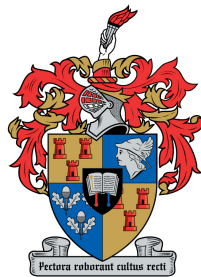


Perceived object similarity in isiXhosa: assessing the role of noun classes

By

Khanyiso Jonas



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1918 · 2018

Thesis presented in partial fulfilment of the requirements for the
degree of Masters of Arts (MA) General Linguistics.
Department of General Linguistics
at Stellenbosch University

Supervisor: Professor Emanuel Bylund

March 2018

DECLARATION

By submitting this thesis, I declare that the entirety of the work contained therein is my own original work, that I am the authorship owner thereof (unless to the extent explicitly otherwise stated) and that I have not in its entirety or in part submitted it for obtaining any qualification.

Khanyiso Jonas

22 October 2017

ABSTRACT

Categorizing objects is central to the way we as humans interact with the world. Without the capacity to form categories, we might not have been able to function efficiently. It is generally assumed that human beings are consistently in the process of categorizing; such as placing entities into groups or classes during conscious, subconscious and even unconscious states. Research on the relationship between language and thought aims to explore the domains of cognition affected by language, as well as the conditions under which these effects are obtained. The aim of the current study is to examine whether the differences in nominal classification between English (a non-noun class language) and isiXhosa (a noun class language) bring about cross-linguistic differences in categorization preferences among speakers of these languages. An object triads-matching task is used to examine categorization preferences of native English speakers and native isiXhosa speakers, specifically evaluating the extent to which isiXhosa noun class categories influence perceived object similarity. Findings from three different experimental conditions, in which the object labels in the matching task have been given different degrees of salience, indicate that noun class categories seem to have a null effect on categorization, even when noun class membership is made maximally salient. The isiXhosa speakers' experience with English as a second language is also assessed, suggesting limited measurable influence of this factor on object categorization. These findings are discussed against the predictions of the label-feedback hypothesis, along with the general framework of linguistic relativity and bilingual cognition.

ISICATSHULWA

Ukwahlula-hlula izinto yeyona ndlela abantu abayisebenzisayo ukunxulumana nehlabathi. Ngaphandle kwalo mandla okwenza ulwahlulo ngeendidi, besingasozise sikwazi ukusebenza ngokufanelekileyo. Kukho into ekholelwa jikelele ukuba abantu basoloko bekwinkqubo yokwahlula-hlula izinto, njengento yokuba, babeke izinto ezikhoyo ngokwamaqela okanye ngokoluhlu ngelixa beyenza beyazi, bengaziqondanga ukuba bayayenza naxa bengazazi ukuba benza loo nto. Ubudlelwane bophando eluphakathi kolwimi ngeenjongo zokuphuhlisa imimandla yolwazi noluchaphazela ulwimi, neemeko nalapho ezi ziphumo zifumaneka khona. Injongo yesi sifundo kukuphonononga lo mahluko uphakathi kokusetyenziswa kwesiNgesi ngokoluhlu olwamkelekileyo (ulwimi olungenamahlelo) nesiXhosa (ilulwimi olunamahlelo) iza zibenomahluko odibanayo kwilingwistikhi nakwindlela yokwahlula-hlula zizithethi zezilwimi. Uhlobo lwesixhobo esibunxantathu noluthilekisa ezi zinto lusetyenzisiwe ukuvavanya izinto ezithile ezahlula-hlulayo kwabo bantetho isisiNgesi nabo bantetho yabo isisiXhosa, kugxilwe kubo nqo ukujonga indlela yokusetyenziswa nokwahlulwa kwamahlelo esiXhosa nempembelelo yawo ukujonga imiyelela/ukuyelelana. Okufunyanisiweyo kwezi meko zintathu bezisetyenziswa ukuvavanya nokuthilekisa oku kwahluka-hlukana nokubalasela kolwimi, lonto ibonakalisa neendidi zamahlelo nanokubonakala njengaphuthileyo kwezo ndidi, nokuba ilungu lehlelo lingabekwa njengelibalaseleyo kulwimi. Abantetho isisiXhosa namava abo kwisiNgesi njengolwimi lwesibini nabo bayaphononongwa, ukufumanisa ngale milinganiselo imbalwa alento yokwahlula-hlulwa. Ezi ziphumo ziye zixoxwe ngokothekalelo lweengcinga engaqinisekiswa (ihipothisisi) nesicwangciso-msebenzi esingqamene nelwingistikhi nokuqonda ngolwimi kwabo bathetha iilwimi ezimbini.

OPSOMMING

Die kategorisering van objekte is sentraal tot die wyse waarop ons as mens met die wêreld interaksie het. Sonder die kapasiteit om kategorieë te vorm sou ons moontlik nie effektief kon funksioneer nie. Dit word algemeen aanvaar dat die mens gedurig besig is met die proses van kategorisering, bv. die plaas van entiteite in groepe of klasse tydens die bewuste, onderbewuste en selfs onbewuste state. Navorsing oor die verhouding tussen taal en denke poog om die domeine van kennis wat deur taal geaffekteer word, sowel as die omstandighede waaronder hierdie effekte waargeneem word, te verken. Die doel van die huidige studie is om vas te stel of die verskille in naamwoordelike klassifisering in Engels ('n nie-naamwoordklastaal) en isiXhosa ('n naamwoordklastaal) lei tot kruis-linguistiese verskille in die kategoriseringsvoorkeure van sprekers van hierdie tale. 'n Objek-triadeparingstaak word gebruik om die kategoriseringsvoorkeure van eerstetaal-Engelssprekers en eerstetaal-isiXhosasprekers te ondersoek, met spesifieke evaluering van die mate waartoe isiXhosa-naamwoordklaskategorieë oënskynlike objek-ooreenkoms beïnvloed. Die bevindinge van drie verskillende eksperimentele toestande waarin die objek-etiket in die paringstaak verskillende grade van opvallendheid gegee is, wys dat naamwoordklaskategorieë 'n nul-effek blyk te hê op kategorisering, selfs wanneer naamwoordklaslidmaatskap maksimaal opvallend gemaak word. Die isiXhosaspreker se bekendheid met Engels as 'n tweede taal word ook geassesseer en suggereer dat hierdie faktor 'n beperkte meetbare invloed het op objek-kategorisering. Hierdie bevindinge word bespreek teen die agtergrond van die voorspellings van die etiket-terugvoer-hipotese, tesame met die algemene raamwerk van linguistiese relatiwiteit en tweetalige kennis.

ACKNOWLEDGEMENTS

Firstly, I would like to thank my supervisor, Professor Bylund, for his continuous support, guidance and patience. His input was and is highly valued and I have him to thank for introducing me to the field of Psycholinguistics. He really has helped me unlock my passion. Robyn, thank you for your assistance with my data analysis. It kept me calm during a stressful period and it was much appreciated.

I would also like to thank Media24: NB Publishers; Zuid-Afrikahuis Studiefonds Nederland as well as the Lund-Stellenbosch project, Unravelling the Multilingual Mind (funded by the South African National Research Foundation (NRF) and the Swedish Foundation for International Cooperation in Research and Higher Education (STINT grant number: STINT16091318878)) for making this year possible.

Ndingathanda nokubulela abazali bam nodade wam – abona bantu bebendixhasile kuwo wonke amaxesha am okungazithembi. Ndibulela nakubahlobo bam ngokundikhuthaza rhoqo nangokundikhumbuza esona sizathu sokuba ndibe seStellenbosch. Andinakungamkhankanyi uDr. Kondowe, inkxaso nenkuthazo yakhe indithwele de ndaza kutsho kweli zinga ndikulo, enkosi. Nawe, Sive, enkosi ngomonde wakho.

Okok' gqibela, andiqondi ukuba ngediphumelele ngaphandle komthandazo. Bawo, ndiyabulela naKuwe ngokundinika amandla okuqhubekeka.

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LIST OF ABBREVIATIONS

- L1 First language
- L2 Second language
- AoA Age of acquisition

1. Introduction

1.1. Background

Categorizing objects is a central part of the process by which we as humans organise the surrounding world. Without the capacity to form categories, we might not have been able to function efficiently “in the physical world or in our social and intellectual minds” (Lakoff 1987: 5). When we see things such as trees, people and animals; we tend to see something as a “kind of thing” (Lakoff 1987: 6), and thus we form categories. It is generally assumed that human beings are consistently in the process of categorizing; such as, placing entities into groups or classes during conscious, subconscious and even unconscious states (Senft 2000: 11 and Lakoff 1987: 19). In perceiving the world, we develop concepts that represent the objects we perceive, and in turn, linguistic expressions referring to and representative of those concepts are commonly created. These expressions, denoting things or objects, are referred to as nouns (Senft 2000: 11).

Different languages further subcategorize nouns by grammatical means, based on specific semantic features, primarily “proper/common, count/ mass, unitary/collective, relative/ absolute” (Senft 2000: 13). The reason classificatory systems are only applicable to nouns rather than to other constituents in the sentence is because we continuously talk about entities and objects, and therefore constantly require ways in which we can refer to them. To refer to something by naming it (e.g. a tree, a car, a person) is to categorise it as part of a certain group distinct from other groups, which suggests that the role of nouns is to narrow down all possible referents to a specific one (Lakoff 1989: 19). It is observed that nouns may be classified on the basis of the semantic features of their referents (Senft 2000: 23). The semantic features being referred to may be described, for example, as [+/- human]; [+/-animate]; humans and social status; humans and kinship relations; sex; shape and dimension etc (Senft 2000: 24). Thus, things are grouped together based on the properties which they share. These semantic features, however, are not universal, but they may “culture-specific” (Senft: 2000: 24) and thus differ between different cultures and languages. Moreover, category boundaries may, in some cases, be fluid in that it is not always clear which semantic features are considered to be relevant (or non-relevant) in the formation of categories. All natural and all synthetic concrete and arbitrary objects and notions are automatically categorized; and an understanding of how these categories are formed is fundamental in order to understand how we as humans think and

function (Lakoff 1987: 5 & 6). The world's languages have various ways in which they achieve the categorization of nouns and these include classificatory noun incorporation (e.g. in Iroquoian languages); classification using verbs (e.g. Athabaskan languages); numeral classification (e.g. Chinese, Japanese, Mayan languages); gender classification systems (e.g. German, Spanish, Italian); and noun class systems (e.g. Bantu languages) (Senft 2000: 13, 14 & 15 and Aikenvald 2000: 93)

This cross-linguistic variation brought about by the different ways nouns are categorised and organised in different languages opens up for the possibility that the linguistic categorization of nouns may influence the way we think about their referents (Whorf 1956), thus bringing about cognitive variation among speakers of different languages. Against this reasoning, several studies (e.g. Imai et al 2010; Schmitt & Zhang 1998; Saalbach & Imai 2007; Sera et al. 2002; and Vigliocco 2005 etc.) have aimed to address whether speakers of different languages categorise and perceive objects differently, as an effect of employing different types of nominal classification systems. Findings from these studies indicate that while language may indeed influence object cognition, this influence is also restricted to certain types of mental processes and experimental conditions.

The current study focuses on how speakers of isiXhosa, an understudied southern African Bantu language with a noun class system, perceive objects in comparison to English speakers, whose language is lacking an overt nominal classification system. The study thus adheres to the line of research that investigates whether speakers of languages with overt nominal classification systems use classification structures inherent in their language to perceive and thus categorize physical objects (Schmitt & Zhang 1998: 108). The importance of investigating linguistic effects on cognition has been highly emphasised throughout the years (Bylund et al. 2013: 930 – 931). However, a review of the available literature indicates a dearth of studies on noun class categories in Bantu languages in the domain of object perception.

1.2.Aims and Hypotheses

Against this background, the aim of the current study is to extend the line of research done on nominal classification systems and cognition to isiXhosa noun class categories and perceived object similarity. Specifically, the study aims to answer the question of whether the differences in nominal classification present in English and isiXhosa bring about cross-linguistic

differences in perceived object similarity among speakers of English and speakers of isiXhosa. The working hypothesis is that because isiXhosa is a noun-class language and English is not, there should be cross-linguistic differences in how speakers of these languages categorize objects. Previous research (Saalbach & Imai 2005; Saalbach & Imai 2007; Schmitt & Zhang 1998; Sera et al. 1994; Sera et al. 2002; Vigliocco 2005; Lucy 1992; Mazuka & Friedman 2008; Athanasopoulos 2006; Athanasopoulos & Kasai 2008 etc.) investigating languages with different nominal classification systems have reported findings which indicate cross-linguistic differences in terms of perceived object similarity/ similarity judgement, and it is suggested that classifier categories have strong effects on conceptual categories (Saalbach & Imai 2005). Seeing however that there are also studies in which no such effects are observed, the present thesis follows Bylund and Athanasopoulos' (2014: 953) suggestion that cross-linguistic differences in cognition may only be obtained under certain experimental conditions, but not others. The label-feedback hypothesis (Lupyan 2012: 1) suggests that labelling, and thus language, can have prevalent effects on "non-verbal processes such as categorization" and performance on tasks not requiring overt language-usage, thus facilitating category formation for speakers. For the current study, the prediction then is that the largest difference between English and isiXhosa will be observed in the experimental condition where object labels are made readily available to the speaker, and the smallest difference should be found when object labels are not introduced in an explicit way at all.

1.3.Thesis Outline

The thesis structure is as follows: The Literature Review provides an outline of some of the studies conducted on nominal classification systems within the domain of object perception. The chapter starts by defining nominal categories, focusing on the semantics and structure of noun class categories found in Bantu languages. The chapter then gives an overview of nominal categorization systems present in various other languages; the implications they have on cognitive processes such as categorization; and the cross-linguistic differences produced by those implications.

The Theoretical framework provides a short account of the principle of Linguistic Relativity, which makes suggestions on how cross-linguistic differences observed in speakers of different languages may be brought about due to different grammatical structures making salient different aspects of reality for speakers of different languages. The chapter continues by describing and focusing on the Label-feedback Hypothesis, which accounts for how a cognitive process such as categorization – and thus object perception – occurs in the presence and non-presence of labels; which may facilitate the process of categorization. The chapter ends off by outlining possible factors influencing cognitive restructuring which need to be taken into consideration when exploring the effects of language on thought in bi-/multilingual speakers in bi-/multilingual and multicultural contexts, such as South Africa.

The Methodology chapter starts off by outlining the study's aim. The chapter then continues to explain the methods used to explore the research question brought forth. Data was elicited from participants by using a language background questionnaire together with a triads-matching task adapted from various studies.

The Results and Discussion chapter reports and interprets the findings obtained from the questionnaire and triads-matching task. The general findings of the current study indicate that there is no noun class effect observed in isiXhosa under certain conditions, but that a slight effect is observed in the presence of object labels.

The final chapter concludes the study by commenting on general findings, the study's limitations and suggestions on research that could be done in future. The general conclusion of the study is that noun class effects are observed under certain conditions in isiXhosa speakers and that hypotheses and methodologies intended to account for L1 monolingual speaker behaviour need to manipulate to suit the multilingual and multicultural South African context.

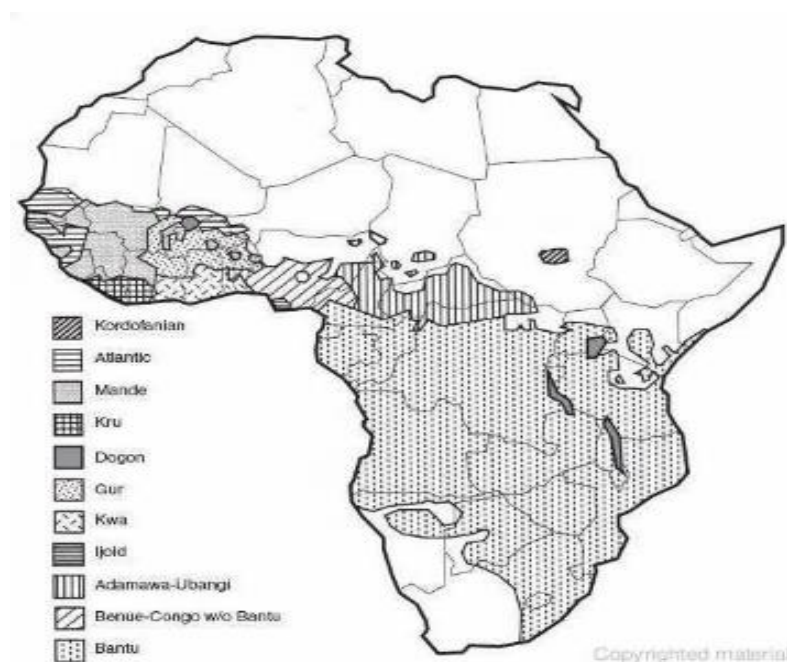
2. Literature Review

The current chapter provides a review of the available literature on nominal classification systems and thus nominal categories in languages employing this kind of nominal classification system. The chapter also describes the Bantu noun class system as well as highlights prevalent studies and findings on perceived object similarity as a result of cross-linguistic nominal classification.

2.1.Bantu Languages

Bantu languages are spoken in Africa, between the south of “Nigeria, across the Central African Republic (CAR), the Democratic Republic of Congo (DRC), Uganda, and Kenya, to southern Somalia in the east” and the Cape (Figure 1) (Nurse & Philippson 23: 2014; Holden 2002: 793). There are however exceptions, where some of the languages in this region are Niger-Congo, but non-Bantu (Nurse & Philippson 2014: 23). Times Atlas (1999) and Grimes (2000) estimate that out of 750 million Africans, approximately 400 million are speakers of Niger-Congo languages; and out of those 400 million, 240 million speak Bantu languages, making that one in three Africans (Nurse & Philipson 23: 2014).

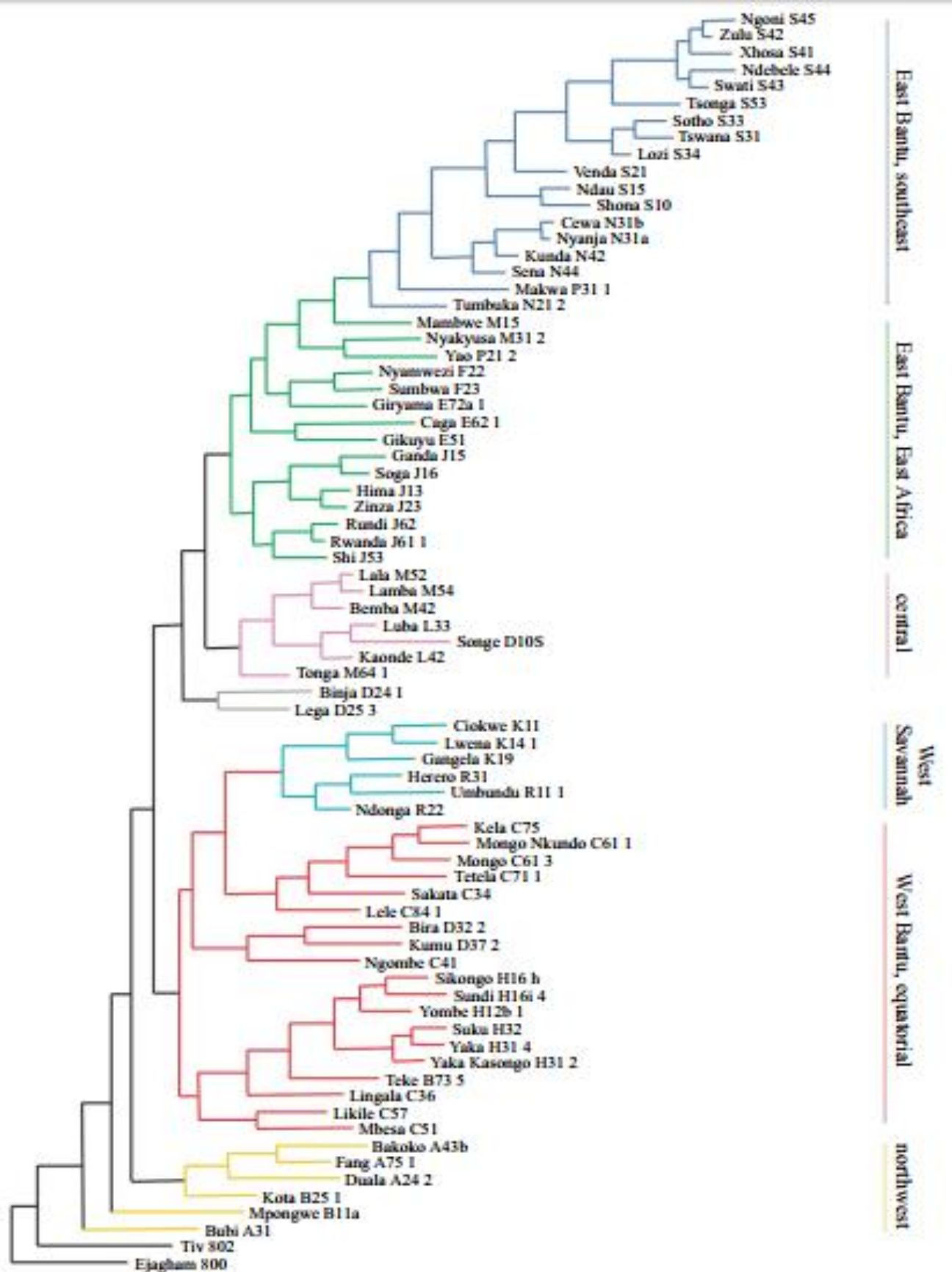
Figure 1: Map depicting Niger-Congo language regions



Nurse and Philippson state that giving an exact figure in terms of the number of Bantu languages tends to be challenging; Guthrie (1967 – 71) suggests that there may be 440 Bantu

language ‘varieties’, while Grimes (2000) lists 501 and Batin *et al.* (1999) 542 (Nurse & Philippson 2014: 24). The large discrepancy may be based on the continuous ‘discovering’ of languages over the years, meaning that the number of newly discovered Bantu languages was increasing and eventually, it may have been difficult to state the total (Nurse & Philippson 2014: 24). Because there is a large number of Bantu languages, they are usually coded with a letter and number for easy referral. The Bantu-speaking region is generally divided into regions known as ‘zones’ (A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S), which are further divided into decade numbers; and these reach a total of roughly eighty (Nurse & Philippson 2014: 26). For example, A10, A20, B10, etc refer to language groups and “A11, A12, A13 etc each refer to a specific language within A10”; and the above ‘Bantu language referral system’ is based on Guthrie (1967-71) (Nurse & Philippson 2014: 26). Holden states that Guthrie based these zones on “geographical and linguistic criteria” (2002: 793). According to Holden, Bantu languages spoken in zones A and B (north-western) are the most “divergent” (Holden 2002: 793). The remaining non-north-western Bantu languages are typically divided into West Bantu and East Bantu languages. West Bantu languages consist of languages in zones H, J, K, L, R; and some regions in D and M – spoken in Zambia, south-west Africa and the equatorial forest. While East Bantu languages can be found in zones E, F, J, N, P and S – spoken in East and south-east Africa (Holden 2002: 973). Figure 2 illustrates 75 Bantu languages labelled according to the Guthrie code (Holden 2002: 796).

Figure 2: Bantu language tree illustrating Bantu languages according to Guthrie's (1967-71) system of referral.



