf. Table 4.12) as derived for the software data analysis.

Table 4.12: Correlation between climate change awareness statements based on factor array

Climate change awareness	
Q-sort statement	*High scoring factor array per statement*
#4: "The climate is not changing."	Factor 2
	Factor 3
	Factor 4
#5: "There is something wrong with the climate."	Factor 4
	Factor 5

Table 4.12 indicates that both Q-sort statements 4 and 5 correlatively offered a high score for Factor 4. This factor is therefore representative of the respondents' climatic change awareness. It can be noted that Q-sort statement #5 also scored high in Factor Array 5 and Q-sort statement #4 in Factor Arrays 2 and 3. However, these scores do not correlate between Q-sort statement #4 and #5.

4.5.3.2 Q-sort statements: causes of climate change

The respondents mentioned various causes of climate change in the semi-structured interviews. Based there upon, five Q-sort statements pertaining to the possible explanation of climatic change triggers were identified:

Q-sort statement #12: *"The climate is affected by the behaviour of people."*

Q-sort statement #13: *"Increasing population growth causes climate change."*

Q-sort statement #14: *"Climate change is caused by technology."*

Q-sort statement #15: *"Climate change is related to the burning of fossil fuels and pollution."*

Q-sort statement #16: *"The climate is influences the growth of crops and the production of food."*

These statements produced various factor arrays that are discussed and correlated in the subsequent sections.

4.5.3.2.1 Factor arrays of Q-sort statements #12, #13, #14, #15 and #16

Together with the Q-sort statement linked to climate change awareness, other Q-sort statements identified possible causes for the changing climate. Subsequently, the factor arrays for each of these statements are presented and discussed.

Table 4.13: Factor arrays of Q-sort statement #12

Q-sort statement #12:				
"The climate is affected by the behaviour of people."				
Factor array				
Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
1	-2	0	1	0
Slightly agree	Disagree	Neutral	Slightly agree	Neutral

This statement identified the consequences of anthropogenic behaviour as the source of climate change. However, the statement scored highly negative in Factor 2 which means that the respondents disagreed with the statement. Therefore, the respondents are of the opinion that the climate is not affected by the behaviour of people.

The term *affect,* as used in the Q-sort statement, may indicate future impacts. Derived from the time orientation in Afro-polychronism, these future impacts may not be obvious, as less

emphasis and acknowledgement is placed on future events. These future events are described by the concept *no-time* as discussed in **Section 2.5.2**.

The Q-sort statement that *The climate is affected by the behaviour of people* may be considered vague, as said behaviour is not specified. This may be the reason why the participant predominantly disagreed with the statement even though some anthropogenic causes for climate change were given in the semi-structured interviews.

The statement also refers to non-specific *people* and this could've been interpreted as individual people. Due to the collectivistic trait of Afro-polychronism it may be possible that the respondents distanced themselves from the idea that people's behaviour, and not the group's behaviour, affect climate change.

It is suggested that, based on Afro-polychronism, the words *affected*, *behaviour* and *people* may have directed the respondents to disagree with the Q-sort statement that *The climate is affected by the behaviour of people*".

Q-sort statement #13 states that *Increasing population growth causes climate change.* The statement implies that more humans will lead to more anthropogenic behaviour that contribute to changes in climate.

Table 4.14: Factor arrays of Q-sort statement #13

Q-sort statement *#13:*				
"Increasing population growth causes climate change."				
Factor arrays				
Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
1	1	0	-2	1
Slightly agree	Slightly agree	Neutral	Disagree	Slightly agree

Based on factor arrays, the high scoring in Factor 4 indicates that respondents disagreed with this statement by saying that changes in climate are not increased by growing populace.

This is contradictory to some of the semi-structured interviews where respondents indicated that human behaviour causes climate change. The fact that this statement only focuses on population growth as the cause for climate change and not on the specific behaviour of groups/people, may explain the factor scoring. The respondents are group-orientated and the term *population* may be too broad for them to identify with as the concept are made up of various groups. A specific community/group is not singled out in the statement and this might have motivated the respondents to distance themselves as a group from the concept *population*. The link between an increase in population and consequently an increase of

anthropogenic behaviour that affect climate change, might also not have been clear to the respondents.

Afro-polychronism focuses on time-consuming relationships between members of a group. This may motivate the respondents to see population growth as a positive concept that cannot possibly contribute to climate change.

Successively, Q-sort statement #14 states that *Climate change is caused by technology.* The statement implies that technology, such as improved industrial processes and scientific breakthroughs and inventions, adds to climatic changes.

Table 4.15: Factor arrays of Q-sort statement #14

Q-sort statement *#14:*				
"Climate change is caused by technology."				
Factor array				
Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
0	-2	0	-2	0
Neutral	Disagree	Neutral	Disagree	Neutral

When reflecting on technology, some respondents used cellular phones as example. This is illustrated by the interview statements *"No. How by technology? Because technology is things like phones, and they are not related to the climate" (IM-02-Jouberton-P2)* and **"***This is modern technology, cell phones and other things" (RM-02-Jouberton-P2)*.

It seems that technology does not necessarily refer to scientific progress, industrial processes and inventions used to advance production and improve existing practices, but rather to tangible and thus concrete everyday-products like cellular phones. This concrete objectification of technology may explain why the respondents felt that technology do not influence changes in climate.

Technology may also imply progress for the future and this is in contrast with Afro-polychronism whereby time flow from the present to the past. Unpredictable future occurrences are classified as *no-time* and of little importance. It might therefore be deduced that technology and progress cannot constitute time because it implies the forward flowing of time in ways that are not always readily predictable. The objectification of technology dissociates it from a temporal view, and places it as a concrete object in the present.

Another anthropogenic statement is displayed in Table 4.14 which states that *Climate change is related to the burning of fossil fuels and pollution.*

Table 4.16: Factor arrays of Q-sort statement #15

Q-sort statement *#15:*				
"Climate change is related to the burning of fossil fuels and pollution."				
Factor array				
Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
1	0	3	3	1
Slightly agree	Neutral	Strongly agree	Strongly agree	Slightly agree

Respondents attributed the *burning of fossil fuels and pollution* to the change in climate. This is illustrated by the fact that respondents "strongly agreed" with the statement as found in Factors 3 and 4.

The disagreement with the Q-sort statement #12 (*The climate is affected by the behaviour of people*) compared with the agreement that *Climate change is related to the burning of fossil fuels and pollution* is contradictory. It implies a distancing of direct human behaviour impacting climatic change while still ascribing cognition to the fact that the use of fossil fuels and the creation of pollutants contribute to climate change patterns.

The *burning of fossil fuels and pollution* is allocated to industrial practices and not to specific community behaviour. This collectivistic focus is a prominent trait of Afro-polychronism and implies that the members of the group function as a holistic unit. By stating that factories implement the burning of fossil fuels and subsequently produces greenhouse gasses (creating more pollution), distances the respondents from taking group responsibility for pollution and the burning of fossil fuels.

The burning of fossil fuels was also explained by the use of automobiles. Some respondents do not own vehicles due to their economic vulnerability. The use of public transport (minibuses) are common practice for many members of the community. This may also explain the respondents' distancing from the individual's contribution to pollution as they are not the drivers or owners of public transport vehicles. The pollutants are thus deemed as outsiders who are not part of the group by distinguishing between passengers using public transport from persons responsible for driving or owning public transport.

Lastly, the factor arrays of Q-sort statement *The climate is influences the growth of crops and the production of food* is presented and discussed to illustrate its link with climate change awareness.

Table 4.17: Factor arrays of Q-sort statement #16

Q-sort statement #16:				
"The climate is influences the growth of crops and the production of food."				
Factor arrays				
Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
3	2	3	2	0
Strongly agree	Agree	Strongly agree	Agree	Neutral

Q-sort statement #16 (*The climate is influences the growth of crops and the production of food*) scored high in Factors 1, 2, 3 and 4 whereby the respondents predominantly "strongly agreed" and "agreed" based on the factor arrays presented in Table 4.17.

The respondents are well aware of a relation between food security and climate patterns. This is supported by the semi-structured interview statement:

"Maybe sometimes when it rains too much it causes floods, whereby the crop may die, you won't be able to have any food to eat, because it destroys everything" (05-BJ-Ikageng).

This possibly illustrates a focus on the holistic sum of events. The present time orientation whereby events can be predicted is based on past experiences as depicted by Afro-polychronic *actual time*.

The concept *potential time*, which is made up by unavoidable future natural phenomena, is supported by the semi-structured interview statement:

"We're gonna die, there will be hunger, because if it is not raining, because the sun is crouching the crops. At the end there won't be food, and food is the source to survive" (04-SS-Ventersdorp).

This suggests a recognition of potential threats posed by occurrences in *potential time* which in turn may motivate behavioural changes leading to climate change adaptation.

Subsequently, a discussion on the possible statement correlations is presented.

4.5.3.2.2 Correlation of factor arrays of Q-sort statements #12, #13, #14, #15 and #16

The high scoring factor arrays pertaining to climate change awareness are presented in Table 4.18 and possible explanation for these arrays will be considered.

Table 4.18: Possible correlation between statements based on the causes of climate changes

Climate change causational statements	
Q-sort statement	*High scoring factor array per statement:*
#12: *"The climate is affected by the behaviour of people."*	Factor 1 Factor 4 (Note that respondents merely "slightly agreed" with the statement in the abovementioned factors).
#13: *"Increasing population growth causes climate change.*	Factor 1 Factor 2 Factor 5 (Note that respondents merely "slightly agreed" with the statement in the abovementioned factors).
#14: *"Climate change is caused by technology."*	Factor 2 Factor 4 (Note that respondents "disagreed" with the statement in the abovementioned factors).
#15: *"Climate change is related to the burning of fossil fuels and pollution."*	Factor 3 Factor 4
#16: *"The climate is influences the growth of crops and the production of food."*	Factor 1 Factor 4

Q-sort statements #12 and #13 scored moderately in the factors arrays with respondents "slightly agreeing" with the statements. Based on the Likert scale used, the respondents did not "strongly agree" or "agreed" with any of the factors. The undistinctive attitudes of the respondents are therefore too weak to use in the correlation between all the Q-sort statements relevant to climate change awareness.

As discussed in **Section 4.4.3.2.1**, the indistinctive attitudes may be based on the collectivistic nature of Afro-polychronism whereby individuals dissociate themselves as possible contributors to climate change. Contribution to climate change is allocated to "outsiders" who are considered to be standing outside the specific group.