Bantu languages have a range of typological features in terms of phonology, tones, morphology, syntax etc., however the current study focuses on noun class categories, and therefore Bantu nominal morphology and the semantics of such categories. While this is the focal point, other typological features such as some of the ones listed above are not overlooked. They will be briefly touched on, as they impact noun class category structures.

2.1.1. The Noun Class System in Bantu Languages

The noun class system is a robust characteristic in all Bantu languages, where nouns are grouped into various classes on the basis of their prefixes (Katamba 2014: 103). In terms of structure, a noun consists of a stem and a prefix; and in Bantu languages, nouns are categorised according to various noun classes based on the prefixes they have (Table 1) (Katamba 2014: 103). As can be seen in Table 1, the noun class system in Bantu languages is arranged around fundamental semantic features such as animacy, shape, and humanness, and the number of noun classes varies from language to language (Aikhenvald N.d.: 3 & 26). Noun class assignment can be according to “semantic, morphological and/or phonological criteria” (Aikhenvald N.d.: 3). Noun class systems are found in agglutinative languages, such as Bantu languages, where nouns are a combination of information about the “noun class, person, case, etc.” (Aikhenvald N.d.: 5). Bantu language noun class systems form part of an obligatory structural agreement system that is “phonologically transparent” and therefore is learnable as a formal grammar system (Demuth 2000: 24).

According to Aikhenvald (N.d.: 4), the properties of noun classes are as follows:

- (i) Noun classes are limited and are therefore countable.
- (ii) All nouns in each noun class language belong to one (sometimes more) specific noun class. In this case, Aikhenvald observes that a given noun may be in one noun class to emphasise a specific characteristic of its referent and in another noun class to emphasise another characteristic of its referent.
- (iii) Noun groupings have some semantic bearing.
- (iv) Noun classes, and therefore nouns, form part of an obligatory concord or agreement system.

Aikhenvald's proposed properties will, in no specific order, be touched on throughout this section and will be accompanied with specific examples from various Bantu languages.

Table 1: A basic semantic outline common to Bantu noun class systems based on the interaction of shape, size and humanness (Demuth 2000: 275)

Class	Semantics
1 / 2	Humans, a few other animates
3 / 4	Plants, plant parts, foods, unpaired body parts, miscellaneous
5 / 6	Fruits, paired body parts, miscellaneous inanimates, liquids, mass nouns
7 / 8	Miscellaneous inanimates
9 / 10	Animals, miscellaneous inanimates, a few humans
11 / 10	Long objects, abstract entities, miscellaneous inanimates
12 / 13	Small objects, birds
6	Masses
14	Abstract qualities, states, masses, collectives
15	Infinitives

As previously stated, in Bantu languages, noun class systems are a mandatory feature, whereby nouns are categorised on the basis of their prefixes. An example of this occurrence, in isiXhosa (S41) is provided in Table 2 (Demuth & Ellis 2010: 101; Katamba 2014: 103). For example, in isiXhosa, as in some Bantu languages¹, a noun stem is attached to a prefix and a pre-prefix (or augment); and the pre-prefix is the same vowel as the vowel found in the prefix (Demuth & Suzman 1997: 126; Katamba 2014: 107). For example, the word *isifo* (disease – noun class 7) is broken up as *i-si-fo*, whereby the first syllable is the augment and the second is the prefix. In languages where the augment is present, its form and function differ significantly (Katamba 2014: 107). Katamba claims that initially, scholars inaccurately assigned it the same function as the article – found in many European languages. An example of this would be when Bleek (1869), according to Katamba (2014: 107), stated that the initial vowel in isiXhosa formed into an article after it previously been a pronoun. This became practice among other Bantu scholars

¹ The augment, or pre-prefix, is not present in all Bantu languages. For example, it is not present in Tuki (A601), Lingala and Swahili, but it is present in many languages closely related to Swahili (Katamba 2014: 107).

and therefore filtered through to other grammatical analyses of Bantu languages (i.e. Brown (1972) referring to the Masaaba augment as a determiner) (Katamba 2014: 107).

Because the essence of the Bantu noun class systems is to classify nouns into distinct categories (Zawada & Ngcobo 2008: 317; Demuth & Ellis 2010: 95), it is therefore important for nouns in a category to be in line with particular linguistic criteria, such as semantic or phonological properties (Table 2) (Zawada & Ngcobo 2008: 317).

Table 2 Noun Classes (and examples) in isiXhosa (S41)²

Noun Class	NC prefix	(Semantic) description	Examples
1	Um-	Singular; Personal nouns	<u>U</u> mntu = a person <u>U</u> mhlobo = friend
2	Aba-	Plural of class 1	<u>A</u> bantu = people <u>A</u> bahlobo = friends
1a	U-	Singular; Personal proper nouns, Kinship terms, some animals	<u>U</u> john = John <u>U</u> mnwe = finger
2a	Oo-	Plural of class 1a	<u>Oo</u> John = John and others <u>Oo</u> nomadudwane = scorpions
3	Um-	Singular; Exclusively non-personal; Some anatomical terms; Names of trees, Some nouns derived from verbs; Miscellaneous	<u>U</u> mtshayelo = broom <u>U</u> mtshato = wedding
4	Imi-	Plural of class 3	<u>I</u> mitshayelo = brooms <u>I</u> mitshato = weddings
5	Ili-/Il-	Singular; Anatomical terms, paired body parts; Nouns referring to individuals of a particular ethnic group, Miscellaneous personal nouns; Words borrowed from other languages; A few animal names; Miscellaneous	<u>I</u> dolo = knee <u>I</u> litye = stone
6	Ama-	Plural of class 5, mass nouns/ liquids, time references	<u>A</u> madolo = knees <u>A</u> matye = stones
7	Isi-	Singular; All languages or ways of doing things in a particular culture; Words from other languages that begin with "s"; Ordinal numbers; Certain personal nouns; Miscellaneous	<u>I</u> siXhosa = Xhosa language, culture, and way of doing things <u>I</u> sikolo = school <u>I</u> sifo = disease <u>I</u> situlo
8	Izi-	Plural of class 7	<u>I</u> zikolo = schools <u>I</u> zifo = diseases
9	I-/In-/ Im-	Singular; Most animal names; Most words from other languages; A few personal nouns; Certain nouns derived from verbs; Miscellaneous	<u>I</u> ngwe = leopard <u>I</u> ti = tea <u>I</u> mbiza = pot <u>I</u> ntombi = girl

² Table 2 was compiled by using various noun class category descriptions from several sources describing various noun class Bantu languages: Demuth 2000: 273 & 275 (Proto Bantu, Sesotho); Zawada & Ngcobo 2008: 319 (IsiZulu); Katamba 2014 :104 & 115 (reconstructed Proto Bantu noun prefixes; semantic content of noun classes), Perry (African Ecology) and author's own examples.

10	Ii-/Iin-/Iim-/Izin-	Plural of class 9	<u>Izingwe</u> = leopards <u>Iiti</u> = teas <u>Iimbiza</u> = pots <u>Iintobi</u> = girls
11	Ulu-/U-	Singular; Certain nouns derived from verbs; Miscellaneous; Abstract nouns, Plural is Class 10	<u>Ušana</u> = baby (<u>iintsana</u> =babies); <u>Uthando</u> = love (from ukuthanda - to love); <u>Uluthi</u> = stick (Izinthi = sticks)
14	Ubu-	Singular without a plural form; Certain abstract nouns; Miscellaneous	<u>Ubuntu</u> = humanity; <u>Ububele</u> = kindness; <u>Ububi</u> = badness, ugliness; <u>Ubuhle</u> = beauty; <u>Ubusi</u> = honey; <u>Ubusuku</u> = night
15	Uku-	Equivalent to the English infinitive <i>to</i> or gerund <i>-ing</i>	<u>Ukufa</u> = to die, dying, death; <u>Ukutya</u> = to eat, eating, food; <u>Ukwenza</u> = to do, doing

Lakoff (1987: 6) puts forth that nominal categories are understood to be groups where things either fell in or outside of the group; and that things are included in a group only if they shared some properties and those properties were then what defined the category. This refers back to Aikhenvald's noun class properties (iii); that noun groupings have some semantic bearing (Katamba 2014: 103 & 114 - 115). In isiXhosa, for example, in noun class 1a one would find that that category is made up of singular nouns referring to personal proper nouns; kinship terms; and some animals (Table 2). Similarly, in noun class 3, one would find singular nouns which are exclusively non-personal; referring to anatomical terms and names of trees; and some nouns derived from verbs. However, it is not this simple. Aikhenvald's noun class property (ii) states that sometimes nouns (noun types) in a system belong to more than one noun class category; and in each case, emphasises different characteristics of its referent. I would like to further nuance this claim by saying that it isn't rare that some, if not all, noun class categories themselves 'share' semantic features, in that there is a lack of clear semantic basis for categories (Katamba 2014: 116). Variations occur, and they cut across various taxonomic and thematic categories. It is proposed that noun classes consist of "multiple central models" and more than one prototype, meaning that noun classes are compiled of various objects which are in some cases 'unrelated' (Dingemanse 2006: 7), as evidence shows in the examples given above from isiXhosa.

For example (Table 2), one would find that noun class 1 classifies personal nouns (*umntu* - person), but so does noun class 9 (*intombi* – girl); or that noun class 3 classifies body parts (*umnwe* – finger), but so does noun class 5 (*idolo* – knee); and that both noun classes 3 (*umthsato* – wedding) and 11 (*uthando* - love) classify nouns derived from verbs. These are

just a few of the many existing examples. The noun class prefix's main purpose is to serve as a "morphological class template for each class", therefore accounting for the claim that the noun class systems of Bantu languages are sometimes viewed as arbitrary morphological systems with little semantic bearing (Zawada & Ngcobo 2008: 316; Demuth 2000: 270). Categories, however, cannot only be defined based on the properties on which the nouns share, because the morphological class 'template' referred to by Zawada and Ngcobo has little semantic meaning and there are no nouns in categories which are "better examples of the category than any other members" of the category (Lakoff 1987: 7). For example, in noun class 7, one would find nouns such as *isikolo*, *isihlangu*, *isifo* (school, shoe, disease). If one had to envision these three nouns and examine their properties, it is rather challenging to select which one of them is the best representative for noun class 7. No one single noun is a prototypical representative of a particular class and the semantic bleaching of isiXhosa noun classes also implies that objects in a single noun class may very well not share any physical properties.

2.1.2. The Semantics of Noun Classes: Loanword Assignment Parallels Between Sesotho (S33) and isiXhosa (S41)

Establishing clear semantic distinctions of noun classes has been challenging, especially in terms of founding underlying consistency (Katamba 2014: 116). The traditional viewpoint that linguistic categories are only valid if predetermined criteria for class membership are present is rejected, and cognitivists maintain that membership can be validated according to more than one criterion (Katamba 2014: 116 – 117), as demonstrated above. The fact that noun classes are obligatory and how they are grouped according to certain semantic categories has been established, but the question now is how their semantic bearing plays a role in some noun classes being preserved to date and others being lost in some Bantu languages. By briefly looking at the semantic productivity of Sesotho and Setswana(S31), Demuth aims to answer this question while putting forth that not all Bantu languages may display the same processes of semantic productivity, but the semantic productivity processes found in Sesotho and Setswana may be characteristic of other Bantu languages (2000: 6) and this may uncover some underlying relations in terms of at least one aspect. Focusing specifically on loanword assignment in Sesotho, parallels will be drawn with loanword placement in isiXhosa in an attempt to illustrate the possible typicality found in the semantic productivity processes in some Bantu languages.

In Sesotho, and possibly in Bantu languages in general, borrowed nouns seem to be categorised according to phonological or semantic properties (e.g. people – noun classes 1/ 2 or 1a/ 2a, abstract nouns – noun class 11 etc – see Table 2) (Demuth 2000: 11). When nouns cannot be assigned on the basis of phonological or semantic features, they are assigned to what Demuth names a ‘default’ class; and in Sesotho it is noun class 9 / 10 (Demuth 2000: 11). The same can be said for isiXhosa noun class loanword assignment – simply based on observation of Table 2 and intuition as a native speaker of isiXhosa. Both the Sesotho and isiXhosa noun classes will be presented in Table 3 for easy reference.

Table 3: Sesotho and isiXhosa noun class prefixes

	Sesotho noun class prefixes	isiXhosa noun class prefixes
Noun class	Prefix	Prefix
1/ 2	Mo-/ me-	Um-/ aba
1a/ 2a	Ø/ ba-	U-/ oo/
3/ 4	Mo-/ me-	Um-/ imi-
5/ 6	Le-/ ma-	Ili-, il-/ ama-
7/8	Se-/ di-	Isi-/ izi-
9/ 10	Ø(N)/ di(N)	I-, in-, im-/ ii-, izin-, iim-
11		Ulu-, u-
14	Bo-	Ubu-
15		Uku-

Consider the nouns in example (a), which are assigned according to phonological features in both Sesotho and isiXhosa.

(a) Sesotho and isiXhosa loanwords classified according to phonological features

	Sesotho	isiXhosa	Loanword
7/ 8	Se-tulo	Isi-tulo	Stoel (Afrikaans) <i>chair</i>
7/ 8	Se-petlele	Isi-bhedlele	Hospital (English)
7/ 8	Se-kolo	Isi-kolo	Skool (Afrikaans) <i>school</i>

It can be seen that in Sesotho, loanwords starting with /s/ are placed in noun classes 7/ 8 (Demuth 2000: 13). A similar observation can be made in the case of isiXhosa (some examples in Table 2). In two (out of many possible) examples, the loan words starting with a consonant cluster composed of /s/ + a consonant and the other words placed in these noun classes share no ‘real’ semantic commonalities (Demuth 2000: 13) in both cases of Sesotho and isiXhosa. Just like Sesotho, in some phonological environments, isiXhosa does not allow intricate onsets. Therefore, the initial syllable of the original loanword is lost, and an epenthetic vowel is used to break up the consonant cluster. It is through this process where words like *se-tulo/ isi-tulo* are assigned to noun class 7/ 8.

On the other hand, in Sesotho, loanwords not classified based on their phonological features are generally assigned to the ‘default’ noun classes 9/ 10 (Demuth 2000: 14). The same argument can be made for isiXhosa – consider example (b).

(b) *Sesotho and isiXhosa loanwords assigned to the ‘default’ noun classes 9/ 10*

	Sesotho	isiXhosa	Loanword
1. 9/ 10	Ø-tafole	I-tafile	Tafel (Afrikaans) <i>table</i>
	Ø-ofisi	I-ofisi	Office (English)
2. 9/ 10	Ø-letere	I-leta	Letter (English)

Considering example (a) and the phonological ‘make-up’ of the loanwords in example (b), it may have been expected that the words in example (b) would have been assigned noun classes according to their phonological features (Demuth 2000: 14). For instance, the words in example (b2) could have been placed in noun class 5 (le- and il-) in both cases of Sesotho and isiXhosa – not considering the augment in isiXhosa. However, the difference between the words in examples (a) and (b) is that the words assigned to noun classes 7/8 – in English and Afrikaans – have a consonant cluster at the initial point of each word (e.g. /st/sk); where an epenthetic vowel insertion had to be made after the word-initial consonant. On the contrast, the examples in (b) all have non-clustered onsets, and this may be the cause of them being assigned to the ‘default’ classes 9/ 10 (Demuth 2000: 5).

Based on the above examples, it appears that in both Sesotho and isiXhosa, loanwords can easily be assigned a noun class based on the consonant and vowel of the onset corresponding to one of the possible noun class prefixes; and in circumstances where there is no morpho-phonological match, loanwords are allocated to the ‘default’ noun classes 9/ 10 in both Sesotho and isiXhosa. Loanword assignment to phonologically similar noun classes seems to be typical

(in both Sesotho and isiXhosa) and to a large extent, straightforward in Sesotho (Demuth 2000: 15). However, the above scenarios are not the only possibilities. Consider example (c) – where some loanwords are assigned to a noun class based on ‘semantic compatibility’.

(c) *Loanword assignment based on semantics: Sesotho (Demuth 2000: 15) and isiXhosa.*

	Sesotho	isiXhosa	Loanword
1. 1a/ 2a	Ø-base	U-bhas U-titshala	Baas (Afrikaans) <i>boss</i> Teacher (English)
2. 7	Se-geremane Se-fora	Isi-jamane Isi-frentshi	German (English pronunciation) French (English pronunciation)

In example (c), *baas* is assigned to noun class 1a/ 2a in both instances of isiXhosa and Sesotho. (D The basic semantic outline common to Bantu language noun class systems in Table 1 above suggests that in Sesotho, both noun classes 1a and 9 classify humans, yet the nouns in example (c1) have ‘opted’ to incorporate with noun class 1a (Demuth 2000: 16). Although this is the case, the nouns have still been assigned a noun class based on semantic coherence. The nouns in example (c2) have gone through a similar process, whereby they have been assigned to noun class 7 – which classifies all languages. Earlier, it was noted that loanwords assigned to noun class 7 often have a word-initial consonant cluster that is broken up by an epenthetic vowel insertion. These nouns were stated to have no semantic relationship among themselves, yet they are classified with other loanwords (e.g. language names) which share a semantic relation. However, Demuth suggests that the examples in (c) indicate that noun classes 1a/ 2a and 7– may be semantically productive (2000: 17). Though, to establish whether the same sentiment can be shared across all Bantu languages, a larger data sample needs to be gathered and a thorough analysis needs to be done. The sample at hand, though, indicates that in Sesotho and isiXhosa, the attribute and human classifying noun classes may be semantically productive. The question of whether this is the status quo for all Bantu languages or whether this varies from language to language within the Bantu language family is still needs to be investigated (Demuth 2000: 17).

2.1.3. Concord System

Bantu noun class prefixes are the core of an extensive concord agreement system (Katamba 2014: 111), where “nominal modifiers, pronouns, and the verb” are all in agreement with the subject (or object) noun phrase (NP) in terms of its noun class. For example, Table 4 (Demuth 2000: 5). outlines the morpheme agreement system for each noun class in Sesotho (S33).

Table 4: Morpheme agreement system in Sesotho.

Class	Nominal	Prfx	Subj-Agr	Obj-Agr	Adjective	Demonstrative	PN	Genitive	Relative
1	mo-		o-	-mo-	e-mo-	enwa	yena	wa-	ya
1a	ø		o-	-mo-	e-mo-	enwa	yena	wa-	ya
2	ba-		ba-	-ba-	ba-ba-	bana	bona	ba-	ba
2a	bo-		ba-	-ba-	ba-ba-	bana	bona	ba-	ba
3	mo-		o-	-mo-	o-mo-	ona	oona	wa-	o
4	me-		e-	-me-	e-me-	ena	yona	ya-	e
5	le-		le-	-le-	le-le-	lena	lona	la-	le
6	ma-		a-	-a-	a-ma-	ana	ona	a-	a
7	se-		se-	-se-	se-se-	sena	sona	sa-	se
8	di-		di-	-di-	tse-N-	tsena	tsona	tse-	tse
9	Ø(N)-		e-	-e-	e-N-	ena	yona	ya-	e
10	di(N)-		di-	-di-	tse-N	tsena	tsona	tse-	tse
14	bo-		bo-	-bo-	bo-bo-	bona	bona	ba-	ba
15	ho-		ho-	-ho-	ho-ho-	hona	hona	ha-	ho

The sentences in examples (d) and (e) illustrate how the concord agreement system operates (in Sesotho), as set out by Demuth (2000: 4 & 5). (Glosses: NC=noun class prefix; Dem=demonstrative; SM=subject agreement marker; OM=object marker; 2, 10=noun class number).

(d) Ba-shányana bá-ne bá-fúmáné di-perekisi tsé-monáte.

NC2-boys Dem2 SM2-found NC10-peaches OM10-good

‘Those boys found some tasty peaches.’

(e) Bá-di-fúmáne.

SM2-OM10-found

‘They found them.’

In example (d), *ba-shanyane* (boys) is the subject NP belonging to noun class 2. *Ba-shanyane* is then modified by the demonstrative *ba-ne* (those) and is in agreement with the subject NP, as indicated by *ba*. The subject marker, *ba*, on the verb *ba-fumane* indicates agreement between the verb and the subject NP. In terms of the object, *di-perekisi* belongs to noun class 10 and the nominal modifier for *di-perekisi* shows agreement with the object through the noun class 10 prefix *tse* in *tse-monate*. Most importantly, as shown in example (e), whether the subject or

object nouns are phonetically realised in a syntactic construction or not, agreement with both of them respectively is still realised through the same agreement markers as shown in example (d).

Consider examples (f) and (g), where the concord agreement system described above is illustrated in isiXhosa. In isiXhosa, basic word order is SVO – as is the case in other southern African Nguni languages such as isiZulu (S42) (Demuth & Suzman 1997: 125). Additionally, like isiZulu, isiXhosa is a “head-initial head marking language”, meaning that verbal and nominal modifiers occur after the noun and the verb respectively and grammatical morphology is applied to both nouns and verbs (Demuth & Suzman 1997: 125). (Glosses: NC=noun class prefix; Poss=possessive; Num=numeral; SM=subject agreement marker; Pres=present tense; 8=noun class number)

(f) Izin-ja z-am ezi-ntathu zi-ya-tya.
 NC8-dogs Poss8-my Num8-three SM8-Pres-eat
 ‘My three dogs are eating.’

(g) Zi-tya zo-ntatathu.
 SM8-eat Num8-three.
 ‘All three are eating.’

In all examples, any other concord marker (not agreeing with the prefix) would make the sentence ungrammatical. The examples in (d) and (e) are parallel with (f) and (g) in that in all four examples, the concord agreement system is demonstrated to be pervasive. It is therefore safe to assume that any changes in or loss of the noun class system may affect the concord system of Sesotho and isiXhosa (Demuth 2000: 273). Noun class prefixes are not only obligatory on the noun, but are also obligatory as a concord marker on the noun together with various other constituents, such as verbs, adjectives, possessives and numerals; and thus are all in agreement with the noun class prefix of the head noun – noun class 2 and 10 in examples (d) and (e) and noun class 8 in examples (f) and (g) (Demuth 2000: 270; Demuth & Suzman 1997: 125; Croft 1994: 147; Gxilishe 2008: 78). In some cases, as in (f) and (g), the same fact that the concord marker is the same form as the prefix motivated linguists to call the concord system alliterative (Katamba 2014: 111), but of course, as can be seen in example (d), that is not always the case.

Seeing that the noun class system in Bantu languages is an integral part of the structure of Bantu languages, unlike noun classifiers in Chinese Mandarin (which are optional) or gender markers in German (which are rarely marked on the noun), it may be expected that there will be cognitive influences of the noun class system in speakers of Bantu languages. It is also plausible to assume that the way in which objects are categorised according to the noun class system may have an effect on perceived object similarity and categorization, as language structure and linguistic categories may play a role in influencing cognition. Since classifier and gender nominal classification systems are generally arranged according to semantic features of nouns and with speakers of languages with classifier and gender categories being found to perceive and categorize the world into those classifier and gender categories (as will be discussed in the Literature Review chapter), it is reasonable to ask the question of whether Bantu, specifically isiXhosa, speakers also then perceive objects and categorize the world according to noun class categories. Ultimately, this is an empirical question, and a review of the available literature indicates that no studies on the subject of perceived object similarity and categorization in the noun class system of Bantu languages have been done.