Founded on the factor array of Q-sort statement #14, the respondents "disagreed" with the statement that *Climate change is caused by technology.* In **Section 4.4.3.2.1** the objectification

of technology was used as motivation to explain this finding. It was suggested that the respondents see technology as tangible objects, like cellular phones.

The two remaining Q-sorts, linked to the awareness of climate changes, correlate with each other by scoring high in Factor 4. The respondents are aware that pollution and fossil fuel burning contribute to changes in the climate. In correspondence with Q-sort statements #12 and #13 the onus of these contributions are put on industries and "outsiders" (as discussed in detail in **Section 4.4.3.2**).

Accordingly, the respondents acknowledged that food security is influenced by the climate. This indicates the risk perception that volatile food production can have a negative effect on available resources. This risk perception can be considered important as a level of threat must be perceived before the need for adaptive action is recognised.

4.5.3.2.3 Factor arrays and correlation of Q-sort statements pertaining to climate change awareness and causes

Table 4.19 represents the correlation between Q-sort statements pertaining to climate change awareness and causes, and these are discussed based on factor arrays. The most noticeable factors that may be typical of Afro-polychronism are also presented.

Table 4.19: Correlation between climate change Q-sort statements and climate change causational Q-sort statements based on factor arrays

Climate change causational statements	
Q-sort statement	*High scoring factor array per statement*
#4: "The climate is not changing."	Factor 2 Factor 3 Factor 4
#5: "There is something wrong with the climate."	Factor 4 Factor 5
Climate change awareness statements	
Q-sort statement	*High scoring factor array per statement*
#12: "The climate is affected by the behaviour of people."	Factor 1 Factor 4 (Note that respondents merely "slightly agreed" with the statement in the abovementioned factors).

#13: "Increasing population growth causes climate change.	Factor 1 Factor 2 Factor 5 (Note that respondents merely "slightly agreed" with the statement in the abovementioned factors).
#14: "Climate change is caused by technology."	Factor 2 Factor 4 (Note that respondents "disagreed" with the statement in the abovementioned factors).
#15: "Climate change is related to the burning of fossil fuels and pollution."	Factor 3 Factor 4
#16: "The climate is influences the growth of crops and the production of food."	Factor 1 Factor 4

Table 4.19 illustrates that Factor 4 is representative of the Q-sort statements pertaining to climate change awareness and the possible causes of climatic change. Derived from the *Factor interpretation crib sheet of Factor 4*" (cf. **Annexure 3**) Q-sort statement #15 ranked at +3, indicating that the participant strongly agrees with this Q-sort statement. Q-sort statements #5 and #15 ranked the highest in Factor 4, compared to other factors.

Q-sort statements #5, #15 and #16 pertain to climate change awareness and the possible causes thereof. It must however be noted that even though Q-sort statement #16 did not rank the highest in Factor 4 (based on the *Factor interpretation crib sheet of Factor 4*), it is still prevalent to Factor 4.

Based on the preceding discussion, it is deduced that Factor 4 may be representative of the climate change awareness and perceptions of climate causes of the respondents.

4.5.4 Conclusion based on results and findings for Objective 3

In order to successfully address Objective 3 (cf. **Section 1.5**), the possible influences of Afro-polychronism on the adaptation to climatic change (based on the research conducted in Ikageng, Jouberton, and Ventersdorp) were investigated.

From the semi-structured interviews conducted in research Phase 1, it became apparent that the respondents were aware of climate change (cf. **Section 4.5.2**). This awareness of climatic change was based on personal experiences in the present and past, and indicates the time orientation of Afro-polychronism where time is concretely constructed by the sum of events. The

sum of events is made up of various occurrences, including weather phenomena and other incidents that happen simultaneously, thus constituting *actual time*.

Research Phase 3 provided factor arrays for the various Q-sort statements pertaining to climate change (cf. **Section 4.5.3.1.1**). By disagreeing with the statement *The climate is not changing*, the respondents deductively imply that the climate is, in fact, changing. This awareness of climatic change, based on present and past experience, signifies *actual time* found in Afro-polychronism (cf. **Section 4.3.1**). Concurrently, the agreement with the present-tense Q-sort statement that *There is something wrong with the climate* also represents Afro-polychronic *actual time*.

In conjunction with climate change awareness, the respondents identified specific anthropogenic behaviour as contributing to climate change (cf. **Section 4.5.3.2**), but also denied that some anthropogenic activities contribute thereto.

Respondents strongly agreed that *Climate change is related to the burning of fossil fuels and pollution,* thus allocating the contribution onus on industrial processes and the use of automobiles. The respondents did however disassociate themselves as contributors to climate change by disagreeing with the statements *The climate is affected by the behaviour of people and Increasing population growth causes climate change.* The possible reasons for this disassociation are discussed in detail in **Section 4.5.3.2.1** and are grounded on the concepts of *no-time* and collectivism in Afro-polychronism.

The disagreement with the Q-sort statement *Climate change is caused by technology* strongly indicates the objectification of time when the respondents explained technology in terms of tangible objects, like cellular phones. This dissociates technology from a temporal view by rather objectifying it in the present. Concurrently, technology also implies progression into the future and will thus be found in *no-time*.

Grounded on the preceding results and findings of Objective 3 (cf. **Section 4.5**) and the preceding discussion, it is deduced that collectivism and time orientation, as imbedded in Afro-polychronism, do in fact influence climate change adaptation. Afro-polychronism will greatly influence the risk perceived by the community and this risk perception will determine the motivation for behavioural adaptation regarding climate change (cf. **Section 4.4.1**).

4.6   Objective 4: Providing recommendations to raise community awareness regarding climate change adaptation

As noted in **Section 4.3.1** a community's worldview and culture will influence various beliefs held by the group. A level of risk must be perceived in order to motivate behavioural change. Change in behaviour is needed in order for a group to adapt to the risks faced.

Prominent risks challenging the vulnerable communities of Ikageng, Jouberton and Ventersdorp are hazards pertaining to climate change. Before a community can adapt to climate change they have to have the relevant knowledge to identify risks. After risks are identified various adaptive strategies can be proposed. Based on the perception that time orientation as found in Afro-polychronism have little regard for distant future events (represented by *no-time*), it may be challenging to instil the need for adaptation.

In Afro-polychronism, *potential time* refers to future events (such as natural phenomena) that may predictably occur and these events are therefore not discarded and labelled as *no-time*. Consequently, recognition of climate change and the possible impact thereof could be accepted when communicated to the communities.

Information regarding the vulnerabilities of the community and the impact of climate change must be communicated to the group. Awareness regarding future climate change impacts can motivate the recognition of adaptive possibilities in order to build on existing capacities and reduce a community's vulnerability (Klein *et al.*, 2014:910).

During the semi-structured interviews of research Phase 1, various respondents identified the need for information pertaining to climate change and adaptation in order to promote community awareness:

"Okay I can say, people normally, things like climate change they can focus on it like everyday bases. So, in order for people to change we have to educate people about this climate change each and every year and . . . them how we can change certain things on climate change." (02-SS-Ventersdorp).

"Maybe people can be learned and motivated that there's something that causes the climate. Maybe motivated so that they don't throw any papers around our communities; they don't maybe burn any something in our communities." (04-SS-Jouberton).

"What I could say--many people they don't understand, once you've thrown the paper around the field, around the window, that causes the climate. Once maybe you're burning the fire around the environment you are doing the climate. People are not aware of that. But once maybe you could take the people and sit down and motivate them to try to learn more about it, maybe it could solve the problem." (04-SS-Jouberton).

When communicating the need for information and education, the respondents seem eager to participate in creating community awareness regarding climate change adaptation. Community participation is of utmost importance in order to share knowledge, gather information and to create a committed attitude (Chagutah, 2009:117) for adaptive behaviour. Chagutah (2009:123)

elaborates by stating that the "people who have suffered the impacts of climate hazards in the past and those that have gained sufficient knowledge of the risks posed by climate hazards, will more readily act on information provided".

Based on the abovementioned need for information in an attempt the facilitate adaptation, it is proposed that a community-based disaster risk management (CBDRM) approach be used and implemented by the relevant communities.

The use of the CBDRM approach is ideal for the peri-urban communities in the study as it relies on community participation to assess various risks, vulnerabilities and hazards in the communities. By incorporating the communities during the community awareness process, the beliefs and culture of the community are not excluded.

4.6.1   Community-based disaster risk management approach

Communities with a low economic status (like Ikageng, Jouberton and Ventersdorp) may live from hand-to-mouth making "insurance and other financial risk transfer tools" unaffordable (Chagutah, 2009:116). Therefore, these mitigating options, that lessen the impact resulting from the risks faced by the community, cannot be seen as viable. Emphasis should rather be placed on community awareness whereby pro-active and adaptive behaviour are communicated (Chagutah, 2009:116). This can be done by implementing the CBDRM approach.

The goal of CBDRM is to "foster participatory local adaptation to climate change that is focused on people's vulnerability, livelihoods, coping and adaptive capacity" (Van Aalst *et al.*, 2008:166). Holloway and Roomey (2008:18) elaborate on the CBDRM approach by stating that it aims to:

> reduce local disaster risks through the application of participatory assessment and planning methods… CBDRM aims to reduce vulnerabilities and strengthen people's capacities to manage specific disaster risks, even if it is not possible to address all their day-to-day difficulties.

Van Niekerk and Annadale (2009:160) are of the opinion that a community-based disaster risk assessment (as grounded in the CBDRM approach) can generate the most fruitful results when trying to understand and identify the risks faced by a community.

As stipulated by the United Nations Inter-Agency Secretariat of the International Strategy for Disaster Reduction (UN/ISDR, 2005:10) a disaster risk assessment is:

> "the process of collecting and analysing information about the nature, likelihood and severity of disaster risks. The process includes making decisions on the need to prevent or reduce disaster risks, what risks to address, and the optimal approach to tackling those risks found to be unacceptable to the target groups and communities".

After the identification of community risks, focus can be placed on pinpointing the community's coping capacities. This can lead to the development instruments that may help the community to be more resilient when confronted with hazards that lead to disasters (Van Niekerk & Annadale, 2009:164).