2.2.Nominal Classifiers

Schmitt and Zhang state that classifiers are a linguistic category³ used to organise objects in the world into categories, by denoting physical features shared by those objects (1998: 108; Saalbach & Imai 2005: 1; Zhang 2007: 43 & 44; Li 1998: 1114). It is noted that classifier systems are generally arranged according to inherent “semantic features such as animacy, shape, function, size, rigidity or social importance” (Imai et al. 2010: 2; Saalbach & Imai 2007: 485; Saalbach & Imai 2005: 1; Saalbach & Imai 2012: 382; Aikhenvald 2004: 105; Zhang 2007: 44). Japanese and Chinese are two examples of languages containing a classifier system and in Japanese and Chinese, it is obligatory that nouns are accompanied by a numeral classifier⁴ as a means to quantify them, including “individuated” items “like cars, computers, and even humans” (Saalbach & Imai 2005: 1; Saalbach & Imai 2012). In Chinese, classifiers are used with both numerals (e.g. one (classifier) table) and demonstrative phrases (e.g. this (classifier) table). In contrast to Chinese, in Japanese, classifiers are used only with numerals and are not used with either demonstrative or determiner phrases (Saalbach & Imai 2005: 4). Classifiers are therefore marked more consistently in Chinese rather than in Japanese (Saalbach & Imai 2012: 381). Even though classifier categories tend to overlap with taxonomic categories, in turn, functional classifiers overlap with them. For example, In Japanese *hon* classifies thin and long objects (as well as objects that are metaphorically associated with thin and long things) such as “pens, base-ball bats, home runs, bananas, carrots, ropes, necklaces, wires and telephone calls” (Saalbach & Imai 2005: 1). In Chinese *ba*, is a classifier used for “objects with a handle” or objects gripped using hands (e. g. umbrella, screwdriver, broom); *zhang* is used to classify flat objects or objects with flat surfaces (e.g. table, bed, paper); and the classifier *tiao* is used to categorize “long, curved and flexible objects” from various taxonomic categories, cutting across animal and non-animal ontological confines (e. g. river, road, rope, fish, snake) (Imai et al. 2010: 2; Saalbach & Imai 2005:1; Saalbach & Imai 2012: 382; Schmitt & Zhang 1998: 109; Zhang 2007: 43 & 44). The question is whether or not classifier categories play an essential role in forming conceptualisations in speakers of classifier languages (Saalbach & Imai 2005: 1). Because shape is an important semantic feature in classifier categories, in perceived object similarity, it is expected that

³ ‘Linguistic category’ refers to a kind of word class (e.g. noun, verb, adjective, adverb etc) and ‘category’ refers to a class or a group of kinds of things or objects. Making this distinction is necessary, as the term ‘category’, is used in various contexts.

⁴ Nominal classifier vs numeral classifier: Saalbach and Imai (2012); Zhang (2007), Li (1998)

Chinese speakers will pay attention to similarities in shape as opposed to speakers of languages without classifier categories, as speakers of classifier languages may use “classification schemes” intrinsic in their language to perceive physical objects (Schmitt & Zhang 1998: 108).

2.2.1. Effects of Classifiers on Cognition

In a study by Saalbach and Imai (2005: 1), Mandarin-Chinese, Japanese and German (with the two former languages being classifier languages and German not) speakers were tested on similarity judgement and property induction. Participants were given 12 quintuplets of items each containing one standard item and four target items. The first target item belonged to the same classifier category as the standard item, but was not related to it either taxonomically or thematically. The second and third items were taxonomically and thematically related to the standard item respectively. Neither the second or third item belonged to the same classifier category as the standard item. Finally, the fourth target item was a control and therefore, had no taxonomic or thematic relation to the standard item. The fourth item was also from a different classifier category (Saalbach & Imai 2005: 2). The aim of the study was to examine whether classifier categories would play a role in influencing the conceptual structures of speakers of these three language groups. Saalbach and Imai (2005: 1) only reported a classifier effect for the Chinese speakers in the similarity judgement task. Because Chinese speakers’ similarity judgements for object pairs occurring in the same classifier category were higher than those of German speakers, this was interpreted as evidence of language influence on cognition (Saalbach & Imai 2005: 3). An interesting find in this study was that German speakers, like Chinese speakers, judged objects belonging to the same classifier category as more similar than those not belonging to the same classifier category (Saalbach & Imai 2005: 4; Saalbach & Imai 2012: 383). Saalbach and Imai (2005: 1) suggest that speakers of a language without a classifier system perceive intrinsic similarities between items drawn from the same classifier category⁵ and this may be because the holistic structure of concepts may be similar across language and cultural groups. Though this might be the case, it is suggested that the intrinsic similarity is emphasised for speakers of classifier languages (Saalbach & Imai 2005: 4; Schmitt & Zhang 1998: 108), thus indicating that the classifier effect observed in this study was language-specific to Chinese (Saalbach & Imai 2012: 383). This observation is consistent with Schmitt and Zhang’s claim that because speakers of a classifier language may use “classification schemes” inherent in their language to perceive objects in reality, it is

⁵ Classifier ‘class’ vs ‘category’

anticipated that Chinese speakers may give precedence to shape similarities in contrast to speakers of languages without a classifier system (Schmitt & Zhang 1998: 108; Saalbach & Imai 2012: 383).

In a similar study by Saalbach and Imai (2007), in a forced choice categorization task, where it was obligatory for speakers to make a categorical distinction by judging objects as more or less similar, German and Mandarin speakers were compared. When the same-classifier item was contrasted with the control, not only the Mandarin, but also the German participants judged the same-classifier item to better match the target even when they did not have any thematic or taxonomic relations between them (Saalbach & Imai 2007: 486). Again, this finding may suggest that there is an inherent similarity among objects belonging to the same classifier category, even when they do not share any thematic or taxonomic relations. However, relative to the Chinese speakers, the classifier effect observed in the German speakers was lower. Again, this suggests that classifier effects are language-specific, and this finding is in line with the expectation that speakers of classifier and non-classifier languages will have cross-linguistic differences in cognitive tasks such as “category formation [and] similarity judgement” (Saalbach & Imai 2007: 486).

In various studies comparing English and Mandarin-Chinese speakers by Schmitt and Zhang (1998), where perceived object similarity was tested on a similarity judgement task, it was found that Chinese speaker’s mental processes can be influenced by grammatical categories like classifiers. Compared to English speakers, Mandarin speakers perceived objects that share a classifier as more similar than objects that do not share a classifier, as they judged items drawn from the same classifier category as more alike than English speakers (Schmitt & Zhang 1998: 120; Saalbach & Imai 2005: 1; Saalbach & Imai 2012: 383). According to these findings, it was concluded that classifier categories may have a strong effect on conceptual categories (Saalbach & Imai 2012: 383). In a study of classifier-related cognition and consumer behaviour (Schmitt & Zhang 1998), the effects of judgement and choice were tested by examining a choice situation between two products; in which one of the products shared a classifier with a third (referent) product. The Mandarin participants were affected by the presence of the classifier-sharing referent product whereas the English speakers were not. While Schmitt and Zhang’s findings may seem to provide evidence for the effect language has on thought and a strong classifier effect (Saalbach & Imai 2005: 1; Saalbach & Imai 2012: 383), they do not indicate whether English speakers’ conceptual structures are significantly different from those of Chinese speakers or not. It could have also been that Chinese speakers gave precedence to

taxonomic or thematic relations rather than classifier categories (Saalbach & Imai 2005: 1; Saalbach & Imai 2012: 383).

2.2.2. Null Effects of Classifier Systems on Cognition

However, the same study by Saalbach and Imai (2005: 3) mentioned above did not find classifier effects in Japanese speakers. It is suggested that the relation between items and their classifier categories may not be as strong for Japanese speakers, as classifiers in Japanese are only applied when the noun is numbered – unlike in Chinese where classifiers function similarly to determiners (Saalbach & Imai 2005: 5). This suggests that the frequency of use of (or experience using) certain linguistic categories has to be considered in addition to the existence of those linguistic categories in a given language (Saalbach & Imai 2005: 6). Similarly, when Chinese and German speakers were compared in an inductive inference task on bacteria carriers (i.e. a case that examined causal reasoning), no classifier effects were observed as the Chinese speakers, like the German speakers, did not depend on the classifier relations (Saalbach & Imai 2012: 385). Additionally, no classifier effects were observed in the speeded-word picture matching task and this may suggest that relations to classifiers are not triggered automatically when accessing words (Saalbach & Imai 2012: 385).

2.2.3. Accounting for the Presence and Absence of a Classifier Similarity Effect

It is important to ask the question of whether observed classifier effects can be generalised to other classifier languages or not. Another important question to investigate are the conditions under which classifier effects arise and therefore gaining a comprehensive understanding of how they arise (Saalbach & Imai 2012: 417). To address this question, Saalbach and Imai (2012) undertook a study comparing Chinese, Japanese (languages with a classifier system) and German (non-classifier language) speakers in a variety of cognitive tasks including similarity judgements, property induction and speed word-picture matching (2012: 381). The main aim of the study was to examine the dependence of the intensified classifier effect on the “properties of the classifier language” (Saalbach & Imai 2012: 417).

The results indicated that speakers of Chinese, Japanese and German all perceived objects drawn from the same classifier category as more similar than those drawn from a different classifier category. This finding is consistent with that of Saalbach & Imai (2007), thus emphasising the possible inherent relationship between objects belonging to the same classifier

category. A classifier similarity effect was also observed in Chinese speakers in the similarity judgment and inductive inference tasks, in contrast to the Japanese speakers, whereby the classifier similarity effect was not observed. This indicates that the classifier similarity effect observed in Chinese may in fact be language-specific (Saalbach & Imai 2012: 417). Saalbach and Imai (2012: 417) concluded that the results of this study substantiate the claim that a classifier system doesn't afford speakers the same system of organisation and classification of concepts as taxonomic associations do.

Saalbach and Imai (2012) propose that the differences in the classifier effects observed in Chinese and Japanese have to do with structural differences rather than semantic features (2012: 418). Unlike in Chinese, in Japanese, classifiers appear in constrained syntactic environments, and as a result are used less commonly in text and spoken discourse (Saalbach & Imai 2012: 418). Therefore, the classifier similarity effect is amplified in Chinese and not in Japanese. The effect seemingly is brought about when innate similarity between two objects belonging to the same classifier category has been reinforced through frequent exposure of indirect relations with the same classifier (Saalbach & Imai 2012: 418). For example, it may be uncommon for nouns like 'pants' and 'road', both drawn from the *tiao* classifier category, to occur simultaneously, but Chinese speakers have had recurrent exposure with each of the nouns, and thus associate them with the *tiao* classifier category (Saalbach & Imai 2012: 419).

Saalbach and Imai (2012) propose that fundamental semantic features in classifiers may only be triggered during sentence processing (2012: 421). In Huetigg et al.'s (2010) eye movement study whereby participants were required to predict nouns from a classifier, Chinese speakers shifted their eye-gaze to objects belonging to the same classifier category when the noun occurred in a classifier phrase (Saalbach & Imai 2012: 421). The tasks in Saalbach and Imai (2012) did not include any form of sentence processing nor were participants asked to predict nouns from classifier categories. Alternatively, participants in the Saalbach & Imai (2012: 421) study were required to trigger a target item from a given noun. A noun, rather than a classifier, triggers multiple semantic properties which cross-cut taxonomic and thematic relations; thus, applying to various conceptual associations. Classifier associations are understood to be weaker than thematic or taxonomic relations and the triggered properties related to the classifier may be inhibited, thus allowing speakers a short processing time for classifier relations (Saalbach & Imai 2012: 421).

2.3. Grammatical Gender

In languages where nominal classification is facilitated by a formal gender system, all nouns have grammatical gender⁶, whether the nouns' referents have a biological sex or not (Vigliocco 2005: 515) and grammatical gender may play a role in the way speakers of languages with a grammatically gendered nominal classification system classify objects.

Languages with grammatical gender systems as a form of nominal classification vary considerably, such that that information pertaining to gender is not always carried by the same grammatical category (Sera et al. 2002: 377 & 378). In German, for instance, only determiners and pronouns encode gender, whereas in languages such as Spanish, pronouns, determiners, nouns and adjectives are often marked for gender. Another way in which languages with a grammatical gender system differ is in the amount of grammatical gender categories they may have (Sera et al. 2002: 378). While languages such as English have no formal nominal classification system and thus no gender system, languages like Greek and German have three gender categories to classify nouns and languages such as Spanish and French have two (Sera et al. 2007: 378). In cases where grammatical gender is marked morphologically, such as in Spanish, the language is considered to be "gender-loaded" and gender categories are marked consistently (Sera et al. 2002: 378; Saalbach & Imai 2012: 420).

Grammatical gender is further sub-divided in the following ways: for example, in German, *STUHL* (chair) is masculine, *KATZE* (cat) is feminine and *BETT* (bed) is neuter (Sera et al. 2002: 378). While chairs and beds have no biological sex, as compared to cats, they are still classified this way. This is known as grammatical gender (Vigliocco et al. 2005: 515). Similar to German, nouns in Italian are classified into one of two gender categories: masculine and feminine. In Italian however, nouns with human referents are closely related with the actual referent and this is known as conceptual gender (Sera et al. 2002: 377 & 378). This is unlike in German where *das Mädchen* (the girl), for example, falls under the *neuter* gender category and *die Frau* (the woman) belongs to the feminine gender category, meaning that in German there is a less transparent relationship between nouns and their human referents. In German, grammatical gender is rarely marked on the noun, but rather realised in determiners (*der*, *die*

⁶ It is important to point out that in some cases, grammatical gender and noun classes tend to be treated as the same kind of nominal classifier (e.g. Sera et al. 2002). Though, given that the current study focuses on isiXhosa and the fact that research (to date) on the effects of grammatical gender on cognition deals with gender systems that are fairly different from the Bantu noun class system, I have decided to treat grammatical gender and noun classes as distinct systems of nominal classification.

or *das*) preceding the noun or in pronouns (Sera et al. 2002: 378). In Italian it is merely illustrated by a gender marker on the noun; while conceptual gender in Italian is represented by derivational and inflectional morphemes (*bambino* – male child; *bambina* – female child) or by using completely different lexical labels altogether (*uomo* – man; *donna* – woman) (Vigliocco et al. 2005: 515). In light of the abovementioned gender categories, language-specific effects regarding gender should be observed regardless of whether the noun referents are related to word gender or not, as the gender effects should be based on general similarity aspects of nouns (Vigliocco et al. 2005: 202). It is also suggested that cross-linguistic variations found in formal gender systems offer a domain to examine the association between linguistic and conceptual classification systems (Sera et al 1994: 263).

2.3.1. Effects of Grammatical Gender on Cognition

In a study by Sera et al. (1994), native Spanish speakers were presented with labelled or unlabelled pictured objects and asked to assign these pictured objects with either a woman's or a man's voice (Sera et al. 2002: 379). Even though grammatical gender effects were observed when the pictures were unlabelled, the effects were more prominent when the objects were presented with their labels (Sera et al. 2002: 379 & Sera et al. 1994: 261 & 273). While the grammatical effects observed in the unlabelled pictorial task indicate that language is not of high significance in these tasks, the prominence of grammatical gender effects in the presence of labels indicates otherwise. In a study where the role of grammatical gender was explored in terms of its relationship with classification (Ervin 1962), Italian speakers were presented with nonsense words that had a masculine or feminine Italian affix. The participants placed the words with masculine affixes in the 'men' category, while they placed the words with feminine affixes in the 'women' category (Sera et al. 2002: 379). In Vigliocco (2005: 504), a multi-experiment study investigating gender similarity judgement in Italian and German was conducted. The first experiment was a triadic similarity judgement task in which English and Italian speakers were shown triplet words. The task was to judge which two of the three words were mostly related in terms of meaning. While all of the Italian speakers indicated not having used grammatical gender in the task, the words were classified into different- and same-gender pairs by all the participants. Even though cross-linguistic differences were observed, findings from studies such as Sera's and Vigliocco's described above often face critique in that participants are required to judge words and the study is said to be observing an effect of language on language rather than language on thought (Sera et al. 2002: 379; Sera et al. 1994:

265). It is possible that when classifying objects as masculine or feminine speakers of a language with a formal gender system may be led to particularly refer to the language in question's grammatical gender system (Sera et al. 1994: 274).

2.3.2. Null Effects of Grammatical Gender on Cognition

While some studies have found grammatical gender to bring about cross-linguistic differences in categorization, others have not (Sera et al. 2002: 378). In the same study (Vigliocco 2005), German and English speakers were asked to perform the same task, only in this experiment, the words presented to the participants only referred to animals and artefacts and the German speakers all indicated that they did not use grammatical gender in the task. Though, unlike the previously mentioned experiment, there was no grammatical gender effect observed. In Vigliocco's (2005: 510) final experiment, the same similarity judgement task was completed by different groups of Italian and English speakers, but this time with pictures instead of words. The pictorial similarity judgement task was to determine whether the gender effects observed in the first experiment were dependent on lexical labels or whether they would be apparent in a task that only entails conceptual knowledge. In contrast to the first experiment, no grammatical gender effect was observed in Italian – in the picture judgement tasks for both animals and artefacts. Vigliocco (2005: 511) suggests that this may have been because grammatical gender effects in Italian may be restricted to nouns in categories which conceptual gender is instinctive. In a study by Clarke et al. (1981), Arabic and Finnish speakers were asked to give a rate to the feminine and masculine quality of objects represented by a set of words. Grammatical gender effects were observed for Arabic, but not Finnish speakers (Sera et al. 2002: 379). It is clear that not all studies reveal grammatical gender effects on the classification of nouns (Sera et al. 2002: 378 & 379). This supports the claim that certain methodologies (lexical judgement tasks vs pictorial judgement tasks) exert conditions which may be non-neutral or which may be biased in favour of a given hypothesis (Bylund et al. 2013: 930).

Importance of methodology

It has become apparent that cross-linguistic differences have either been observed or unobserved as a result of researchers using different methodologies and as suggested by Bylund et al. (2013: 930), certain methodologies may make participants prone to behaving in a certain way. For instance, the results of Spanish speakers in the study by Sera et al. (1994) contrast

with those reported by Perez-Pereira (1991). While Sera et al. (1994) reported grammatical effects on cognition, Perez-Pereira suggested that grammatical gender and perceptual categorization are autonomous (Sera et al. 2002: 379). In Perez-Pereira's (1991); Sera et al.'s (2002: 379) and Sear et al.'s (1994: 265) studies, Spanish speaking children were presented with images of novel animate objects (some images portrayed females and others males) and were informed "this is a picture of a *pifar* (an invented word)". The figures in the images were allocated with both a grammatical gender coded in both the noun and determiner; and perceptual gender was also depicted in the image. In some instances, the grammatical and perceptual gender corresponded and in other instances they contradicted one another. An additional picture (with the same image) with a different colour was shown to the children after they had seen the initially labelled picture. The participants were then requested to state the colour of the second *pifar*. Like in French, Spanish adjectives and nouns have gender-agreement, and because of this, the adjectives (colours) indicated by the children portrayed their categorization of the gender of the image. Perez-Pereira (1991) reported that the participants produced adjectives that corresponded with the grammatical gender of the image even when the perceptual and grammatical gender were contradictory. It was thus concluded that because the participants overlooked the perceptual gender of the figures in the images, the findings from the study revealed that grammatical and perceptual gender are therefore autonomous. It is thus suggested that effects of gender on perception and classification are consistent with the language and task used to investigate the relationship (Sera et al. 2004). In regard to this point, Bylund and Athanasopoulos (2014: 953) suggest that effects of language on cognition may be observed depending on the methods used, or it could be that the linguistic attribute under investigation simply does not affect cognitive processing at all and is limited to specific behaviour.

2.4.Plural Marking: In English, Yucatec Maya and Japanese

English has a number of ways in which it marks plurality on nouns and noun phrases. Count nouns are generally marked by the plural suffix (-s) (e.g. boy(s), girl(s), grain(s) etc.). However, in cases of mass nouns, the plural marking (-s) suffix is not permissible. In order to mark plurality or express number, count nouns often take “indefinite articles such as (a/an), quantifiers (each, every, either, neither.), demonstratives (this, that, those) or quantitative modifiers (one, two, three, first, last)” (Mazuka & Friedman 2000: 354). On verbs, number is marked through number agreement by the subject and the verb (e.g. she sleeps/ they sleep) and through the selection of pronouns (e.g. it, they, her, we etc.). In Yucatec Maya, unlike in English, plurality on nouns is generally not marked, as the typical pattern is to neglect number (Pfeiler 2009: 91). It is possible for it to be marked by using plural suffixes as in English, but that distinction is not necessary and is typically used to emphasize plurality rather than merely mark or indicate it. Verbs are also generally not obligatorily marked for number, but it can be done optionally through referencing the pronoun (Mazuka & Friedman 2000: 354). Though, in the case of noun phrases, number is primarily expressed through numeral classifier-containing phrases; and numeral classifiers are compulsory in modifier phrases (e.g. ‘two turkeys’ is expressed as *ká ‘a-túul ‘ulum* (two units of turkey), with *túul* the numeral classifier (Mazuka & Friedman 354).

To contrast the differences in number marking in English and Yucatec Maya, Lucy (1992) uses the features [+/- animate] and [+/- discrete] to illustrate the relationship between them and number marking (Athanasopoulos 2006: 90). English noun phrases which are [+animate] or [-animate, +discrete] in nature are obligatorily marked for number (e.g. three book*/ three books), while noun phrases which are [-animate, -discrete] are not (e.g. three waters*) (Imai & Gentner 1997: 173 and Athanasopoulos 2006: 90). In Yucatec Maya, however, [+animate] noun phrases are optionally marked for number while [-animate, +discrete] / [+animate -discrete] are not generally marked for this feature (Mazuka & Friedman 2000: 355; Pfeiler 2009: 91; Imai & Gentner 1997: 174 and Athanasopoulos 2006: 90). It is argued that English [-animate, -discrete] nouns which are mass nouns lack inherent characteristics of unit in their referential denotation (Lucy 1992: 73). Therefore, to mark number on the noun’s referent, units must be explicitly stated via unitizers (e.g. three glasses of water) (Mazuka & Friedman 2000: 355; Imai & Gentner 1997: 173 and Athanasopoulos 2006: 90). In comparison, nouns demanding unitizers in Yucatec Maya are like mass nouns in English (Imai & Gentner 1997:

174 and Athanasopoulos 2006: 90). In Yucatec Maya, numeral classifiers behave as unitizers, as they specify units and the “boundness” of nouns to which they refer (Mazuka & Friedman 2000: 355).