For the community-based risk assessment, members of the community are involved in the identification of risks as mentioned in the definition of a disaster risk assessment. The community-based risk assessment also enables the respondents to share their worldviews and beliefs (including their cultural time orientation on which behaviour can be grounded), together with their relevant experiences. Possible solutions and adaptive techniques can also be identified by creating a relaxed atmosphere where the respondents can voice their opinions (Van Niekerk & Annadale, 2009:165).

4.6.2   Recommendation

Community-based disaster risk assessments include both the formation of cognisance of disaster risks, and empowering capacity building of the community by producing possible tools when faced with hazards and disasters (Van Niekerk & Annadale, 2009:165). This is done in a participatory fashion.

Derived from the characteristics of community-based disaster risk assessments and specifically the participatory nature thereof, this method is recommended in order to address the communicated need for climate change and adaptation information to create public awareness.

4.6.2.1 Community-based disaster risk management principles

In order to successfully implement the CBDRM approach, various principles must be adhered to. Wisner *et al.* (2012:714) identify three principles of community-based disaster risk reduction (found in community-based disaster risk management): 1) community participation and empowerment; 2) development-orientated activities; and 3) a multi-stakeholder approach.

4.6.2.1.1 Community participation and empowerment

According to Wisner *et al.* (2012:715), the objectives and activities of community-based disaster risk reduction are grounded in the community's understanding of the disaster risks they face. The focus is placed on the community and when the community can identify relevant risks they will be able to take ownership of the activities, processes and outcomes of community-based disaster risk reduction (Wisner *et al.*, 2012:715). Ownership taken by the community can lead to empowerment without creating a cycle of dependency on external stakeholders.

4.6.2.1.2 Development-orientated activities

Community-based disaster risk reduction is both community- and development-orientated (Luna, 2007:9). Community development activities include "community analysis, community education, conscientization, community organization and mobilization, and participatory planning" (Luna, 2007:10). By implementing development-orientated activities the cause of vulnerability of a community can identified and the community capacity can be increase (Wisner *et al.*, 2012:716).

4.6.2.1.3 Multi-stakeholder approach

The support of multi-stakeholders is important in order to further empower a community in a sustainable manner. Prominent stakeholders to include are local and national governments as these stakeholders can provide support by investing in the community's "social resource, local DRR (disaster risk reduction) planning, appropriate management structures, and implementation and co-ordination mechanisms" (Wisner *et al.*, 2012:716).

It must be noted that the role of multiple stakeholders is not to intervene in such a manner as to take away the ownership of the community. They should rather provide support in such a manner as to create independence in the community by means of empowerment and capacity building.

4.6.2.2 Community-based disaster risk reduction methods

There are a multitude of methods available when implementing a community-based disaster risk assessment. When considering what method to implement, is it advised to investigate if the proposed method adheres to the CBDRM principles (cf. **Section 4.6.2.1**). Multiple methods do adhere to these principles – one example is illustrated in the document *Weathering the Storm: Participatory risk assessment for informal settlements* (Holloway & Roomey, 2008).

4.6.3   Conclusion for Objective 4

The aim of Objective 4 was to provide a recommendation by which community awareness regarding climate change adaptation can be raised. The need for information regarding climate change and adaptation were identified by the respondents of the study.

When offering information and creating community awareness on a topic like climate change adaptation, it is essential to include the community members. They can provide valuable information regarding the risks faced by their community based on their beliefs and experiences. It is of significance to include beliefs, like Afro-polychronic time orientation, in raising public awareness, as this will influence the adaptive measure a community will accept, due to the fact that cultural beliefs are the foundation on which behaviour is modelled.

In order to successfully address Objective 4, the use of community-based disaster risk assessment (as grounded in community-based disaster risk management) in peri-urban South African communities like Ikageng, Jouberton and Ventersdorp, are recommended as this approach is participatory in nature.

4.7   Evaluation of the hypothesis

The preceding results and findings illustrate that the essential beliefs of time orientation in Afro-polychronism are concrete, present- and past-orientated (as represented by the concept *actual time*), with lesser regard for future events constituting *no-time* (cf. **Section 2.4.2**).

Climate change presents itself over an extended period of time and adaptive actions must be taken now to mitigate further climatic changes. However, the future view of climate change may be irrelevant to Afro-polychronism as these events constitute *no-time* and *potential time* and not *actual time*. *Potential time* refers to inevitable natural phenomena which indicates that these phenomena may not be controllable or avoided.

Time orientation and collectivism in Afro-polychronism influence the community's risk perception, which will in turn determine the behaviour a group will deem necessary for adaptation to climate change (cf. **Section 2.7**). Climate change adaptation requires the cognition of possible future scenarios based on unchanged behaviour. This future view is not prevalent in Afro-polychronism, as future events constitute *no-time*.

In other words, Afro-polychronism will greatly influence the adaptive behaviour taken by the communities, and time orientation creates the "bases on which all cultures rest and around all activities revolve" (Hall, 1990:179).

CHAPTER 5: CONCLUSION

5.1   Introduction

Chapter 5 summarises the preceding chapters and gives an exposition of the major conclusion, limitations and recommendations for future studies.