2.4.1. Effects of Plural Marking on Cognition

Based on the above analysis, it was hypothesised that the grammatical differences between English and Yucatec Maya number marking would lead to English speakers (who are obliged to indicate number on count nouns) to focus on number for various types of referents as compared to speakers of Yucatec Maya (Mazuka & Friedman 2000: 355; Imai & Gentner 1997: 174 and Athanasopoulos 2006: 89). It was expected that for English speakers, using count nouns as a means to refer to the items would lead to their attention being drawn toward shape, while for Yucatec Maya speakers, the use of nouns equivalent to English mass nouns should lead them to focus more on item material. Lucy (1992) conducted a study comparing English and Yucatec Maya speakers on this cross-linguistic difference, predicting that it should influence how speakers of English and Yucatec Maya conceptualise and make choices about the referents. The study consisted of several tasks (similarity judgement, recognition, recall and picture description) which directly and indirectly tested the contrast between material and shape (Mazuka & Friedman 2000: 355). Participants were given the original objects (e.g. a sheet of paper) and were required to decide which of the given alternatives (in the case of a sheet of paper, the shape alternative would be a sheet of plastic and the material alternative would be a book) was more similar to the original item. Findings indicated that English speakers preferred the shape alternative, while Yucatec Maya speakers preferred material (Mazuka & Friedman 2000: 356). The differences between English and Yucatec number marking therefore had an effect on how speakers of English and Yucatec Maya conceptualised objects, as speakers of English focused relatively more on item shapes while speakers of Yucatec Maya focused relatively more on item material (Lucy 1992: 89; Imai & Gentner 1997: 175 and Athanasopoulos 2006: 90). However, it is argued that Lucy’s (1992) findings may be invalid, as his methodology was somewhat flawed (participants’ socio-economic and educational background from either language group were vastly different). Therefore, differences could have been as a result of these factors rather than the cross-linguistic differences in English and Yucatec Maya (Mazuka & Friedman 2000: 356).

In a study on the effects of grammatical representation of number on cognition in bilinguals, Athanasopoulos (2006) replicated Lucy's (1992) study on monolingual English and Japanese speakers, as well as bilingual L1 Japanese – L2 English speakers. Because Japanese, like Yucatec Maya, is a numeral classifier language and number is not generally marked on nouns and verbs (Athanasopoulos 2006: 89), it was predicted that Japanese speakers would behave similarly to speakers of Yucatec Maya in that they would choose material rather than shape alternatives in object classification tasks (Mazuka & Friedman 2000: 357). For all [+animate], [+animate, +discrete] and [-animate, -discrete] nouns, number marking entails a numeral classifier (Mazuka & Friedman 2000: 357). For example, long and thin items are numerally marked with the classifier *hon* (5 *hon-no* enpitsu – five pencils) and flat and thin items are numerally marked with the classifier *mai* (3 *mai-no* kami – three sheets of paper). Though, Japanese and Yucatec differ in that in Japanese, [+/- human] is an obligatory feature to consider when describing Japanese noun classifiers (Imai & Gentner 1997: 173). The collective suffix *-tati* is optional with human referents, obligatory with non-human animate referents and impossible with inanimate referents (Mazuka & Friedman 2000: 358).

The first experiment, conducted on the English and Japanese monolingual speakers was conducted to verify that the test instrument used in Lucy (1992) could be reliably applicable to Japanese speakers, as well as to attain a reference point for cognitive performance to compare the bilingual speakers' cognitive behaviour (Athanasopoulos 2006: 91 and Pavlenko 2005: 437). Similar to Lucy's study (1992), in each trial participants were presented with a standard picture and five alternative pictures similar to the original picture except for one difference which would be explicitly pointed out to them by the task administrator. Thereafter, they were supposed to decide which given alternative was more like the standard item. The results supported the hypothesis that there was in deed a cognitive difference between the English and Japanese monolingual speakers. The L1 Japanese – L2 English bilinguals were separated further into two groups; 'intermediate' and 'advanced' L2 English speakers and thereafter required to perform the same task as the monolingual speakers. The findings indicated that, for the 'intermediate' group, their cognitive inclination towards inanimate objects may still be affected by their knowledge of and long-term experience using [-animate, -discreet] noun phrases (Athanasopoulos 2006: 94). For the 'advanced' group, however, results propose that acquisition of L2 (English) grammatical number marking on [-animate, +discreet] entities has directed their cognitive inclination towards noun phrases of this nature (Athanasopoulos 2006: 94). The findings in Athanasopoulos (2006: 95) therefore provide evidence for the proposal

that language has an effect on cognitive inclinations by guiding a speaker's attention towards features of stimuli represented in the grammar of the language they speak.

Again, Athanasopoulos and Kasai (2008) extended Lucy's (1992) study by also conducting a study on English and Japanese monolinguals, as well as L1 Japanese – L2 English bilinguals. The study investigated English and Japanese monolinguals' object categorization preferences, and similar to Athanasopoulos' (2006) study, the L1 Japanese – L2 English bilinguals were further grouped into 'intermediate' and 'advanced' bilinguals. An additional aim of this study was that the bilinguals' use of grammatical number marking in their L2 was also measured in the production of speech (Athanasopoulos & Kasai 2008: 109). Participants were shown novel standard items along with two alternatives; one shape alternative and one colour alternative. Using colour rather than material alternatives was to avoid the lexical labelling of stimuli with count or mass nouns, to eliminate the chance of participants making their choices based on item names (e.g. "the car", or "the heap of sand"). There was however, a likelihood that participants would label the novel stimuli themselves using straightforward noun phrases such as "the green one" (count) or "the green stuff" (Athanasopoulos and Kasai 2008: 109). It was predicted that English speakers would make decisions based on shape preferences as compared to Japanese speakers in the case of the monolingual speakers, while it was unsure whether the bilingual speakers would make their categorization choices based on their L1 or L2 patterns (Athanasopoulos and Kasai 2008: 110). The findings indicated a definite cognitive difference between the English and Japanese monolinguals. The English participants preferred the shape alternatives significantly more than the Japanese speakers, even though the Japanese participants showed a preference for shape above chance level (Athanasopoulos and Kasai 2008: 116). Although the study used novel rather than conventional stimuli, the findings in Lucy's (1992) study were corroborated; that the structure of one's language may have an effect on non-linguistic similarity judgements. In terms of the bilingual speakers, the 'advanced' bilinguals' results significantly differed from L1 monolingual speakers of their language, but were more similar to L1 speakers of their (English) L2 (Athanasopoulos and Kasai 2008: 116), while the 'intermediate' group of bilinguals' results were more comparable to monolingual speakers of their L1 and differed a great deal from monolingual speakers of their L2. These results propose that there is a possibility for language to have an effect on cognition at a later stage in life, as it seems the 'advanced' bilinguals' cognitive behaviour is inclined toward their L2 patterns and that this affect may be connected to the acquisition of specific linguistic

features and proficiency level reached in the specific L2 (Athanasopoulos and Kasai 2008: 117).

2.4.2. Null Effects of Plural Marking on Cognition

To replicate Lucy's (1992) study, Mazuka & Friedman (2000) conducted a study on the differences in expressing quantity units related to nouns and/or noun phrases in English and Japanese speakers. In their study, it was predicted that English speakers would prefer shape alternatives rather than material alternatives and that the Japanese speakers would prefer the opposite, like speakers of Yucatec Maya. Participants were shown standard objects (e.g. candle) as well as shape (e.g. crayon) and material (e.g. wax chunk) alternatives. They were required to decide which of the two alternative items was more similar to the standard target item. Findings indicated that Japanese speakers preferred shape alternatives (72 % of the time), while English speakers chose shape alternatives 67% of the time (Mazuka & Friedman 2000: 360). The findings generated in Mazuka & Friedman (2000) contrasted with Lucy's (1992), as Japanese speakers chose shape alternatives as much as the English speakers. Mazuka & Friedman's (2000) findings therefore confirm that the findings in Lucy (1992) were likely a result of non-linguistic differences between the two participant groups rather than the cross-linguistic differences present in English and Yucatec Maya (Mazuka & Friedman 2000: 362).

2.5. Conclusion

The current chapter has provided a review of the available literature on nominal classification systems and thus nominal categories in several languages employing a type of nominal classification system. The chapter also described the Bantu noun class system as well as highlighted relevant studies and findings on perceived object similarity as a result of cross-linguistic variation found in languages containing differing nominal classification systems. What has been most prevalent throughout the chapter are that effects of language on cognition can either be language-specific or dependent on the methodologies used and therefore cognitive domains affected under certain conditions. Though that may be the case, it is evident that there is a relationship between language and thought and further steps in exploring that relationship need to be taken through retesting claims by either developing alternative methods/

manipulating existent ones or by observing similar domains which language may have an effect on in languages from different language families than the ones mentioned above.

3. Theoretical Framework

3.1.Linguistic Relativity

The principle of linguistic relativity states that people who speak different languages will have somewhat different worldviews as a result of the differences in the grammars of their native languages (Wharf 1956). Specifically, the notion shapes the idea that the language one speaks may play a role in the influencing of one's cognition by making prominent grammatical distinctions more "fluent" (Schmitt & Zhang 1998: 119; Hunt & Agnoli 1991: 377 & Casasanto 2008: 65); and this forms part of the larger question of how thought is influenced by language (Lucy 1997: 292). Whorf (1956) himself summarised these ideas in the following way:

"The linguistic relativity principle... means, in informal terms, that users of markedly different grammars are pointed by their grammars toward different types of observations and different evaluations of externally similar acts of observation, and hence are not equivalent as observers but must arrive at somewhat different views of the world." (Wharf 1956: 248)

The principle of linguistic relativity rests on two assumptions, and a following conclusion. The first assumption is that word meanings and syntactic structures in different languages differ to a great extent (Wolff & Holmes 2011: 253 and Swoyer 2011: 25). The second assumption is that semantic structures shape one's cognition, and thus the way one conceptualises the world (Wolff & Holmes 2011: 253; Swoyer 2011: 24; Mazuka & Friedman 2000: 354 and Athanasopoulos 2006: 89). The conclusion following these assumptions is consequently that people who speak different languages think differently (Wolff & Holmes 2011: 253 and Swoyer 2011: 25) and thus have slightly different worldviews (Bylund & Athanasopoulos 2014: 953; Swoyer 2011: 23 and Mazuka & Friedman 2000: 354). Up until the 1990s, there has been a lack of empirical evidence to substantiate claims made by the linguistic relativity hypothesis (Bylund & Athanasopoulos 2014: 953 and Sera et al. 1994: 262), as the proposal as it stood brought about some paradoxes (Wolff & Holmes 2011: 253). Empirical research examining the principle of linguistic relativity has gradually shifted toward the investigation of non-verbal cognition, with the aim of finding processing differences that do not only pertain to cross-linguistic differences, but that also logically associate with the same perceptual or cognitive processes (Thierry 2016: 692). As a result, it is claimed that interactions observed between language and thought have led to several nuanced forms of the hypothesis (Wolff & Holmes 2011: 253 and Athanasopoulos 2006: 89). The theory of linguistic relativity now consists of a collection of connected proposals (Figure 3 below) that do not operate on the

strong-weak continuum once occupied by linguistic determinism and linguistic relativity as polar opposites (Wolff & Holmes 2011: 253). The rationale behind this development is that in order to assess whether language influences thought, it is not sufficient to look at how people speak. Using verbal evidence to draw conclusions about the influence of language on thought runs the risk of creating circularity (see Pinker 1994). Instead, an independent measure of thought (often assumed under the label ‘non-verbal’) is needed to assess any potential influence of linguistic structure. Usually, thought is operationalised as cognitive processing, including (but not restricted to) processes such as categorization, classification, recognition memory, and similarity judgements.

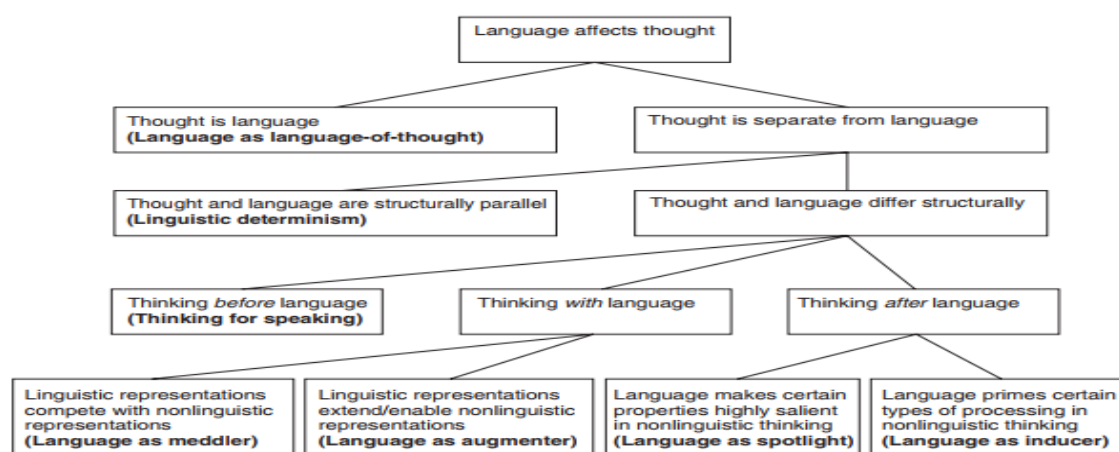


Figure 3: Approaches to the principle of linguistic relativity

Two decades of research on linguistic relativity using non-verbal tasks have generated evidence that suggests different types of influence of language on thought.

With reference to Figure 3 (Wolff & Holmes 2011: 254), Language as ‘language of thought’ takes the position that language has an effect on thought if thought units are represented in the form of words which are from natural language (Wolff & Holmes 2011: 253). This version of how language has an influence on thought has gained support from the likes of Plato, “the soul when thinking appears to me to be just talking... (p.252)” and Max Muller, “language is identical with thought (p.ii)” (Wolff & Holmes 2011: 254). However, as argued by Pinker (1994), it is possible to have thoughts which are inexpressible, and this would not occur if natural language was able to entirely express thoughts (Wolff & Holmes 2011: 254). People’s ability to coin new terms for new concepts and comprehend ambiguous expressions also

suggests “a finer representation than that encoded in words” (Wolff & Holmes 2011: 254). These counter-arguments of language as ‘language of thought’ point to a stream of conceptual representations that is not dependent on representations used in the specification of word meanings and constructions in languages (Wolff & Holmes 2011: 254). In linguistic determinism, on the other hand, the role of language on thought is said to have such an effect that it prevails over current perceptual and conceptual competences (Athanasopoulos 2006: 89 and Pavlenko 2005: 436). While linguistic determinism is slightly more progressive than the proposal made in language as ‘language of thought’, it can still be rejected as a proposal as it makes unsustainable assumptions about the relationship language shares with thought and the world (Wolff & Holmes 2011: 255), as in languages where there is no term for a concept it does not necessarily imply that the concept does not exist in its entirety (Mazuka & Friedman 2000: 354). Although this may be the case, in the stream ‘thinking before language’, thought may be influenced by language when it occurs directly before language use. Speakers then pay attention to certain features of (language) experience called ‘thinking for speaking’ (Wolff & Holmes 2011: 256). The general conclusion, though, is that language as ‘language of thought’ and linguistic determinism may both be rejected for theoretical and empirical reasons (Wolff & Holmes 2011: 253). Therefore, the nature of the current study diverts focus to the branches ‘thinking *with* language’ (‘language as meddler’ and ‘augmenter’) and ‘thinking *after* language’ (‘language as spotlight’).

Recent studies suggest that in some instances, language related processes are co-active with non-linguistic processes, therefore in these instances thinking occurs alongside language (Wolff & Holmes 2011: 256). As seen in Figure 3, the ‘thinking with language’ effect has two groupings: language as meddler and language as augmenter. In the former grouping, language effects occur when linguistic codes are in partnership with non-linguistic codes during the decision-making process (Wolff & Holmes 2011: 256). In the latter, language is suggested to supplement thought by providing new conceptual tools in the sense that non-linguistic and linguistic representations may combine so that activities which could otherwise not be accomplished with any of the two kinds of representations alone, may be accomplished (Wolff & Holmes 2011: 253).

Studies which show effects for the ‘language as meddler’ stream of the hypothesis include studies on colour. The domain of colour has been one of interest in language and cognition research and a number of studies show that differences in colour categorization have been consistent with cross-linguistic differences in colour terms (Lupyan 2012: 2; Wolff & Holmes

2011: 256). In a study on colour cognition on the Berinmo tribe in New Guinea, whose language consisted of 5 basic colour terms (while English consists of 11), Robertson et al. (2005) found that the recognition memory of the Berinmo tribe was suited for the central colours existent in their language rather than those existent in English (Wolff & Holmes 2011: 256). Similarly, Russian and English speakers were presented with colour swatches showing different shades of blue (Winawer et al. 2007). In Russian, there are two categories of blue, *siniy* for dark blues and *goluboy* for lighter blues. The findings showed a categorical perceptual effect for Russian speakers only (by measuring reaction times) and more importantly, the cross-linguistic difference observed in the study were no longer present under verbal interference conditions (Lupyan 2012: 2; Wolff & Holmes 2011: 256). The findings in the studies above indicate that language and cognition can meddle through the interaction of linguistic and non-linguistic codes, but the findings do not indicate a change in the underlying perceptual representations of memory as the cognition effects, in the latter study, disappeared as a result of verbal interference (Wolff & Holmes 2011: 256).

In cases where language is seen as an augmenter, studies on category formation have suggested that language may be useful in category formation processes (Wolff & Holmes 2011: 258). In a study by Lupyan et al. (2007: 1079), participants were required to distinguish whether alien-like creatures were approachable or non-approachable. The categories ‘approachable’ and ‘non-approachable’ were distinguishable on the basis of visual perception, therefore it was not essential for participants to learn the labels to perform the task. However, category formation was quicker when the stimuli were presented with written or auditory labels (Lupyan et al. 2007: 1082; Wolff & Holmes 2011: 258). It has also been shown that interference from unconventional stimuli is less likely to occur when categories are learned with the aid of labels, and are more flexible in terms of new category member incorporation (Wolff & Holmes 2011: 258).

As previously discussed, the effects of language as meddler and augmenter occur when thought employs language online. An alternative way in which language may influence thought is after language use (Wolff & Holmes 2011: 259). Unlike in the previous ‘thinking with language’ branch, effects of ‘thinking after language’ should not disappear under verbal interference conditions, as they take place after language use (Wolff & Holmes 2011: 259). As seen in Figure 3 above, the ‘thinking after language’ effect deviates into ‘language as spotlight’ and ‘language as inducer’. In ‘language as spotlight’, Wolff & Holmes propose that long-term experience using language may cause one to pay direct attention to specific properties in the

physical world (2011: 259; Boroditsky 2001: 2; Casasanto 2008: 65; Hunt & Agnoli 1991: 377; Schmitt & Zhang 1998: 119; Swoyer 2011: 28; and Thierry 2016: 693), as we are suggested to dissect, as a means to make meaning, our natural surroundings according to the guideline that is our native language; that is, the grammar of our native language (Swoyer 2011: 28; Athanasopoulos 2006: 89 and Pavlenko 2009: 434). People who speak different languages may show a bias in addressing and “encoding different aspects of their experience”, even in contexts which are non-linguistic in nature (Boroditsky 2001: 2 and Wolff & Holmes 2011: 259). Therefore, language behaves as a spotlight, highlighting and making more prominent certain aspects of the world. On the other hand, when language acts as an inducer, language may prime a certain processing mechanism which may remain in use even after language use (Wolff & Holmes 2011: 259).

Findings in studies on grammatical gender have suggested that ‘language as spotlight’ effects may consequently occur because of exposure to grammatical gender (Wolff & Holmes 2011: 259). As evident and discussed in the Literature Review chapter, languages typically conflict when assigning grammatical gender to nouns and this variability across languages suggests that grammatical gender assignment is not universal, but that it is rather largely determined by factors which are language-specific (Wolff & Holmes 2011: 259). A number of studies (Sera et al. 1994, 2004 & 2007; and Vigliocco 2005) support this claim. It is reported that in some cases, effects persist even under verbal interference conditions, which suggests that this was not because of language being used online, but rather attention bias accumulated through frequently and habitually using language (Wolff & Holmes 2011: 259).

Another area in which language may cause attentional biases is with regard to distinguishing between objects and substances (Wolff & Holmes 2011: 26). As discussed above, in English, object names generally infer that objects are individuated. For example, when referring to more than one chair, English uses the plural marker ‘-s’. However, in Japanese and Yucatec Maya, such plural markers are not typically used; “it is as if the noun for chair means ‘chair stuff’” (as discussed in section 2.4. of the Literature Review) (Wolff & Holmes 2011: 260). To recap, a few studies have examined whether the difference in plural marking between Japanese, Yucatec Maya and English may have an effect on thought (Lucy 1992, Gentner 1997, Athanasopoulos 2006, Athanasopoulos & Kasai 2008 etc.) and findings indicate that during object categorization, English speakers may focus more on shape, as items may be distinguished based on shape, while speakers of Japanese and Yucatec Maya, may have an

attention bias towards material, as nouns in Japanese and Yucatec Maya do not individuate their objects explicitly (Wolff & Holmes 2011: 260).

In light of available experimental evidence of linguistic relativity and to re-iterate, Bylund and Athanasopoulos (2014: 953) emphasise that rather than being concerned with whether language has an influence on thought, we should be concerned with the cognitive processes affected by linguistic categories under different conditions and investigate which of those cognitive processes are affected under which conditions. Swoyer (2011: 25) maintains the idea put forth by Bylund and Athanasopoulos (2014: 953); and suggests that in order to successfully (or meaningfully, rather) form testable versions of the linguistic relativity hypothesis, questions pertaining to which domains of thought are systematically affected by which domains of language; how they are affected and how strong the effect is should be accounted for.

As demonstrated above, empirical research examining the theory of linguistic relativity has gradually shifted toward the investigation of non-verbal perception, with the aim of finding processing differences that do not only pertain to cross-linguistic differences, but that also logically associate with the same perceptual or cognitive processes (Thierry 2016: 692) and that apply to evidence of the theory of linguistic relativity. The label-feedback hypothesis, as proposed by Lupyan (2012), is one such mechanism that may account for cognitive processing in the domain of object categorization and perception (Thierry 2016: 694).

3.2. Label-Feedback Hypothesis

To perceive a stimulus as significant depends on the stimulus being represented as belonging to a larger class or category (Lupyan 2012: 4). Studies indicate that labelling, and thus language, can have prevalent effects on “non-verbal processes such as categorization” and performance on tasks not requiring language-use (Lupyan 2012: 1). It is further suggested that labels play an active part in both the processes of categorisation and perception, as they select and activate perceptual features that represent the class or category being named or labelled. Miller and Dollard (1941) hypothesise that learning that some colours are labelled ‘red’ and others ‘green’ affords category-training and may, over time, assist in differentiating their representations and thus cause less similarity in the representations of these two categories (Lupyan 2012: 4; Lupyan et al. 2007: 1077 & 1078). Furthermore, learning that some items are labelled ‘dax’ may suggest that they share common properties, and these may then be grouped into the same category or class on the basis of their shared perceptual features (Lupyan et al. 2007: 1077). The label-feedback hypothesis therefore suggests that language is responsible for the temporary control of continuous perceptual processes.