Chapter 1 provided the contextual background of the study from which the problem statement, hypothesis, research questions and objectives ensued. The research methodology, ethical considerations, limitations and delimitations, significance and provisional layout of the study followed. The investigation of time orientation from an African perspective and exploration of its possible influences on climate change were presented in the form of a literature review in Chapter 2. Chapter 3 is a scientific article based on the study and includes a summarised literature review, the research results and discussion thereof, followed by conclusions and recommendations. This article is submitted to the *International Journal of Disaster Risk Reduction* and the article is written in accordance with the journals prerequisites as stipulated in the Preface (viii-xviii). Chapter 4 presented in-depth discussions based on the results and findings per research objective. As part of Objective 4, recommendations for raising community awareness were presented.

5.2   Major conclusion

The main argument of this study is based on the relationship between the concepts of *worldview*, *culture*, *risk perception*, *behavioural change* and *climate change adaptation*. Worldview is the frame of reference used by people to make sense of the world. A group's culture stems from their worldview which includes various beliefs (like collectivism and time orientation). Culture guides the group when identifying risks and consequently influences the group's risk perception. The recognition of risks or threats is cardinal since it may motivate behavioural changes in order to mitigate and adapt to the risks faced by the group.

The prominent cultural characteristic this study focuses on is time orientation from an African perspective (also referred to as Afro-polychronism), since this trait will influence a group's risk perception and behaviour which is essential for climate change adaptation.

Based on the works of Mbiti (1969) and Hall and Hall (1987) this study found that the cultural traits of collectivism and time orientation are in fact embedded in each other. The concept *Afro-polychronism* is therefore proposed in order to include both cultural collectivism and time orientation as found in the context of the indigenous community used in the research (cf. **Section 4.3.1**).

Based on the research, it is apparent that the respondents are aware of change in climate (cf. **Section 4.5.3.1**). This awareness stems from present and past experiences of changes in weather patterns over a period of time. Climate change awareness based on present and past experiences represents *actual time* in Afro-polychronism according to which time flows from the present to the past (cf. **Section 4.3.1**).

The respondents identified the link between climate change and the burning of fossil fuels and pollution, but they do not recognise themselves as possible contributors. They rather blame industrial practices and the use of automobiles for pollution levels, caused by the burning of fossil fuels, that contribute to climate change (cf. **Section 4.5.3.2.1**). This dissociation might stem from collectivism in Afro-polychronism which means that the group is made up by its members and functions as a holistic unit. It seems that the specific group (in contrast with individual behaviour) does not contribute to pollution or the use of fossil fuels and, since the individual identifies with the group, this allows for the observed dissociation.

Semantic analysis of the factor arrays for specific statements revealed that, based on Afro-polychronism, different meanings are allocated to specific words ("people", "population", "behaviour" and "affect"). Broad, non-specific wording like "people" and "population" in some Q-sort statements (cf. **Section 4.5.3.2.1**) enables the respondents to distance themselves from the individuals and groups represented by "people" and "population", because these terms do not explicitly state that the respondents' group are meant to be included in these concepts. The word "affect" indicates consequences or impacts which in turn represents a future view. In Afro-polychronism, the possible effects might not be easily conceptualised as future events cannot constitute time (cf. **Section 2.4.2**). Therefore, based on dissociation and *no-time*, the attitude of the respondents is that climate is not affected by the behaviour of people.

Due to collectivism in Afro-polychronism, the focus shifts to timely interpersonal relations between members of a group. This emphasis on relationships and group members enables the respondents to regard population growth (where population growth may also imply group growth) as a positive occurrence and not as a contributor to climate change (cf. **Section 4.5.3.2.1**). The respondents hereby also distance themselves as possible contributors to climate change.

Based on their present and past experiences grounded in *actual time*, the respondents are aware of climate change (cf. **Section 4.5.2**). Subsequently, the respondents distance themselves to some degree as contributors to climate change. Industrial practices and "the other" are blamed for major contributions to climate change (cf. **Section 4.5.3.2.1**).

The research gave respondents the opportunity to voice their need for information regarding climate change and adaptation. The use of the community-based disaster risk management

approach, with specific implementation of community-based disaster risk assessment because of its participatory nature, is therefore proposed.

Community participation is of utmost importance and the community's worldview must be incorporated in the disaster risk assessment as it will greatly influence the community's risk perception. In Afro-polychronism, ignorance of this fact poses challenges with regard to the provision of information to raise climate change and adaptation awareness. Recognition of the collectivistic trait in Afro-polychronism will help to overcome this challenge by facilitating the rephrasing of information to focus on the particular group's behaviour. The respondents will be regarded as part of the group and by being group-orientated in the information provided, the risks faced by the group can be identified easier which will motivate behavioural changes.

Another challenge posed to climate change adaptation from an Afro-polychronism perspective is the time orientation (which cannot be separated from collectivism). From this perspective, focus is placed on present and past experiences with the flow of time in a retrogressive direction. Only past and present experiences can constitute time and is therefore called *actual time*.

Climate change is presently experience in *actual time* and the respondents' awareness of climatic change is based on present and past experiences. The motivation for climate change adaptation is however based on possible future events and scenarios. In Afro-polychronism, future events cannot constitute time and is suitably referred to as *no-time* (cf. **Section 4.3.1**). In Afro-polychronism the future beyond two years from the present is "silent and indifferent" and "people can neither plan for the distant future nor 'build castles in the air'" (Mbiti, 1969:20, 23) (cf. **Section 2.4.2**). This future view of *no-time* may prove to be challenging for climate change adaptation as little emphasis is place on future events.