The hypothesis proposes that language generates momentary or ‘transient modulation’ of continuous perceptual processing. For example, in the case of colour, having learnt that some colours are labelled ‘red’, perceptual representations stimulated by red-coloured items are processed via top-down feedback (Figure 4), as the verbal label ‘red’ is also activated (Lupyan 2012: 4). This effect causes momentary warping, whereby reds are grouped together and/or reds are being separated from non-reds. Lupyan ((2012: 4) suggests that the modulation generated by language may be up or down-regulated by allowing a subject to hear a verbal label before seeing the object or via verbal interference – which reduces the influence of language on non-verbal language processing – respectively. Figure 4 is a simple diagram which illustrates a fully recurrent and functional neural network; demonstrating the concept that labels (or language) produce modules of on-going perceptual processes (Lupyan 2012: 5).

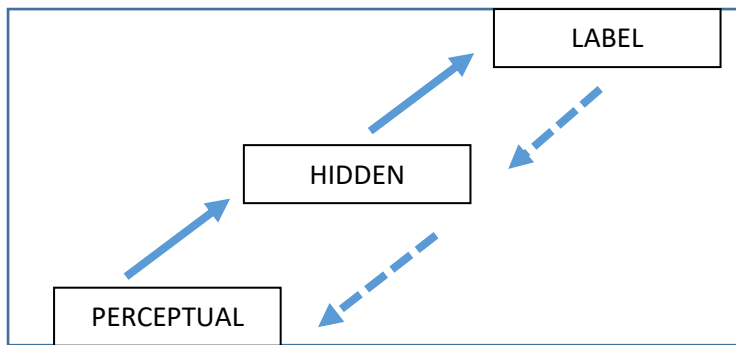


Figure 4: A representation of a neural network for exploring on-line effects of labels (or language) on perceptual representation.

Lupyan (2012: 5) states that the solid arrows represent feedforward (or bottom-up) connections and that dashed arrows represent feedback (or top-down) connections and that in this state, the perceptual tier is presented with an item and is thus receiving input that is feature-based. While training, the model acquires label production and comprehension. For example, when confronted with a label, i.e. “chair”, properties typical of chairs are then activated. Because of the one-to-many relation shared by between-category labels and category prototypes, the model may not be able to identify the specific item being referred to when confronted with just a category label (Lupyan 2012: 5). The one-to-many relation described above is what allows the model to make generalisations about item properties the subject has not seen. Some characteristics (e.g. having a cushion or back) are more related with a given category than others (e.g. being made of wood or being brown) and therefore category labels associate more with characteristics that are representative of the given category and dissociate from characteristics that are not representative of the given category (Lupyan 2012: 5).

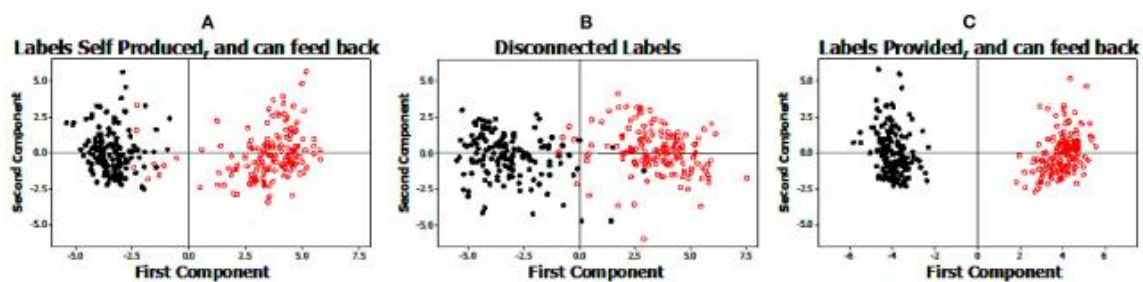


Figure 5: **Principal-components analyses from a connectionist simulation showing the influence of category labels on the perceptual representations.** The simulation uses the network architecture shown in Figure 5. Each dot represents an item from one of two categories, denoted by separate colours and its location. Category structure is enhanced when labels, activated by the network, can feed back onto the perceptual layer (A). When this feedback of labels is disrupted by blocking the flow of activity from the label to the hidden layer, representations revert to reflecting the perceptual structure of the stimulus space (B). Categorization is further enhanced when the label is provided to the network exogenously (C). See text for additional details.

Figure 5 (Lupyan 2012: 6) gives further insight into the structure and the processes of the model in Figure 4. In Figure 5, Lupyan (2012) illustrates a principal-components analysis (PCA) of how prototypes from two categories learned as labels are perceptually represented. In Figure 5A, the label is provided by the model and this occurs in response to the input received by the perceptual layer (i.e. the subject seeing the actual object and thus perceiving it). The label layer therefore feeds back to the perceptual layer and this is aligned with the hypothesis that verbal labels modulate perceptual representations through top-down feedback (Lupyan 2012: 5). In the case of figure 5B, the connection between the label to the hidden layer is deactivated and to distinguish between the two categories in the PCA diagram, the model is reliant on bottom-up perceptual dissimilarities between the two given categories (Lupyan 2012: 5). In 5C, the subject's perceptual layer is presented both with the object and the object label and it is proposed that distinct category formation can be seen even though categorising objects depends on being able to point out similarities (or dissimilarities) between category prototypes and the presence of labels facilitates this procedure (Lupyan 2012: 5).

Language effects on categorization have also been observed within the domain of colour. Studies have shown that differences in colour categorization have been consistent with cross-linguistic differences in colour terms (Lupyan 2012: 2). As touched on above, Russian and English speakers were presented with colour swatches showing different shades of blue. In Russian, there are two categories of blue, *siniy* for dark blues and *goluboy* for lighter blues. The task was identical to both of Vigliocco's tasks in both experiments one and four mentioned above. The participants decided whether colour *X* matched colour *A* or *B*. The results showed a categorical perceptual effect for Russian speakers only (by measuring reaction times). It is supposed that warping may make it possible to bring about cross-linguistic differences in colour categorization and perception (Lupyan 2012: 2). Additionally, warping is suggested to be a product of learning and thus long-term experience using language (or labels) in order to make colour distinctions may progressively warp "perceptual representations of colour" (Lupyan 2012: 2). This may result in colours sharing the same label being perceived as more similar and thus placed in the same category and those with different labels being perceived as dissimilar and thus placed in a different category. Lupyan (2012: 2) further argues that using certain lexical items like *siniy* and *goluboy* will, in time, result in classifying some parts of the colour spectrum as separate. This assumption may then be applied in broader linguistic relativity domains like object perception and categorization. It could be that long experience categorizing (anything) using language gradually warps the perceptual representations of

whatever is being categorised. And just like gradual perceptual warping applies to differences in categorical colour perception, the same could be said for the use of nominal classification systems. Learning to categorize nouns by using noun class categories, or any other nominal classification system, can progressively warp the perceptual representations of objects. This may result in nouns (or objects) with the same lexical label being placed in the same category and thus being perceived as more similar; and nouns with different lexical labels being placed in different categories and thus being perceived as distinct from each other. This claim is consistent with Miller and Dollard's (1941) view that learning object names facilitates category learning (Lupyan 2012: 4; Lupyan et al. 2007: 1077 & 1078) and it does indeed seem that language may be accountable for modulating certain perceptual processes, as proposed by the label-feedback hypothesis (Lupyan 2012: 4). Just like differences in colour terminology across languages may cause cross-linguistic differences in colour perception (Lupyan 2012: 2), differences in nominal classification systems (i.e. the noun class system in isiXhosa; the grammatical gender system in German; no formal nominal classification in English etc.) may also cause differences in object perception across different languages.

A study that investigated whether category labels affected category learning has shown that at as early as 9 months, children can distinguish between labelled and unlabelled objects, individuating the labelled ones, while at 12 months, children assume that words denote object categories or classes (Lupyan et al. 2007: 1078). In another study examining whether categories with labels are easier to learn than categories without labels, it was hypothesised that participants who learnt the names of stimulus categories would perform better than participants who did not learn the names of the stimulus categories, as it is suggested that learning labelled categories is easier than learning unlabelled categories (Lupyan et al. 2007: 1078; Lupyan 2012: 8). The findings illustrate that participants who were placed in the named category condition and learned the categories with the presence of labels retained their knowledge of the categories through the whole testing phase of the experiment; while participants who were placed in the unnamed category condition gradually decreased in accuracy (Lupyan 2012: 8). According to these results, it is evident that the presence of labels had an effect on thought, as participants learned to classify the stimuli faster when the names of the stimuli were also learned (Lupyan et al. 2007: 1078). Evidence supporting the suggestion that category distinctions are made more salient by the presence of labels was also found: categories learned with labels were more robust, as the retaining of labels by participants in the labelled condition was also observed even when the labels were no longer presented (Lupyan et al. 2007: 1078).

Studies pertaining to linguistic impairments find that difficulties in categorization tasks which don't require language can be consistent with linguistic impairments such as aphasia (Lupyan & Mirman 2012: 1). Studies found that aphasics have difficulties organising items when tasks entail singling out specific dimensions while disregarding other dimensions (Lupyan & Mirman 2012: 2); for example, focusing on colour rather than shape. In a study where patient LEW had anomia, a type of aphasia where individuals fail to retrieve words (primarily nouns and verbs), where patient LEW could not name or label specific dimensions, LEW could not categorize. However, patients like LEW are able to isolate specific features of objects and thus categorize when they are able to name or label those features (Lupyan and Mirman 2012: 2). This finding is consistent with label-feedback hypothesis top-down feedback scenario presented in Figure 5A. As described above, the subject's network provides the label in response to the stimulus presented to the perceptual tier.

3.3.Conclusion

Various studies illustrate that category distinctions are made more concrete by labels, and that this has a direct impact on the language-and-thought debate. However, studies showing the role played by category names in category learning are relatively few (Lupyan et al. 2007: 1077). Target category labels are suggested to be intensely activated when the neural network (Figure 4) encounters an item considered as typical (Lupyan 2012: 7). However, the question of intense activation of target category labels when there is no one single item which can be considered as an absolute representative of a category still remains, particularly in the case of isiXhosa noun class categories (Table 2). Exemplars considered atypical are suggested to have a weaker relationship with labels than with more typical exemplars (Lupyan 2012: 7). Again, in a case where there are no exemplars central to the category; where certain objects can be placed in more than one category; and where partial rather than full labels denote categories, the question of how labels interact more or less strongly with a label is raised.

3.4. Factors Influencing Cognitive Restructuring in L2 Speakers

As findings discussed in the current study – many of them based on observations made in monolingual speakers – reveal that language may influence thought, it may be significant to ask the question of whether the acquisition of more than one language may also possibly have an effect on thought. Studies on bilingualism have generally been concerned with the processing of lexical items, rather than with “linguistic and cultural specificity of conceptual representation” (Pavlenko 2005: 433), with the consequence that our current knowledge on bilingual lexical and cognitive processing is exhaustive, but less is known regarding the influence of cross-cultural and cross-linguistic variation in cognitive processes (Pavlenko 2005: 433). It is important to note that associations are bound by context and that different interlocutors may perceive the same stimulus in various ways depending on the context in which the stimulus is presented. However, it is also important to consider individual differences, as these associations may be guided by uniformities in the individual’s past experience – as well as the possibility that an L2 speaker’s L1 competence may, in a number of domains, be influenced by their L2 (Pavlenko 2005: 437). In a case where an additional language is learned, cognitive restructuring may be highly dependent on the L2 speaker’s acquisition trajectories, meaning all the characteristics that usually describe an individual who speaks two or more languages (Bylund and Athanasopoulos 2014: 968). Because the current study investigates L1 isiXhosa – L2 English bi-/multilingual speakers who:

- i. acquired English (as an L2) in diverse target L2 contexts alongside their L1
- ii. acquired English at an early age
- iii. frequently use English in various contexts
- iv. constantly codeswitch effortlessly between the L1 and L2
- v. are still residing in the ‘target’ L2 context
- vi. may be highly proficient in English as a result of the combination of the attributes mentioned from (i. – v.)

it is vital to take into account the factors that may have an influence on their cognitive restructuring, as careful observation of the way in which several languages interact in bi-/multilingual minds is necessary for a comprehensive understanding of the relationship shared between language and thought (Pavlenko 2005: 433). Bylund and Athanasopoulos (2014: 968 – 976) and Pavlenko (2005: 433) suggest six factors that have confirmed to influence cognitive

restructuring in L2 speakers and that should serve as a “framework” for research on language and thought in bilinguals.

3.4.1. Language Proficiency

Language proficiency entails an L2 speakers’ general proficiency level with regard to either their L1 (in cases of language attrition) or L2, as well as knowledge of the specific linguistic feature under examination. It is suggested that acquiring semantic properties specific to the L2 may influence some cognitive changes in an L2 speaker. Therefore, this warrants the prediction that high proficiency in the L2 will cause cognitive restructuring in the L2 speaker (Bylund & Athanasopoulos 2014: 968).

In a study by Athanasopoulos (2006), where cognitive number representation was observed by evaluating L1 Japanese – L2 English speakers’ sensitivity to alterations in the number or amount of countable and non-countable objects or substances respectively, L2 speakers performed in alignment with over-all L2 proficiency (Athanasopoulos 2006: 94). The results in Athanasopoulos’ (2006) study illustrate two points. They show that a higher proficiency in the L2 and knowledge an L2 speaker has about the particular linguistic attribute being examined within a particular perceptual domain may encourage cognitive restructuring in the L2 speaker. For example (in the case of L1 Japanese – L2 English speakers), the more a speaker’s knowledge of grammatical number marking in English is improved, the more the speaker may prefer shape (rather than material) when faced with the task of categorizing (Bylund and Athanasopoulos 2014: 969). While some L1 Japanese – L2 English speakers may be inclined to categorize according to object shapes, some may still prefer to use object materials as a means of making category distinctions in categorization tasks, and this is dependent on L2 language proficiency differences in individuals (Bylund and Athanasopoulos 2014: 969). Preferences of categorization patterns can also be based on L1 attrition. For example, Athanasopoulos (2009: 90) found that the inability to recall L1 terms for ‘blue’ aligned with weak categorical awareness in native blue distinctions in Greek speakers who stayed in the UK for a longer period of time.

In contrast, not all studies have illustrated correlations between non-verbal cognition and language proficiency. In a study on preferences in object categorization in Japanese-English bilinguals (Cook et al. 2006: 147), no L2 proficiency effect was observed. Similarly, no effect

was observed in Bylund and Athanasopoulos' (2014b: 438) study on grammatical aspect and end-point orientated motion events in multilingual isiXhosa speakers.

3.4.2. Language Contact

This aspect alludes to the amount, and thus frequency, of contact bi-/multilingual speakers have with their languages (Bylund and Athanasopoulos 2014: 970). Bylund and Athanasopoulos suggest that the robustness of the properties that compose conceptual representation would be reliant on constant reformation "as a function of the individual's language usage patterns" (2014: 970). It is therefore predicted that frequently using a specific language may lead to non-verbal behaviour specific to that particular language, or L2 speakers may develop linguistic repertoires which may lead to new ways of conceptualisation which may not necessarily mirror those of either their L1 or (target) L2 (Pavlenko 2005: 437 & 438)

In a study on the categorization of colour in L1 Japanese – L2 English speakers, the effect of the frequency of use of the L2 was investigated. It was found that the more speakers were frequent users of their L2, the more the shifting from L1 cognitive patterns to L2 cognitive patterns was observed (Athanasopoulos et al. 2011: 14). A comparable finding was described by Bylund et al. (2013: 948); the more frequent L1 Afrikaans – L2 English speakers used English, the more they seemingly behaved like L1 English monolinguals in the similarity judgement task.

On the other hand, language contact may affect L2 speakers' cognitive restructuring more than just directly. Studies on L1 attrition and L2 attainment illustrate that the more or less frequently a language is used may have an effect on high or low proficiency in that particular language. They then suggest that one of the purposes of language contact is to advance and/ or maintain proficiency with the linguistic attribute that may cause cognitive restructuring (Schmid 2001: 12).

3.4.3. Context of Acquisition

Thus far, no studies have reported on correlations between L2 speaker cognitive behaviour and L2 context of acquisition; as a result of not having manipulated the acquisition context for comparison, for example, the influence of natural acquisition contexts, as opposed to tutored or sociocultural bi-/multilingual acquisition contexts (Bylund and Athanasopoulos 2014: 971). However, in some language-specific research, findings have shown independent effects of L2

acquisition in natural (Athanasopoulos, 2009), tutored (Kurusinki & Sera, 2011: 215) and semi-natural/semi-tutored acquisition contexts (i.e. multilingual settings whereby the L2 is instructed at school and is also prominently used in the society at large). Although these results provide minimal evidence on the degree to which acquisition context may have an effect on L2 speakers' cognitive representations, they do illustrate that L2 speakers' cognitive restructuring may take place in various acquisition contexts (Bylund and Athanasopoulos 2014: 972).

3.4.4. Bilingual Language Mode

This factor refers to the extent to which the L1 and L2 are activated in the bilingual mind. In bilinguals, languages are at different levels of activation depending on the languages the speaker has at his/ her disposal, as well as codeswitching patterns and preferences of the interlocutor(s). It is thus likely that the language mode the bilingual is currently operating in may have an effect on his/ her category distinctions (Grosjean 1998: 3).

A study on action event categorization by L1 Indonesian – L2 English bilinguals (Boroditsky et al. 2002: 5) provided evidence for the effect of language mode when Indonesian speakers who were tested in English behaved similarly to L1 English speakers in terms of categorization behaviour as compared to those who were tested in Indonesian. In a study where L1 Spanish – L2 English speakers were required to organise novel, animate items and events into categories based on the manner in which motion occurred (Kersten et al. 2010: 42), findings indicated that the language of testing was a sensitive variable. When participants were instructed in English, they behaved more like L1 English speakers, and when they were tested in Spanish, their behaviour mirrored Spanish L1 speakers' behaviours (Bylund and Athanasopoulos 2014: 973). Similar findings are observed in Athanasopoulos et al. (2015: 14) in a study on motion events in English and German bilinguals. They found that although they observed preferences for motion ongoingness irrespective of language of operation, the language in which the bilinguals were operating systematically influenced their preferences.

Just as in the factors listed above, not all studies showed effects for bilingual language mode. For example, Filipovic (2011: 15) found no language testing effects in his study on motion events and recognition memory in Spanish-English bilinguals. Athanasopoulos (2007) observed a similar finding in his study on object categorization in L1 Japanese – L2 English bilingual speakers (Bylund and Athanasopoulos 2014: 973). Speakers tested in their L1 (either

English or Japanese) did not significantly differ from their monolingual counterparts in the same study (Athanasopoulos 2007: 697).

Although there are instances of null effects for this factor, it is evident that the language of testing in experiments may play a vital role, as it may activate certain perceptual features related to and acquired through that language, therefore making certain perceptual features of the object more salient and others not (Bylund and Athanasopoulos 2014: 973).

3.4.5. Age of L2 Acquisition

The AoA of the L2 refers to the age at which an L2 was learned. Pavlenko (2005: 437) suggests that some research makes the assumption that when the L2 is learned after the adolescent stages, it will not have an impact on the L1, yet, as mentioned above, L2 speakers' knowledge of their L1 is subjected to influence of their L2. The acquisition age of an additional language may have an effect on cognitive behaviours in the following ways. First, it is likely to affect the degree to which bilinguals' cognitive behaviours are affected by the language mode referred to above. Secondly, the language proficiency factor may also have an effect on the influence of age of acquisition on bilinguals' cognitive behaviour (Bylund and Athanasopoulos 2014: 974).

In the case of the first claim, a study on motion event cognition in L1 Spanish – L2 English speakers (Kersten et al., 2010: 34), indicated that the language of testing for the experiment affected the behaviour of bilinguals whose L2 age of acquisition was older than 5 years and not those of bilinguals whose L2 age of acquisition was less than 5 years. With regard to the second claim, in Athanasopoulos and Kasai's (2008) study on object categorization in L1 Japanese – L2 English speakers, it was revealed that the age of acquisition of the L2 and L2 language proficiency could incline bilinguals' categorization preferences toward patterns observed in L1 English monolinguals (Bylund and Athanasopoulos 2014: 974). Likewise, in Boroditsky's (2001: 1 & 15) study on Mandarin and English speakers' perception of time, results showed that the degree to which L1 Mandarin – L2 English bilingual speakers conceptualised time vertically (as observed in Mandarin monolinguals) was in relation to their L2 AoA, as thinking about time vertically was observed in the Mandarin speakers who learned English at a later stage in their lives.

Kersten et al.'s (2010) study illustrates how crucial the factor age of L2 acquisition is. It is stated that bilinguals who acquire an additional language earlier acquire their respective languages within close sequential proximity and more often than not, in parallel contexts. Bilingual speakers may exhibit composite categorization patterns, using constituents of both the L1 and L2. Alternatively, bilinguals who acquire their L2 at a later stage do not acquire their languages within chronological proximity and in similar contexts and thus may depend on more deviating representation systems (Bylund and Athanasopoulos 2014: 973 & 974).

However, not all studies have produced findings which report an effect for age of acquisition. In Athanasopoulos' (2009: 90) examination of colour categorization in L1 Greek – L2 English speakers (AoA between 1 – 13 years), L2 AoA effects were not observed (Bylund and Athanasopoulos 2014: 274). Bylund et al. (2013) reported similar findings in their investigation of motion event categorization in Afrikaans-English bilinguals (AoA 1 – 18 years).

3.4.6. Length of Stay in L2 Context

Residing in a context where the target language (i.e. the L2) is spoken as an L1 may have a role to play in the reorganization of the cognitive structure of an L2 speaker, because behaviours in categorization may change and thus develop over a prolonged time period due to training (Bylund and Athanasopoulos 2014: 975). Training may include factors such as proficiency, multiple opportunities to interact with the linguistic properties that may be in question and a grounded acquisition context whereby the speaker may consciously or unconsciously exhibit L1 speaker non-verbal behaviour of the target L2 (Bylund and Athanasopoulos 2014: 975).

Several studies report findings on the effect of the length of stay in a context where the L2 is spoken. It is reported that in cases where L2 users reside in the target L2-speaking context, the more their patterns of cognitive categorization are altered (Bylund and Athanasopoulos 2014: 975). In a study investigating object categorization in L1 Japanese – L2 English speakers (Cook et al., 2006: 147), speakers who resided in the target L2 context longer (between 3 to 8 years) showed significant differences in cognitive patterns than speakers who resided in the target L2 context for a less amount of time (length of stay < 3 years). The former group exhibited patterns of categorization leaning toward the L2 (Bylund and Athanasopoulos 2014: 975).

Similar to the factors previously mentioned, not all studies revealed an effect for a longer length of stay in the L2 context. Boroditsky et al.'s (2001: 13) study, L1 Mandarin speakers had been

residing in the target L2 (English) context for a minimum of 10 years. Although that was the case, no effect for this factor was observed (Bylund and Athanasopoulos 2014: 976). It is suggested that findings such as these can be accounted for by language proficiency. It could be that even though speakers had lived in the context for an extended period, their language proficiency may have been low.