Noteworthy is that *potential time* refers to inevitable natural events (like climate change) which might be seen as uncontrollable due to its inevitability. Respondents may feel helpless and unmotivated when the need for adaptation to climate change arises.

The collectivism and time orientation in Afro-polychronism, and the identified need for information seems to be incoherent. Although the respondents identified the need for information regarding climate change and adaptation, they also dissociate themselves as contributors to climate change. According to their time orientation, climate change falls under *no-time* and "potential-time".

This leads to the conclusion that Afro-polychronism greatly influences climate change adaptation, since Afro-polychronism is a cardinal cultural aspect on which group behaviour is based. It is therefore imperative to include Afro-polychronism in awareness efforts and to adapt

the information provided to raise awareness regarding climate change and adaptation. The adapted information may motivate the group to include their beliefs with regard to *potential time* if it illustrates that climate change can be mitigated by adaptation.

5.3   Limitations

When conducting international research, it is common for cultural and language differences to arise. This challenge was anticipated due to the fact that multicultural South Africa has 11 official languages. The field researchers are fluent in English and either Afrikaans or Setswana, and therefore provided the respondents with the option to participate in the research in their preferred language.   Verbatim transcribing and translation of the interviews conducted in Afrikaans and Setswana were done in order to make the data available in English, thus overcoming the possible language barriers. The transcribing and translation of the data were done by external professional translation companies to ensure the quality, integrity, and ethical management of the translated data.

The experience of "African time" (as described by Mbiti, 1969) made research more time-consuming since respondents emphasised and prioritised interpersonal relationships instead of adherence to schedules. Additional time for the fieldwork had to be scheduled to accommodate this Afro-polychronic cultural aspect.

5.4   Recommendations for future studies

Culture is a "variable to be integrated in theory and research on all aspects of human behaviour" (Matsumoto & Hee Yoo, 2006:234). The culture of a group includes its worldviews and time orientation and demarcates the behaviour (including adaptive behaviour) of the group. It is therefore of great importance to investigate diverse culture when assessing the group's capacity to adapt to climate change.

The aim of Q-methodology is not to provide generalised conclusions and results, but rather to measure the opinions of a specific group. Culture is context-specific and therefore more Q-studies on the multicultural groups of South Africa should be conducted.

These multicultural studies may facilitate a parallel comparison between the various cultures in South Africa in order to establish how time orientation influences adaptation to climate change. Recommendations and awareness campaigns, based on these findings, can be tailored for the specific culture in an attempt to more successfully motivate adaptive behavioural change.

Q-methodology can also be applied to other developing African countries in order to compare time orientation and its influence on climate change adaptation between African nations.

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ANNEXURES

Annexure 1: Q-sort set

1. The climate is a natural part of the world we just have to accept and live with.
2. The climate is complicated.
3. The climate is unpredictable.
4. The climate is not changing.
5. There is something wrong with the climate.
6. Climate change is not a sign that the world is ending.
7. Natural disasters happen when nature wants to reshape itself.
8. The climate is determined by God.
9. Climate change is not punishment for the sins that people commit.
10. Climate change is caused by the fighting of the ancestors.
11. Traditional healers cause the climate to change.
12. The climate is affected by the behaviour of people.
13. Increasing population growth causes climate change.
14. Climate change is not caused by technology.
15. Climate change is related to the burning of fossil fuels and pollution.
16. The climate is influences the growth of crops and the production of food.
17. People are trying to make money, that's why they are damaging the environment.
18. The climate was not better when I was younger.
19. We can solve environmental problems by returning to the ways of the past.
20. The next generation will be influenced by our current behaviour towards nature.
21. We must act now to prevent the climate problems of the future.
22. Young people can help older people catch up with new knowledge about the climate.
23. We have the right to know about climate issues that affects us directly and indirectly.
24. Educating people about climate change will anger the ancestors and cause bad luck.
25. It is not the duty of the government to inform people about climate change.
26. We can address climate problems by drafting laws that protect the environment.
27. We can solve climate problems when we stand together and unite.
28. It is possible for humans to control the climate through technology.
29. Using sustainable technology is not good for the climate.
30. It is difficult to care about climate change because of economic pressures.
31. The climate does not play an important role in our lives.
32. We do not have to respect the environment.
33. It is difficult to educate people about climate change because of their beliefs.
34. It is possible to change my beliefs when someone else tells me to.

35. In order to change our beliefs about the climate, we must sit down and discuss the matter.

36. My beliefs can change if I see in reality that things are different from my beliefs.

37. My beliefs about the climate can change when mechanisms are in place to protect us.

38. I am open to change my beliefs, because I learn new things all the time.

39. It is not possible to change my beliefs.

40. The climate influences how people feel emotionally and that may cause changes in their beliefs.

Annexure 2: Factor interpretation crib sheet of Factor 1

Items ranked at +3	
9	Climate change is not punishment for the sins that people commit.
16	The climate influences the growth of crops and the production of food.
27	We can solve climate problems when we stand together and unite.