3.5.Conclusion

As discussed above, it is evident that the factors which may influence cognitive restructuring in the L2 speaker may in some cases be dependent on one another and are interlinked. For example, language contact may have an effect on acquisition context and that may in turn affect AoA of L2 and thus language proficiency, etc (Bylund and Athanasopoulos 2014: 976). However, in the case of South Africa, not all of the above-mentioned factors may be applicable. For instance, it would be difficult to define the length of stay in the L2 context, or define the context of acquisition when bi-/multilingual societies live beside and among one another for their whole lives and when the L2/ L3/ L4 etc. is acquired naturalistically as a result of related Bantu language dialects (Banda 2009: 5). In the European context, country borders somewhat reflect linguistic borders, therefore situations of language contact are easily identifiable, unlike in the African context where most African languages typically traverse country borders (Banda 2009: 5). It is also possible for languages to co-exist in the same setting (e.g. the same province/ city or the same household). In South Africa, and Africa in general, it is the norm rather than an exception to speak more than one language in a single utterance or conversation on the same day (Banda 2009: 5) and it is also the norm to mix different linguistic units (e.g. an isiXhosa affix with an English stem) from languages the speaker has at his or her disposal. Therefore, meaning in the case of bilingual language mode, for example, if this factor refers to the extent to which the L1 and L2 are activated when the bilingual is currently operating in that specific language, then it is important to consider how this factor would be defined when more than one language is activated simultaneously. It is therefore important to note that what is defined as a multilingual context and a bi-/multilingual speaker in the Western context is not the case in Africa, and describing these factors as the same in both cases is “theoretically misleading” (Banda 2009: 5). Bylund and Athanasopoulos (2014: 976) suggest that in order to comprehend the degree to which these factors converge and interact with one another, future studies should consider careful scrutiny of their relationships while operationalizing them reliably by building on established methods to elicit information regarding these factors.

Established methods and defining characteristics of these factors appropriate for Western contexts may need to be redefined in the case of Africa.

4. Methodology

4.1.Introduction

The aim of the current study is to investigate whether the cross-linguistic differences present in English and isiXhosa in terms of nominal classification, where the former language does not make use of noun class categories and the latter does, give rise to differences in categorization preferences, or more specifically, perceived object similarity, between English and isiXhosa speakers. In doing so, the study also aims to test claims made by the label-feedback hypothesis by creating different experimental conditions (described below). Additionally, because previous research has revealed that learning an L2 may have an effect on thought patterns specific to the L1 (especially when the L2 is learnt at an early age) it will be necessary to record and analyse the isiXhosa speakers' experience with L2 English to see whether this had an effect on their categorization preferences.

A language background questionnaire and a triads-matching task were used to collect the data and participants were tested under three different experimental conditions. The language background questionnaire yielded information such as participants' linguistic background and personal information. The triads-matching task assessed the extent to which isiXhosa-speaking participants judged objects belonging to the same noun classes as being more similar, compared to English speakers. The triads-matching task has been used in previous research pertaining to object perception (e.g. Lucy 1992; Vigliocco 2005; Athanasopoulos 2006 etc.). Detailed information on these components is provided below.

4.2.Participants

A total of 93 speakers participated in the study. Of these, 46 were L1 isiXhosa speakers. and 47 were L1 English, all of them residing in Port Elizabeth, Eastern Cape. Participants wanting to take part in the study contacted me through information they obtained either from other participants (i.e. 'snowballing') or that was posted and shared on social media platforms (Facebook and Instagram). The isiXhosa participants function as fully bilingual, as they have English as an L2 or even second L1⁷. It must be noted that although the current study investigates perceived object similarity in isiXhosa in comparison to English, it is almost impossible to find, particularly in an urban setting, monolingual speakers of isiXhosa with no

⁷ In these cases, participants indicated they learnt English from birth, but English was not the dominant home language.

knowledge of English. The majority of both participant groups were students and according to the participants' background questionnaires, many of the isiXhosa participants confirmed their bilingual, or even multilingual status. Both participant groups in the current study are well-suited for the study as they are considered to be fully competent L1 adult speakers of isiXhosa or English.

Information on the age of participant groups is given in Table 5:

	Average	Standard deviation
Age (of both English and isiXhosa participants)	21.01	2.45
isiXhosa participants	21.16	3.09
English participants	20.87	1.68

Table 5: All participants' ages

4.3.Ethical Considerations

To commence with the study, ethical clearance was obtained from the Stellenbosch University Research Ethics Committee. Participants in the current study remain anonymous, as personal information was not required for participation in the study. Participants were required to give consent before taking part in the study. Participants were also allowed to withdraw from the study at any given moment without consequences if they wished to, although there were no foreseeable psychological or physical risks, discomforts or inconveniences that could have been endured by participants during the study. All information provided by the participants is kept confidential and is shared between myself and my supervisor. There was no remuneration for taking part in the study.

4.4. Materials

Triads-Matching Task

A triads-matching task was used to collect data on perceived object similarity. Before selecting which images would be appropriate to include in the triads, a norming test was done to ensure the potential images elicited common isiXhosa names, that is, as opposed to loanwords. This was necessary, as when using a borrowed word (from English, for example), or when code-switching (between English and isiXhosa, for example) but still making use of the isiXhosa noun class prefix, the object being referred to, in some cases, transfers to a different noun class altogether. For instance, *usiba* ('pen') belongs to noun class 11. However, when the borrowed English term is used, *ipen* there is still an isiXhosa prefix, but the object now belongs to noun class 9 (see further discussion on loan word assignment in the Literature Review, page 13).

For the norming test, 20 speakers of English and 20 speakers of isiXhosa were given a booklet with pictures and were asked to write down the common object names of possible items to be included in the trials. On the basis of these findings, the items that elicited the lowest instances of English borrowings and the highest numbers of consistency were selected for the present study. The items selected to be included in the study had been hand-drawn and resized electronically in order to eliminate a size and/or drawing style bias. The pictures were also placed at equal distances apart from one another and this was important, as all the other aspects of the booklets and the triads needed to be kept constant as consistent order to eliminate potential confounds.

Booklets containing 12 triads of images were prepared. The 12 triads of images were presented twice with counterbalanced positions, therefore producing a total of 24 trials (Addendum I⁸). This is done so that when a triad (or trial) is repeated, participants don't choose the first available option. Each triad consists of a target item, labelled *X*, and two choice items, labelled *A* and *B*. The items in a single triad were selected under the condition that they had no explicit semantic relationship between them, but they are matched so that either item *A* or *B* belong to the same noun class as the target item *X*. The triads-matching task is a forced-choice task, in the sense that the participants had to make a decision between objects *A* and *B*.

⁸ Addendum (I) provides all the triads used in the study throughout Conditions I, II and III.

The triads were presented in pseudo-randomised orders. A total of 5 different triads series were created using the random number function in Excel, assigning each triad a random number, and then creating five presentation lists. These lists were used to create 5 different booklets with their own unique presentation order of the triads. While it would have been ideal to have fully randomised orders (i.e. unique orders for each participant per language group), pseudo-randomisation was chosen due to infrastructural challenges. Importantly, the randomised lists were equally distributed among the groups.

The five series of booklets were prepared in English and in isiXhosa. The booklets were adjusted according to the experimental condition for which they were to be used (see procedure).

Background Questionnaire (Addendum II)

Information on the participants' personal background (age and gender) and linguistic background was elicited through a background questionnaire consisting of 8 questions and these questions covered the following sections:

1. Personal information: age and gender.
2. Linguistic background: language(s) participants learned (as L1); other language(s) spoken by participants and where they were learnt.
3. Proficiency and frequency: participants self-rated proficiency for each language they listed and the frequency of use of each language.
4. Participants specified which language(s) they used in different kinds of settings (e.g. at home, school, work, etc.).
5. Debriefing: participants disclosed what they based their judgements (in the triads-matching task) on.

4.5.Procedure

Each language group was further divided into three groups to complete the triads-matching task under one of the following three different conditions (Addendum I: 9.1 – 9.3):

- I. No-label condition (Condition I):
Items in the booklet only appeared with the labels *A*, *B* and *X*, to be used for classification purposes. The participants were required to go through

their respective booklets and for each triad decide whether the target object *X* was more similar to object *A* or object *B*.

This condition consisted of 15 English and 14 isiXhosa participants.

II. Priming condition (Condition II):

In this condition there were two booklets; one containing items appearing with *A*, *B* and *X* (triad trials) and a picture booklet containing only objects appearing (in random order) with object names. They were then asked to return the picture booklet to the researcher and go through the second (triad) booklet. At this stage, they were asked to proceed and complete the same triads-matching task as in Condition I (without labels).

This condition consisted of 17 English and 16 isiXhosa participants.

III. Label condition (Condition III):

Items in the booklet appeared with labels *A*, *B* and *X* together with the object names. Here, as in Condition I, participants were required to go through their respective booklets and for each triad, decide whether the target object *X* was more similar to object *A* or object *B*.

This condition consisted of 15 English and 16 isiXhosa participants.

The isiXhosa participants received their instructions in isiXhosa and thus isiXhosa booklets. The English participants received their instructions in English and thus English booklets. Both participant groups were addressed by an isiXhosa – English bilingual administrator. The instructions in English were, “In this booklet you will see pictures of different objects: object *A*, object *B*, and object *X*. Your task is to decide whether object *X* is more similar to object *A* or *B*”, and in isiXhosa the instructions were, “Kule ncwadana kukho imifanekiso yezintu ezintatu ezahlukeneyo. Into enophawu *A*, into enophawu *B* nento enophawu *X*. Khawugqibe ukuba ingaba into enophawu *X* iyelene kakhulu nento enophawu *A* okanye *B*” (as written in the booklets). Participants in each language group completed a different booklet series and booklet series were randomly assigned. The participants were tested individually under test conditions in sessions which lasted between ten to twenty minutes.

5. Analyses

This chapter will report the results participants obtained in their triads-matching task across all three conditions, as well as a series of Pearson correlations run between the isiXhosa participants' relevant participant background variables (AoA of L2 English, proficiency of L2 English and frequency of use of L2 English) and their categorisation preferences, for each of the three conditions. Participants categorization preferences in the triads-matching task were calculated by total no. of matches/ total no. of trials.

5.1.Condition I: No Label Condition

Results

An examination of the categorization preferences of both the isiXhosa and English-speaking participants indicates that both participant groups matched objects belonging to the same noun class category with an average frequency of 49% in all the trials combined and in the same task. The isiXhosa group has *SD* 12.19, while the English group has *SD* 11.62. These findings are illustrated in Figure 6 below.

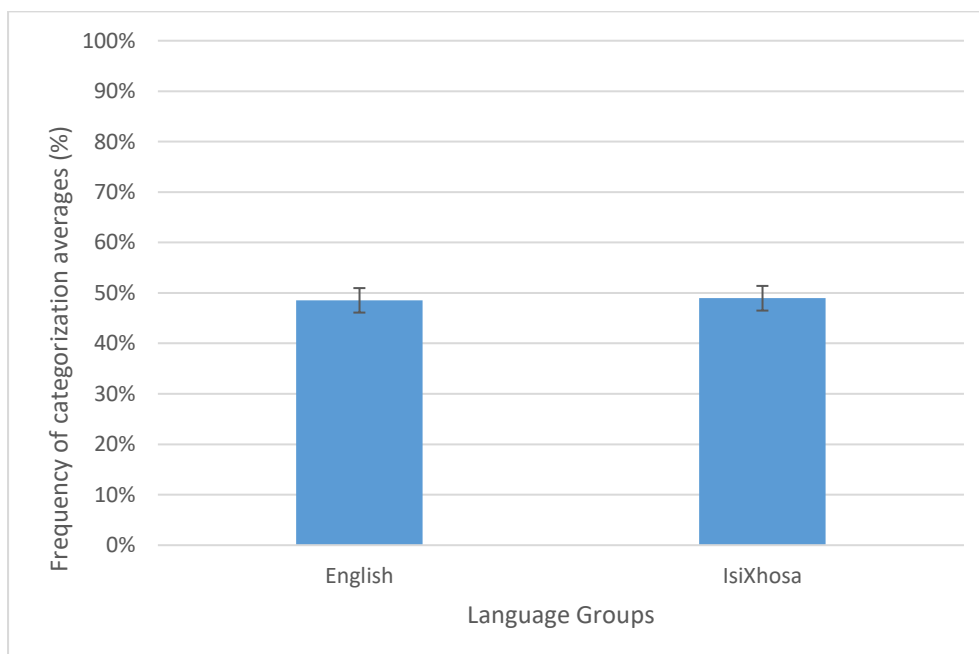


Figure 6: Noun class matches (%) between English and isiXhosa participants in Condition I. Error bars represent standard error of the mean.

An independent *t*-test reveals what could be inferred from a visual inspection of the means and their overlap in terms of variance, namely that there are no significant differences between the isiXhosa participants and the English participants, $t(27) = -0.09, p = 0.93$. In other words, noun class categories seemed to exert no effect on object categorization preferences. These results thus indicate that when faced with the task of discriminating between objects and deciding which objects are more similar to one another, isiXhosa speakers seemingly behaved like English speakers.

The finding that the noun class matches for both groups average at approximately 50% indicates that the design of the triads-matching task must be deemed successful, in the sense that it does not contain any biases. Instead, matching with items belonging to the same noun class occurs at chance level.

Whereas, a matching degree at around 50% could be expected for the English speakers, who do not mark the membership of the test objects in a linguistically systematic way, the same cannot be said for isiXhosa speakers. It is however possible that the matching degrees found among the latter group was due to the fact that the English is present in their everyday lives, exerting an influence in their categorization preferences. In order to find out whether experience with English had any effect on task performance, a series of Pearson correlations were run between categorization behaviour and English language background variables (see Table 6).

Variable	Average	<i>SD</i>
AoA of English (yrs.)	3.6	3.1
English proficiency	4.1	0.9
Frequency of use of English	4.1	1.1

Table 6: Condition 1 participants' AoA of English, English proficiency and frequency of use of English

The first correlation concerned the potential influence of age of English acquisition. Here, a negative relationship was found ($r = .05, p = .9$) (Figure 7). Moreover, a positive uphill correlation ($r = .03, p = .3$) was evident between the noun class matches and English proficiency (Figure 8). Finally, the correlation between noun class matches and the frequency of use of English indicated a positive uphill relationship ($r = .28, p = .4$) (Figure 9). None of these

correlations were consequently statistically significant, showing that there was no measurable effect of English experience on object categorization preferences among the isiXhosa speakers.

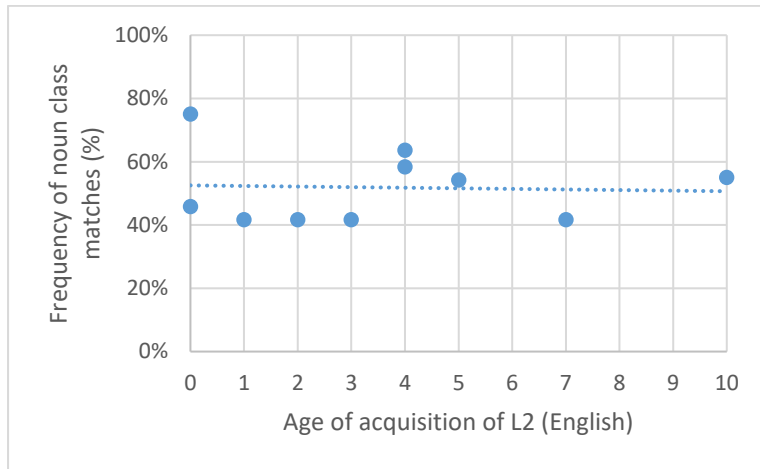


Figure 7: Scatterplot depicting the relationship between age of L2 English acquisition and categorization preference among the isiXhosa participants (Condition I).

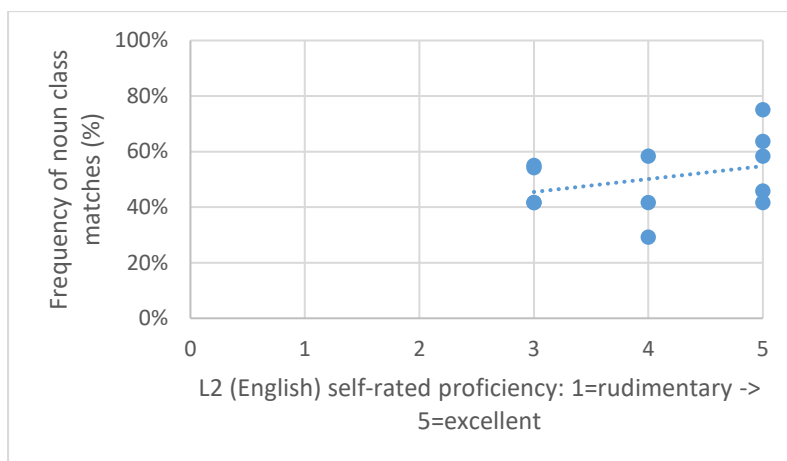


Figure 8: Scatterplot depicting the relationship between L2 English proficiency and categorization preferences among the isiXhosa participants (Condition I).

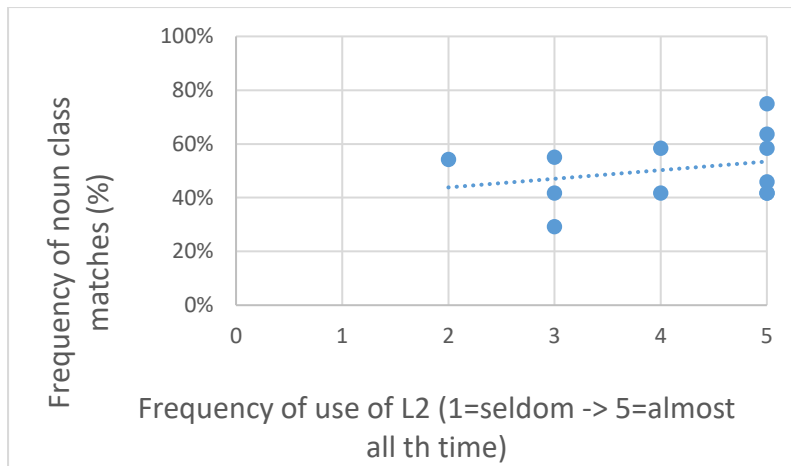


Figure 9: Scatterplot depicting the relationship between frequency of use of L2 English and categorization preferences among the isiXhosa participants (Condition I).

5.1.1. Discussion

The results of the first condition contradicts the claim that the language one speaks may influence one's judgements of object similarity by making prominent grammatical distinctions more "fluent" (Schmitt & Zhang 1998: 119; Hunt & Agnoli 1991: 377 & Casasanto 2008: 65) in a number of ways. A null noun class effect was observed in isiXhosa speakers, as both English and isiXhosa speakers judged objects belonging to the same noun class category similarly. It is thus safe to assume that the language one speaks may not always highlight certain grammatical distinctions and may therefore have no effect on cognitive processes such as categorization. These findings emulate the findings by Saalbach and Imai (2005: 3)⁹, where no classifier effect was observed in Japanese speakers. It was suggested that this could have been because the relation between objects and their classifier categories in Japanese may not have been strong, as classifier categories in Japanese are only realised when the noun is numbered. Although this was the case for the language of that particular study, the same conclusion cannot be maintained for the current study. As mentioned above (in the Literature Review, page 15), isiXhosa noun class categories form the basis of all syntactic structures and are obligatory at all times. There are no instances in which the prefix – and thus noun class category – of the noun does not govern a structure – whether the noun is phonologically realised or not. Therefore, the frequency of use (and experience using) of noun class markers need not be a consideration in this instance, as it can be said with certainty that the noun class system in isiXhosa is productive. However, this finding may be parallel to the findings in Saalbach and Imai (2012: 385), where both Chinese and German speakers did not depend on classifier categories to make relations between objects. It is possible that in the case of Condition I, isiXhosa speakers relied more on thematic, shape or material relations while making their judgements. I would like to point out that some categorical judgements may be related to context and experience; and the individual experiences of the participants must be taken into account¹⁰. It is possible that they may have prevailed over the participants' linguistic experiences, especially in the case of the isiXhosa speakers. These findings also rule out the possibility of noun classes functioning as a 'language as spotlight', where it is proposed that long term experience using language may cause speakers to pay attention to specific properties

⁹ The study by Saalbach & Imai (2005) used slightly differing cues in their task (see page 19).

¹⁰ Since these dimensions (theme, shape, material) were not considered in the current study, these possibilities would have to be addressed with a different stimulus set.

in the world and in turn, show a bias in addressing different aspects of their experience even in non-linguistic contexts (Wolf & Holmes 2011: 259 and Boroditsky 2000: 1).

Here, the suggestion brought forth by the linguistic relativity hypothesis, that thought may be influenced by language, may be also be interpreted in the following way: in the case of these findings, it could be interpreted that language may influence thought in the sense that isiXhosa speakers' categorization preferences indicate that their non-verbal behaviour is mirroring that of the English speakers (Figure 6). In other words, even though a specific effect of isiXhosa is lacking, language might still influence the judgements. This was subsequently addressed through the correlational analysis. The trendline in Figure 6 indicated however virtually no relationship between AoA and isiXhosa speakers' categorization preferences. It is as though the isiXhosa participants in Condition I matched objects belonging to the same noun class 49% of the time by chance, just as the English speakers. Additionally, the linguistic relativity proposals don't seem to account for which language will have an effect on cognitive processes like categorization when there is more than one language at the speaker's disposal. The original idea of linguistic relativity seemingly assumes that the L1 is the language that will influence thought in cognitive processes, but doesn't account for when speakers have more than one L1 or when speakers are highly proficient in and frequently use their L2 - which in this case is English. This is precisely why subsequent researchers (e.g. Bylund, Athanasopoulos, Palvenko, etc.) do research on bilinguals; to add this dimension. Though it is suggested that the language a bilingual is currently operating in may have an effect on his/ her category distinctions (Grosjean 1998: 3), no such effect is observed here. In Kersten et al. (2010) and Boroditsky et al. (2002), an effect for this variable was observed depending on bilinguals' language of testing. Although isiXhosa speakers were tested and instructed in isiXhosa, it remains the result that noun classes exerted null effects on isiXhosa participants' categorization preferences.

In terms of the label-feedback hypothesis, the findings in Condition I do not correlate with the suggestions made by the hypothesis in Lupyan's (2012:6) proposed PCA. In Condition I, the object names are provided by the model (and thus the participants) in response to a given stimulus (i.e. the objects). Once the participant has retrieved the object label, he or she is now able to label the object and therefore make a category distinction, as Lupyan (2012: 1) suggests that labels play an active part in the process of categorization. Although, in the case of isiXhosa, with noun class prefixes being bound morphemes and with unclear/ overlapping semantic distinctions, they may be considered as partial labels, which the label-feedback hypothesis does not account for. These findings could possibly suggest the non-prominence of these partial

labels, in that they do not seem to be accessed, thus giving rise to the null effect. However, in the case of first having to retrieve partial labels with no clear semantic bearing before making object similarity judgements could be support to this condition having null noun class effects. In a ‘conventional’ system, where object labels represent whole categories (for example the label ‘chair’ referring to the category of chairs) it may be somewhat easier for the module to retrieve a label, based on the input received by the perceptual layer and for the verbal layer to modulate perceptual representations through top-down feedback and thus easier to make category distinctions. If isiXhosa was such a case, there may have been a slightly higher noun class match score for all the participants. In the case of isiXhosa and the South African multilingual context, partial labels can also mean the same noun can be present in more than one category, depending on which language the (bi-/multilingual) module has selected its label from. I assume that the labels Lupyan (2012) refers to are selected from a ‘monolingual module’ and therefore some of the claims made may not be generalisable. I suspect that because isiXhosa’s noun class categories are not a conventional system – as described above – it may be slightly problematic to firstly, select ‘obvious’ object labels and secondly, to then rely on these object labels to make categorical distinctions. The way object names are structures in isiXhosa could in itself be seen as a down-regulation for the module and thus object label selection may be deferred.