Items ranked higher in Factor 1 array than in other factor arrays		
2	The climate is not complicated.	0
4	The climate is not changing.	-1
6	Climate change is not a sign that the world is ending.	1
7	Natural disasters happen when nature wants to reshape itself.	2
9	Climate change is not punishment for the sins that people commit.	3
12	The climate is affected by the behaviour of people.	1
13	Increasing population growth causes climate change.	1
14	Climate change is not caused by technology.	0
16	The climate influences the growth of crops and the production of food.	3
21	We must act now to prevent the climate problems of the future.	2
27	We can solve climate problems when we stand together and unite.	3
29	Using sustainable technology is not good for the climate.	-1
31	The climate does not play an important role in our lives.	-1
35	In order to change our beliefs about the climate, we must sit down and discuss the matter.	2
36	My beliefs can change if I see in reality that things are different from what I believe.	2
37	My beliefs about the climate can change when I feel less vulnerable.	0
40	The climate influences how people feel emotionally and that may cause changes in their beliefs.	1

Items ranked lower in Factor 1 array than in other factor arrays		
3	Climate change is caused by the fighting of the ancestors.	0
8	The climate is determined by God.	-2
10	Climate change is caused by the fighting of the ancestors.	-3
11	Traditional healers cause the climate to change.	-3
22	Young people can help older people catch up with new knowledge about the climate.	0
24	Educating people about climate change will anger the ancestors and cause bad luck.	-3
26	We can address climate problems by drafting laws that protect the environment.	0
30	It is difficult to care about climate change because of economic pressures.	-1

Items ranked at -3	
10	Climate change is caused by the fighting of the ancestors.
11	Traditional healers cause the climate to change.
24	Educating people about climate change will anger the ancestors and cause bad luck.

Annexure 3: Factor interpretation crib sheet of Factor 4

Items ranked at +3	
15	Climate change is related to the burning of fossil fuels and pollution.
23	We have the right to know about climate issues that affect us directly and indirectly.
27	We can solve climate problems when we stand together and unite.

Items ranked higher in Factor 4 array than in other factor arrays		
2	We do not have to respect the environment.	0
5	There is something wrong with the climate.	2
6	Climate change is not a sign that the world is ending.	1
12	The climate is affected by the behaviour of people.	1
15	Climate change is related to the burning of fossil fuels and pollution.	3
17	People are trying to make money, that's why they are damaging the environment.	2
18	The climate was not better when I was younger.	-1
21	We must act now to prevent the climate problems of the future.	2
23	We have the right to know about climate issues that affect us directly and indirectly.	3
27	We can solve climate problems when we stand together and unite.	3
30	It is difficult to care about climate change because of economic pressures.	1
34	It is possible to change my beliefs when someone else tells me to.	0
37	My beliefs about the climate can change when I feel less vulnerable.	0

Items ranked lower in Factor 4 array than in other factor arrays		
1	The climate is a natural part of the world we just have to accept and live with.	-1
3	The climate is unpredictable.	0
4	The climate is not changing.	-3
13	Increasing population growth causes climate change.	-2
14	Climate change is not caused by technology.	-2
28	It is possible for humans to control the climate through technology.	-1
29	Using sustainable technology is not good for the climate.	-3
31	The climate does not play an important role in our lives.	-3
32	We do not have to respect the environment.	-3
33	It is difficult to educate people about climate change because of their beliefs.	-2
35	In order to change our beliefs about the climate, we must sit down and discuss	1

	the matter.	
36	My beliefs can change if I see in reality that things are different from what I believe.	0
38	I am open to change my beliefs, because I learn new things all the time.	0
40	The climate influences how people feel emotionally and that may cause changes in their beliefs.	-1

Items ranked at -3	
4	The climate is not changing.
29	Using sustainable technology is not good for the climate.
31	The climate does not play an important role in our lives.
32	We do not have to respect the environment.

Annexure 4: Co-author permission letter – J.V. Dokken

CO-AUTHOR PERMISSION FOR ARTICLE: "CULTURAL TIME ORIENTATION AND ITS INFLUENCES ON CLIMATE CHANGE ADAPTATION".

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As co-author of the presented article, I hereby give permission that the article may be included as part of the dissertation that will be submitted in partial fulfilment of the requirements for the degree *Magister Artium* in Development and Management at the North-West University and declare that the student contributed sufficiently to the research and the writing process of the presented article.

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Title: __Master of Philosophy in Human Geography__

Affiliation: __University of Oslo_____

Annexure 5: Co-author permission letter – D. Van Niekerk

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To whom it may concern

PERMISSION: CO-AUTHORSHIP FOR THE ARTICLE: "CULTURAL TIME ORIENTATION AND ITS INFLUENCES ON CLIMATE CHANGE ADAPTATION"

I hereby give permission to Ms. Aida Terblanche-Greef for the inclusion of the above mentioned article as a chapter in her thesis "Beliefs of time orientation from an indigenous African perspective: Possible implications for climate change adaptation", for the qualification in *Magister Artium* in Development and Management (Disaster Studies).

It is my conviction that Ms. Terblance-Greef is the first author of this article and that I have assisted her as her co-supervisor with the focus of the article, in particular the aspects relating to disaster risk reduction and climate change adaptation.

Kind regards,

Prof. Dewald van Niekerk
Director: African Centre for Disaster Studies
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