Condition II was therefore aimed at increasing the presence of (partial) labels in the experiment with the intention to see whether this would make the isiXhosa participants more likely to draw on noun class distinctions when judging object similarity.

5.2. Condition II: Priming Condition

Results

In order to increase the likelihood of obtaining cross-linguistic differences between isiXhosa speakers and English speakers, participants in Condition II were first exposed to the labels of the objects before they carried out the categorization, as a means of priming (for details, see section 4.5.). This manipulation yielded the following results: the isiXhosa-speaking participants frequently categorised objects belonging to the same noun class category at an average of 51% ($SD\ 22.50$), while the English-speaking participants obtained an average of 55% ($SD\ 10.52$). This result is shown in Figure 10.

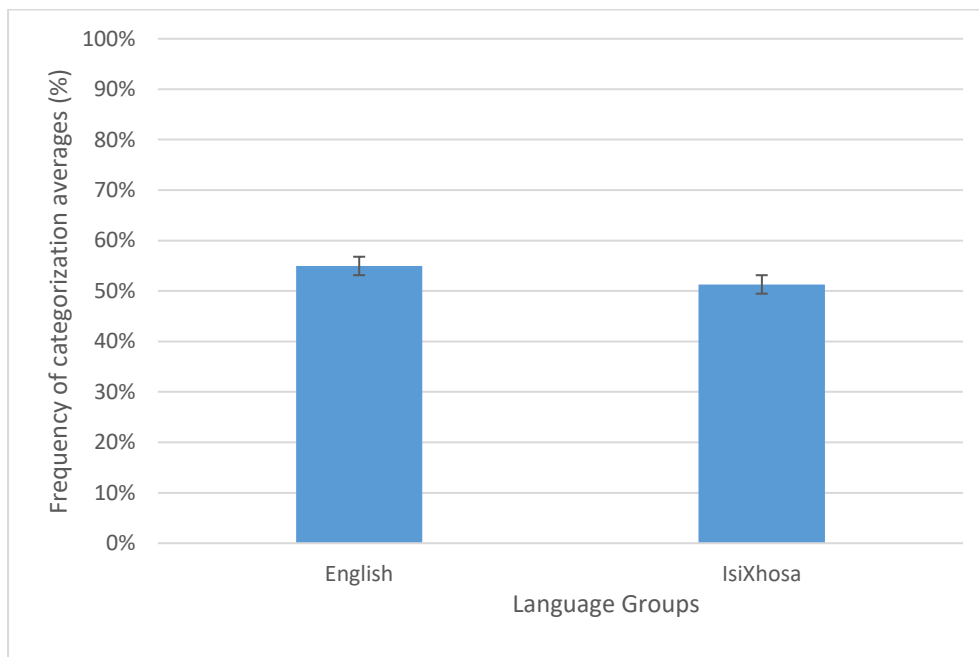


Figure 10: Noun class matches (%) between English and isiXhosa participants in Condition II. Error bars represent standard error of the mean.

An independent t -test reveals that there are no significant differences between the isiXhosa participants and the English participants, $t(21) = 0.59$, $p = 0.56$. This shows that when faced with the task of discriminating between objects and deciding which objects are more or less similar to one another, isiXhosa speakers and English speakers are equally likely to classify objects belonging to the same noun class as similar. Again, the averages of both groups landed

at around 50%, suggesting that the matching on the basis of noun class membership occurs randomly.

The finding that the noun class matches for both groups average at approximately 50 in the triads-matching task not contain any biases and that matching with items belonging to the same noun class occurs at chance level. In Condition II, a matching degree at around 50% could also be anticipated for the English speakers. It is possible in Condition II that the matching degrees found among the isiXhosa speakers were, similarly to Condition I, because of the fact that English is present in their daily lives, having an effect on their categorization preferences. In order to find out whether experience with English had any effect on task performance, a series of Pearson correlations were run between categorization behaviour and English language background variables (see Table 7).

Variable	Average	<i>SD</i>
AoA of English (yrs.)	5.3	2.1
English proficiency	4	0.7
Frequency of use of English	4.7	0.5

Table 7: Table: Condition II participants' AoA of English, English proficiency and frequency of use of English

The correlation test between the isiXhosa speakers' categorization frequencies and AoA of English yielded a positive uphill relationship, $r = .18$, $p = .6$ (Figure 11). A negative relationship was indicated in the correlation between isiXhosa speaker's noun class matches and English proficiency, $r = -.28$, $p = .3$ (Figure 12). Additionally, the correlation between frequency of use of English and isiXhosa speakers' noun class matches revealed a negative downhill relation ($r = -.05$, $p = .9$) (Figure 13). As in Condition I, none of these correlations were statistically significant.

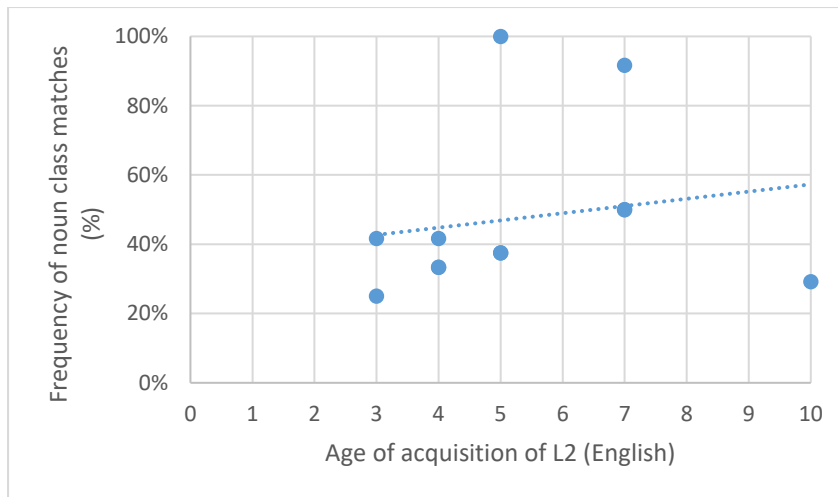


Figure 11: Scatterplot depicting the relationship between age of L2 English acquisition and categorization preferences among the isiXhosa participants (Condition II).

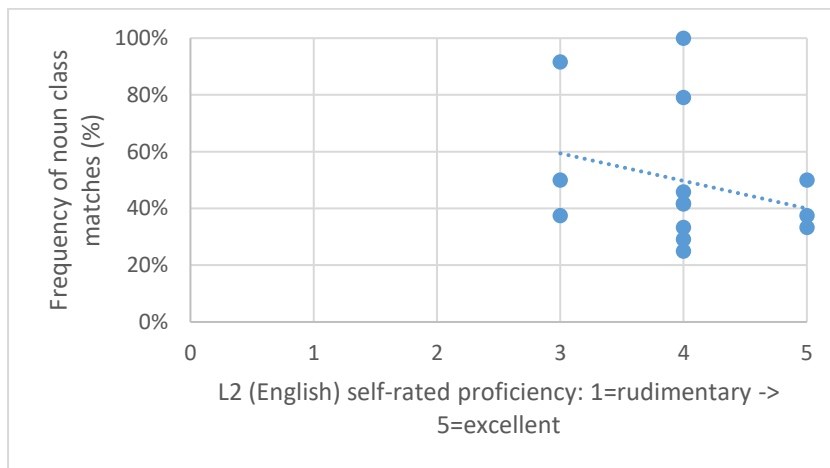


Figure 12: Scatterplot depicting the relationship between L2 (English) proficiency and categorization preferences among the isiXhosa participants (Condition II).

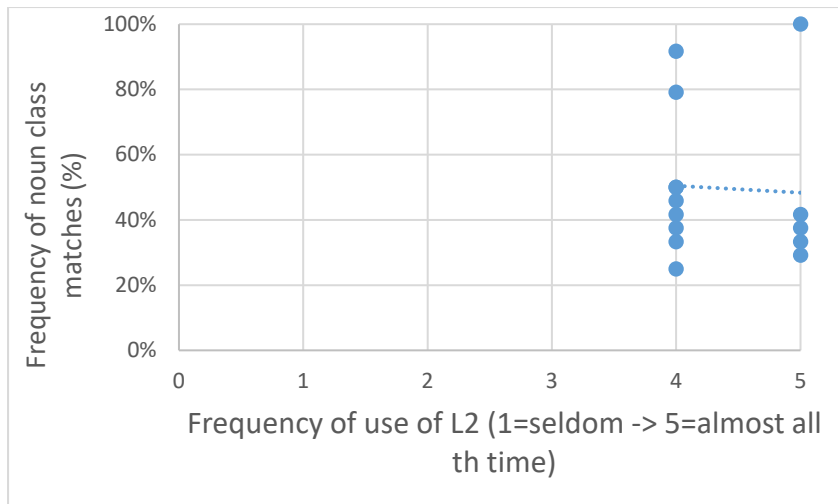


Figure 13: Scatterplot depicting the relationship between frequency of use of L2 English and categorization preferences among the isiXhosa participants (Condition II).

5.2.1. Discussion

The results in Condition II also disconfirm the hypothesis that speakers of noun class languages will rely on noun class categories in category formation and similarity judgement tasks. In fact, the isiXhosa speakers obtained a lower noun class match average than the English speakers. Though there was a slight difference between the two groups, the effect observed was small and by chance from a statistical viewpoint, as previously mentioned. Taken together then, evidence from Conditions I and II seemingly points to the idea that nominal classification effects cannot be generalised to all languages with nominal classification systems.

Apart from these findings not providing evidence for the Whorfian hypothesis, they also question whether isiXhosa speakers' conceptual structures are different from English speakers' conceptual structures at all. According to the correlation test in condition II (Figure 12), isiXhosa speakers use English as a frequent means of communication (all rating themselves with either a 4 or a 5) and this is evident in their noun class match average being lower than English speakers'. The isiXhosa speakers' L2 English proficiency's relationship with categorization preferences was non-significant (Figure 11), although the trendline indicates that the more proficient isiXhosa speakers were in the L2, the less categorical matches they made. This may illustrate that their high L2 English proficiency may have had a slight influence on their categorization preferences. The isiXhosa speakers' high L2 English proficiency is also an indicator of their early AoA, which in this case had a non-significant, but apparent, relationship with the isiXhosa speakers' categorization preferences. The trendline indicates that the earlier the isiXhosa speakers acquired their English L2, the less they perceived objects belonging to the same noun class as similar. It is apparent then that L2 speakers' knowledge of their L1 may be subjected to influence of their L2 Pavlenko (2005: 437). Again, the question of which language makes grammatical distinctions more fluent (in a speaker comfortably and frequently using a language which has a structure that is contradictory with the supposed L1) is raised. isiXhosa speakers in this condition were also tested and instructed in isiXhosa (as in Condition I), however, no effect was observed for this variable. It is thus evident, in this case, that when it comes to perceived object similarity judgements, isiXhosa speakers unexpectedly behaved more like English speakers than in Condition I, even though participants were primed with object names. As in Condition I, effects for the 'language as spotlight' are not observed.

Saalbach and Imai (2012: 421) make an interesting suggestion that classifier-object relations may be weaker than thematic or taxonomic relations and this too, may be the case in terms of

noun class-object relations. This may substantiate the findings in both Conditions I and II of the current study, as the nouns themselves, rather than the noun class, prompt more than one semantic characteristic. This observation, again, allows one to take into account more than a speaker's linguistic experience. Some speakers may make relations between a chair and a shoe (isitulo – isihlangu; both noun class 7) based on one speaker's reality that we wear shoes when we go to school and sit on chairs at school or between a shoe and a tree (isitulo; noun class 7 – umthi; noun class 3) based on another type of reality where we wear shoes when we go to school, which is given under a tree. Or, some speakers may relate a key and shoe (isitshixo – isihlangu; both noun class 7) based on the idea that in the event of needing to kick down a locked door, it would be advisable to wear shoes or between a key and a tree (isitshixo; noun class 7 – umthi; noun class 3) based on an alternative experience that we use keys to unlock doors made of wood and therefore trees¹¹. These distinctions may also hold for English speakers. It could also be that the object characteristics related to a specific noun class are inhibited, as suggested by Saalbach and Imai (2012: 421) for classifier languages, therefore not allowing speakers sufficient time to process classifier relations (as described in Condition I).

With regards to the label-feedback hypothesis, Condition II reflects the disconnected labels model (4B) in Lupyan's (2012) PCA described above. Although the participants were primed to upregulate their label production and thus could be expected to make more precise category distinctions (compared to Condition I), the results in Condition II were not in support of the hypothesis that category structures are enhanced when labels are activated by the network and can therefore feed back onto the perceptual layer (Lupyan 2012: 5). Because the connection between the label and hidden layers is not active, the model is therefore reliant on object dissimilarities observed in the perceptual layer. This may mean that because the participants were initially presented with the object labels, they may have focused more on the objects' perceptual features and thus the differences in those perceptual features instead of the object labels together with the perceptual features. This could suggest that during the triads-matching task, isiXhosa speakers may not have been able to make obvious distinctions between the two categories the objects belonged to.

Even though it is suggested by Lupyan (2012: 2) that long term experience using language is said to progressively warp perceptual representations and that this may result in items sharing the same labels being perceived as more similar and others not sharing the same labels being

¹¹ Though this claim is a generalisation, it is one which tries to illustrate more than one experience with everyday objects.

perceived as dissimilar. This brings us back to the point of isiXhosa noun classes (and thus noun prefixes) being referred to as partial labels. In languages like English, when referring to the category of chairs using the label ‘chair’ and seeing a prototypical representation of what chairs are, it may be slightly simpler to distinguish chairs from cars. But in the case of isiXhosa, where the noun *isitulo* (chair) belongs to a large and diverse category (noun class 7) including objects like *isonka* (bread) and *isilamba* (jacket), identifying the objects as part of the larger and diverse category takes more than realising the perceptual features of the objects as they are completely dissimilar. As I have mentioned above, the label feed-back hypothesis accounts for ‘whole’ object labels rather than alternate object label types such as the ones in isiXhosa. This may be slightly problematic, as it doesn’t allow for the same kind of assessment as one would find when assessing a task involving ‘whole’ labels with objects belonging to categories with actual prototypes.

To maximise the chances of finding an effect of the kind of label afforded by isiXhosa noun classes, Condition III thus augmented even further the presence of labels in the triads-matching task.

5.3. Condition III: Label Condition

Results

In this condition, the objects were presented side by side with their respective labels (for details, see section 4.5.). After examining the patterns of all the participants in the label condition, it was found that isiXhosa participants matched nouns belonging to the same noun class category at an average of 55% (SD 18.79); and the English-speaking participants at an average of 48% (SD 8.53) (Figure 14). At a statistical-descriptive level, isiXhosa speakers were more likely to classify objects belonging to the same noun class as similar when compared to English speakers and when the object labels are present.

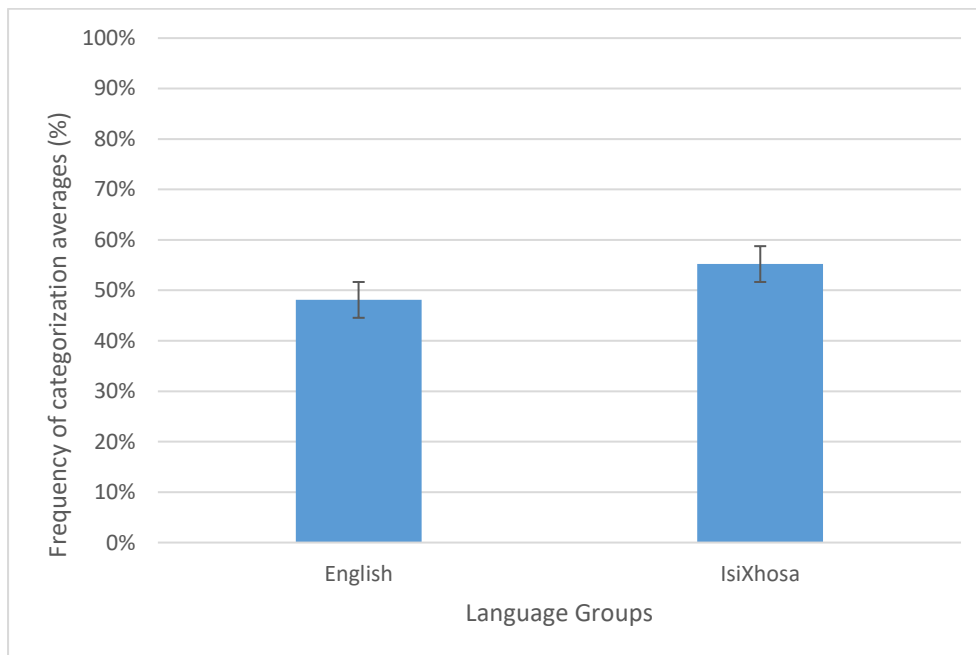


Figure 14: Noun class matches (%) between English and IsiXhosa participants in Condition III. Error bars represent standard error of the mean.

An independent t -test reveals that there are no significant differences between the isiXhosa participants and the English participants, $t(21) = -1.37$, $p = 0.19$. This shows, again, that when faced with the task of discriminating between objects and deciding which objects share noun class membership, the difference between the two groups is insignificant. In Condition III, a matching degree at around 50% could also be predicted for the English speakers. It is possible in Condition III that the matching degrees found among the isiXhosa speakers were because of

the fact that these participants acquired English as an L2 at a later stage as compared to the participants in Conditions I and II. And as a result, they may be slightly less proficient at English despite their self-reported ratings and despite them being frequent users of English. In order to find out whether experience with English had any effect on task performance, a series of Pearson correlations were run between categorization behaviour and English language background variables (see Table 8).

Variable	Average	<i>SD</i>
AoA of English (yrs.)	6.9	2.6
English proficiency	4.1	0.6
Frequency of use of English	5	0.8

Table 8: Condition III participants' AoA of English, English proficiency and frequency of use of English

In condition III, the correlation tests revealed the following: a negative correlation ($r = -.72$, $p = .8$) between the AoA of English and the speakers' noun class matches (Figure 15); a negative, and notably significant, correlation ($r = .64$, $p = .02$) between English proficiency and speakers' noun class matches (Figure 16), thus suggesting that the more proficient the isiXhosa speakers were in English, the less likely they were to match objects on the basis of noun class membership. A visual inspection of the scatterplot depicting this correlation does not reveal any obvious outliers, thus suggesting that the correlation is genuine. Though the correlation between L2 English proficiency and noun class matches proved to be significant, the negative correlation ($r = -.23$, $p = .5$) between noun class matches and frequency of use of English (Figure 17) was found to be statistically insignificant, thus finding no effect for this variable.

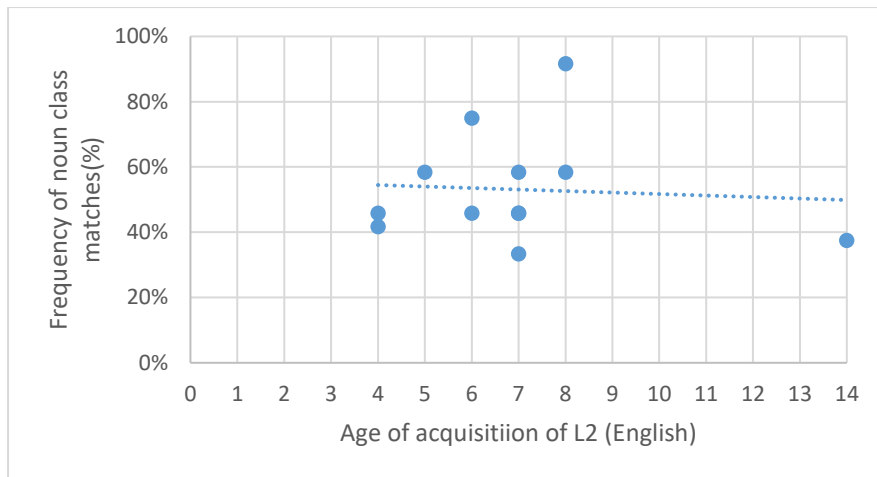


Figure 15: Scatterplot depicting the relationship between age of L2 English acquisition and categorization preferences among the isiXhosa participants (Condition III).

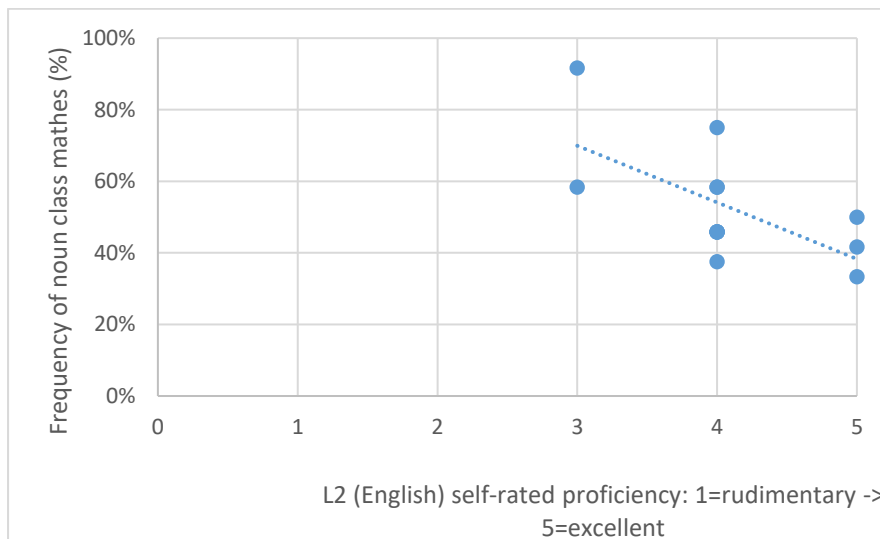


Figure 16: Scatterplot depicting the relationship between L2 English proficiency and categorization preferences among the isiXhosa participants (Condition III).

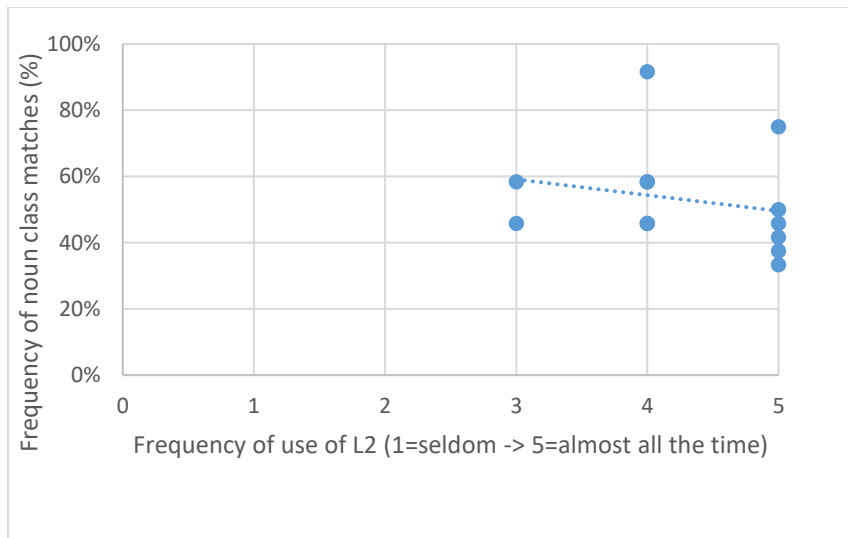


Figure 17: Scatterplot depicting the relationship between frequency of use of L2 English and categorization preferences among the isiXhosa participants (Condition III).

5.3.1. Discussion

The results in Condition III, as in Conditions I and II, do not provide evidence for the proposal that speakers of different languages may have slightly differing dissections of the world, in this case in perceived object similarity, as a result of the differing grammars of the languages they speak. A null noun class effect was observed in isiXhosa speakers, as the differences between the English speakers and the isiXhosa speakers were non-significant. The null effect demonstrates that language may not have a role to play in influencing cognitive tasks such as categorization and perceived object similarity and may not provide a source of information that will organise reality into categories meaningful to the speaker of a particular language. In terms of ‘language as spotlight’, whereby long-term experience using language may cause one to pay direct attention to specific properties in the physical world, the current findings disprove the proposal as speakers’ linguistic experience with language (isiXhosa) and long-term warping still had no effect.

According to Lupyan’s (2015: 5) proposed PCA (Figure 4C), when the subject is confronted with both the object and object label, object categorisation is dependent on the subject being able to identify similarities (or dissimilarities) between what could be considered category prototypes and the presence of object labels facilitates this process. In Vigliocco’s (2005: 510) pictorial judgement task, where effects observed in a previous experiment were tested to examine whether they were label-dependent and whether they would be apparent when the task

was only dependent on conceptual knowledge, no grammatical gender effects were found in Italian speakers. In the case of Condition III of the current study, speakers were presented with object labels as a form of warping or training in order to facilitate the process of category formation and enhance differences between categories. While training, the model is suggested to acquire label production and comprehension (Lupyan 2012: 5). Compared to Conditions I and II, the results yielded by Condition III still do not provide support for the label-feedback hypothesis in that, when the object labels are present, the difference between isiXhosa speakers and English speakers is not significant.

The label-feedback hypothesis makes claims about objects sharing the same labels being perceived as more similar and those not sharing the same label being perceived as dissimilar. In an ideal situation, isiXhosa speakers would all match items belonging to the same noun class in every trial in Condition III, since the model acquires label production and comprehension over long-term training and experience using the labels. Having the labels present should up-regulate label production and thus further facilitate category formation. Something worth considering is that if the presence of labels (and therefore language) facilitates category formation, which is a cognitive process, then surely partially matching labels forming part of what is described as a full label (Lupyan 2012) presented to speakers highly proficient and functional in a non-noun class language must raise some questions about how these speakers form categories mirroring one language while navigating the world with two (or more) languages daily. The proposed label-feedback hypothesis makes it difficult to account for these types of speakers, as they may not be consistently inclined to performing cognitive tasks in one language more than the other. So, for example, the assumption that colours sharing the same label may be perceived as more similar and those sharing a different label may be perceived as dissimilar is not, in this case, generalisable to domains like object perception because noun class categories do not have prototypes which can be moved away from or gravitated towards category boundaries, as explained in section 5.1.1. Although there is some semantic coherence, objects included in the same noun class categories cut across many taxonomic, theme, shape and colour boundaries and the little semantic coherence present still does not facilitate speakers in distinguishing between and more importantly, establishing category members.

Though, previous studies focusing on bilinguals propose observing speakers' linguistic backgrounds, as some variables, such as acquiring an L2 at an early stage and thus frequently using it may provide an explanation for null effects of certain linguistic categories; such as noun class categories in this case. Correlations revealed that participants Age of Acquisition

and the frequent use of their L2 English had no effect on the isiXhosa speakers' categorization preferences. The only correlation where an effect was observed between isiXhosa speakers' noun class matches and their L2 English proficiency. It appears that the more proficient isiXhosa speakers are in English, the less likely they will be to match objects belonging to the same noun class. As suggested by (Bylund & Athanasopoulos 2014: 968), acquiring semantic properties specific to the L2 may influence some cognitive changes in an L2 speaker. Therefore, this warrants the expectation that high proficiency in the L2 will cause cognitive restructuring in the L2 speaker.

5.3.2. General Discussion

The aim of the current study was to provide preliminary findings in the under-researched domain of noun class systems and perceived object similarity. In light of proposals made in linguistic relativity, Saalbach and Imai (2005: 1) ask the question of whether classifier categories play a vital role in forming general conceptualisations in speakers of languages with classifier systems. In response to this, Schmitt and Zhang (1998: 108) make a claim that speakers of languages with overt nominal classification systems may make object classifications and categorizations based on the categorization structures inherent in their language. In applying this view to English and isiXhosa, where the former language does not have an explicit nominal classification system and the latter does, it was thus fitting to test the hypothesis that English and isiXhosa speakers will produce results which indicate cross-linguistic differences in object similarity as a result of their different nominal classification systems. More specifically, the study sought to test whether isiXhosa speakers would be more likely to perceive objects as more similar when they belong to the same noun class category. By tailoring the study in a way which encompassed test conditions that would make noun class categories more (or less) explicit, the current study also seeks to test the label-feedback hypothesis. The label-feedback hypothesis claims that labelling objects may have prevalent effects on cognitive processes such as categorization (Lupyan 2012: 1). It is also suggested that object labels actively play a role in categorization and perception, as perceptual features are activated to represent the category being referred to or being named (Lupyan 2012: 4). The label-feedback hypothesis therefore aims to account for how, rather than whether or not, a cognitive process such as categorisation occurs.

Overall, I argue that the findings in the current study have provided little to no evidence for the hypotheses under investigation perhaps because the hypotheses, and thus the study design, are based on notions and findings from studies where participants may not be functionally bilingual or bilingual at all. The research available on bilinguals (e.g. Athanasopoulos 2006, Athanasopoulos & Kasai 2008 etc.) may try to add and address these extra dimensions, but in the South African context it is not easy to quantify and define factors such as length of stay in an L2 context or acquisition of L2 context, for example, as bi-/monolingual communities live among one another and speakers acquire multilingual proficiency from birth in most cases. As factors influencing cognitive restructuring in the L2 in some cases rely on one another, difficulty in defining and quantifying some leaves the rest undefinable and unquantifiable, too. For example, if it is not easy to define language contact in South African context, then, to a larger extent, it may be difficult to define bilingual language mode, as South Africans may speak more than one language in every utterance on a single day, both code-switching and code-mixing effortlessly between them. Though, possible effects of factors (such as L2 English age of acquisition, L2 English proficiency and frequency of use of L2 English) that could have influenced cognitive restructuring in the isiXhosa speakers were not observed across all the conditions. The only effect found to have an influence on isiXhosa speakers' categorization preferences was that of L2 English proficiency in Condition III. The higher the participants' proficiency, the less they perceived objects belonging to the same noun class as similar. This finding illustrates the proposal that a higher proficiency in the L2 may encourage some cognitive restructuring in the L2 (Bylund & Athanasopoulos 2014: 969). In terms of the speakers' knowledge about the linguistic attribute under investigation having the same effect, the same could be said for the inverse. In the case of English, there is no overt nominal classification system, therefore, the less a speakers' underlying knowledge is in terms of noun class categories, the less they would be expected to rely on noun class categories when making categorical distinctions in cases of perceived object similarity.

Therefore, another interpretation regarding the current findings is that noun class categories simply have no effect (across Conditions I, II and III), at least not in the isiXhosa speakers investigated in the current thesis. Again, I propose that this may be because isiXhosa speakers are functionally bilingual (isiXhosa L1, English L2/ isiXhosa L1, English L1) speakers who navigate the world in English in many cases more than in isiXhosa because of the way languages are socially structured in the South African multilingual context; despite the self-reported frequency of use of L2 English which may have had an effect on the non-significant

correlation between frequency of use of L2 English and participants' noun class matches across all three conditions.

Specifically, regarding the linguistic relativity proposal as 'language as spotlight', however, if applied to bilingual speakers and their L2, given the findings of the current study, there may be some evidence for the proposal as some isiXhosa speakers may make categorical distinctions not based on noun class categories and thus portraying English native-like behaviour. Bylund and Athanasopoulos (2014: 969) also suggest that categorization preferences can also be based on L1 attrition, where the ability to recall L1 lexical labels is reduced and is aligned with weak categorical awareness in the case of noun class categories, especially considering Conditions I and II (no labels during the triads-matching task). The null noun class effect could be as a result of partial labels being too weak while also competing with full labels from an L2 which doesn't mark nouns and which participants are fluent in. Even when the labels were present, as in Condition III, as previously mentioned, the label-feedback hypothesis presented by Lupyan (2012) seemingly only caters for whole label type of labels which explicitly indicate group membership, rather than the partial labels found in isiXhosa. Because the partial labels are not semantically based (at least not transparently), it may be harder for isiXhosa speakers to decide on which objects belong match based on object labels. Partial labels may be seen as a kind of down-regulation during the process of category formation. In English, one object name refers to one object. Regardless of there being prototypical and non-prototypical examples of that object (i.e. "chair" refers to chair even when the actual chair does not look like a traditional chair), it is still sufficient to identify it as belonging to the category of chairs. While in isiXhosa, "isi-" (noun class 7), for example, is meaningless without the noun stem, suggesting that "isi-" is not sufficient to refer to a specific object in the category of noun class 7. The same can be said for all nouns in isiXhosa across all the noun classes. The idea of partial labels, upon observation of previous research referred to throughout the thesis, has not been dealt with, as the languages in the previous studies are commonly Indo-European and use different nominal classification systems as compared to isiXhosa. Noun classes and noun structure in isiXhosa therefore challenge the traditional understanding of what is meant by 'label' and when something can be considered a label and when it cannot.

6. Conclusion

The current chapter summarizes the results obtained in this study, as well as reports the limitations of the study in terms of materials and participants. The chapter also makes recommendations for future studies of this nature.

6.1. Summary of Results

The study aimed to investigate perceived object similarity in English speakers and isiXhosa speakers residing in Port Elizabeth, in the Eastern Cape. Specifically, the study examined whether isiXhosa speakers perceived objects belonging to the same noun class category as more (or less) similar. In order to achieve this, the study made use of methods typically used in studies of perceived object similarity, such as a similarity judgement triads-matching task. The background questionnaire participants were required to fill out gathered information such as L2 AoA, (L2) language proficiency as well as frequency of use of languages at the participants' disposal.

Overall, the results reveal that noun class categories do not have an effect on isiXhosa speaker's categorization preferences and this could be due to a number of factors. Firstly, participants were self-reportedly proficient bi-/multilingual speakers of isiXhosa and English, which does not make use of an overt nominal classification system. Previous studies indicate that the acquisition of an L2, especially within close chronological proximity to L1 AoA, may have an effect on speakers' cognitive behaviour in tasks such as categorical judgements. L2 language proficiency may have been another factor which may have brought about this result, as participants across all three conditions indicated a high English L2 proficiency. However, the only factor which illustrated a significant effect, if at all, on the categorization preferences was the L2 English proficiency for the isiXhosa speakers in Condition III. The conditions set out to test the label-feedback hypothesis yielded no significant differences between the participants across the conditions, and this may have been as a result of types of labels isiXhosa object names are – 'partial' labels instead of 'whole' labels the hypothesis may be referring to. Noun classes and the structure of the noun in isiXhosa may go against the traditional understanding of what is meant by 'label' and when something can be considered a label and when it cannot.

6.2. Limitations of Study

6.2.1. Materials

6.2.1.1. Triads-Matching Task

The study made use of a triads-matching task, which is typically considered reliable for similarity judgement tasks and the study thus made use of it with the intention that it is reliable. One limitation of this task (specifically considering the test items for observing perceived object similarity in isiXhosa speakers) was that many of the items included in the study were generally sourced from the same noun classes. This was not by choice, but many items that could have been excellent test items consist of (when drawn/ visually represented) of more than one noun for the most accurate representation (e. g. *ukutya* - food (noun class 15): different food items, plate, perhaps a spoon/fork). Good test items were also very abstract and therefore could not be visually represented in an accurate way (e.g. *umstható* – wedding (noun class 3)). For this reason, the noun classes the items belonged to weren't as diverse as they could have been under the circumstances.

6.2.1.2. Background Questionnaire

The use of a self-reported background questionnaire also posed some issues. Participants' self-rating of variables such as language proficiency and frequency of use of a language, for example, are some of them. It is difficult to know the exact amount of time a participant has in contact with a language/ one uses a language and give it a value, especially in a multilingual context where speakers don't only know and use two or more languages, but also use and know languages which are mutually intelligible. It is also problematic assigning a value to language proficiency as there are several factors which may need to be considered and are generally not. When it comes to the L1, some speakers may be fluent only in speech production and reception, but not writing and reading, for example. When it comes to the L2/L3/L4, some people may be only be fluent in speech reception and writing/ reading, but not production and so on.

6.3. Recommendations

Past psycholinguistic studies have generally focused on the Western context. However, established theories from that context (such as the principle of linguistic relativity or the label feedback-hypothesis) and definitions (as points of departure) applied in the African context, are not always applicable and may be "theoretically misleading" (Banda 2009: 5). This is

probably the case whenever a study is replicated, as no context will be like another, but, linguistically, Africa is intricate and diverse (see Banda 2009). Bilingualism and multilingualism are commonly said to be the norm in Africa (Banda 2009: 5), therefore it is vital to re-evaluate and re-define concepts (such as mono-/ bi-/ multilingualism, language contact, age of acquisition, language proficiency etc.) central to psycholinguistic research if need be. Though, this illustrates the point that research in different kinds of contexts is what aids the development, redevelopment and re-establishment of circulating theories and hypotheses. The current study therefore highlights phenomena and concepts which were once thought to be straightforward for the complexities they really are.

The participant sample size per condition was not large enough therefore a larger sample size may be needed to retest the findings of the current study and/or achieve greater statistical power and thus increase the chances of finding a noun class effect. Thirdly, if the budget allows, it may be less problematic to use a computer to do the task on. This way, there will be less room for error when transferring data to capture it electronically and issues of pages sticking together, or participants not completing all the triads may be avoided.

6.4. Strengths of the current study

One of the study's main strengths is its contribution to a field still dominated by Eurocentric points of view, by taking theories and hypotheses conceptualised for the Western context in the Western context and attempting to apply them to an intricately multilingual and multicultural South African context. Additionally, other studies, not necessarily psycholinguistic in nature, conducted on isiXhosa and other Bantu languages alike are also typically conducted by non-native speakers. Native speaker intuition in a study conducted on an under-researched language plays an important role, as native speakers may have insights that non-native speakers may not have just by virtue of interacting with the language at a more advanced level for a longer period of time. Overall, the study may have opened a gateway in an area of psycholinguistics as well as isiXhosa noun classes which is only beginning to be explored.

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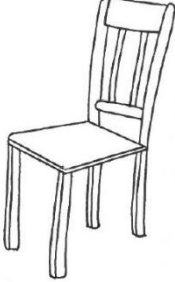
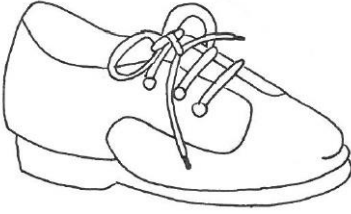

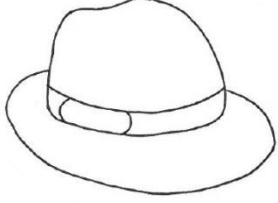
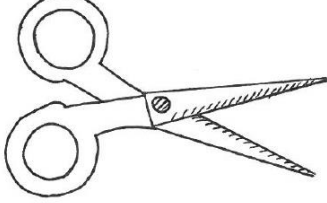
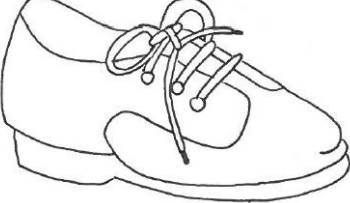
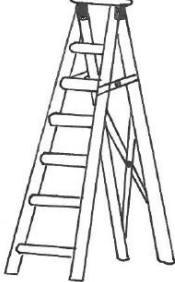



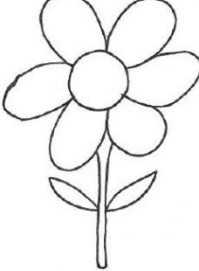

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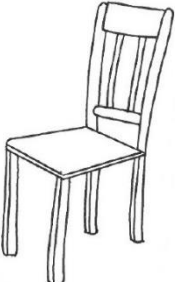
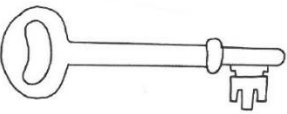

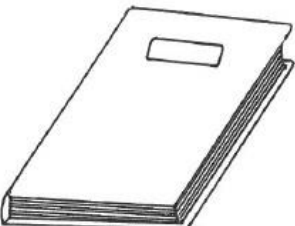
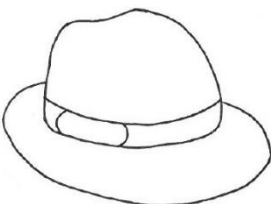
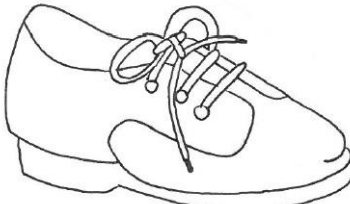
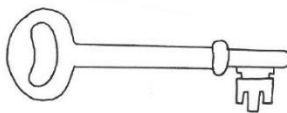

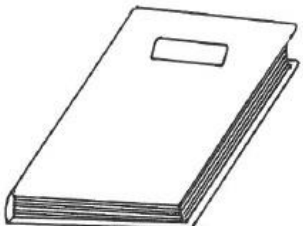

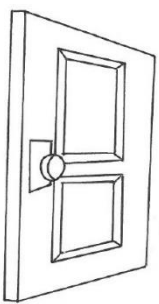



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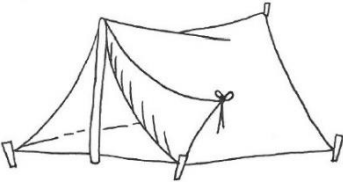
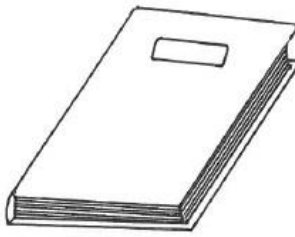
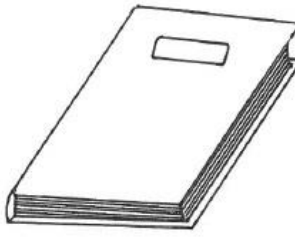
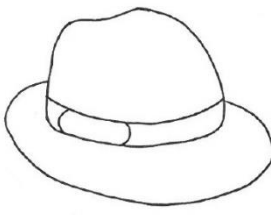

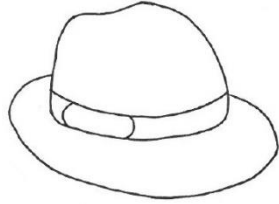

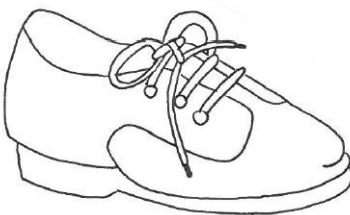
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8. Addendum I

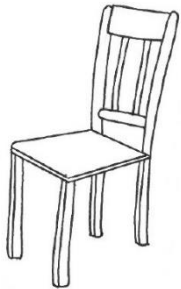
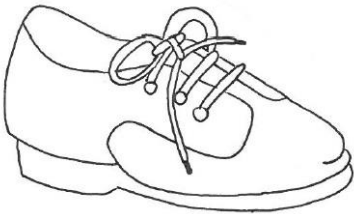

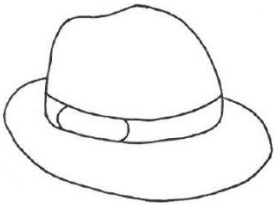
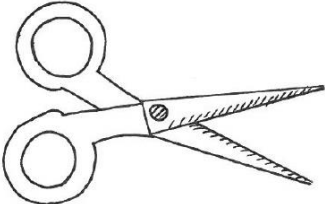
8.1. Condition I: No Label Condition

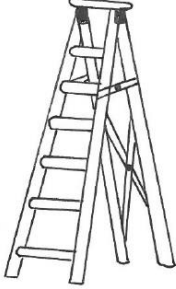


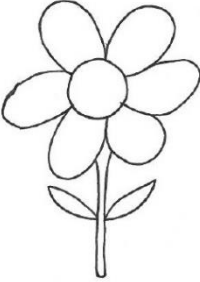
TRIAL	A	X	B
1			
2			
3			
4			


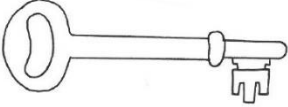

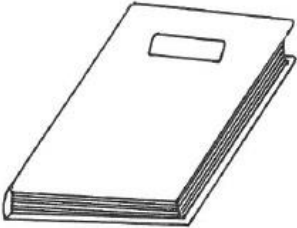

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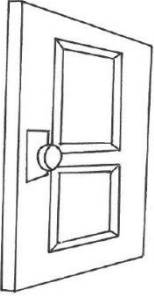

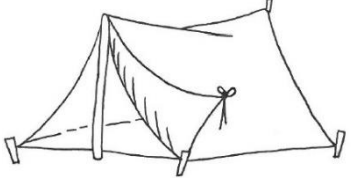
10			
11			
12			

8.2. Condition II: Priming Condition

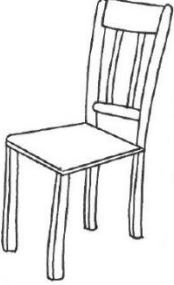
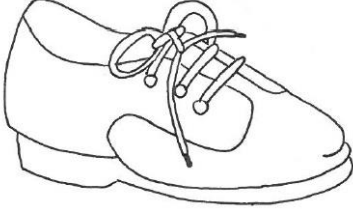
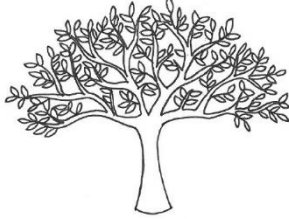
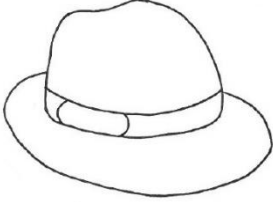
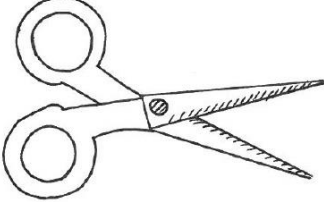
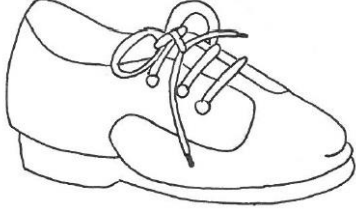
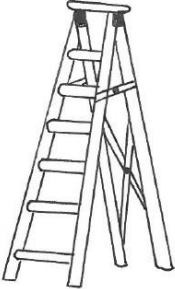


Page	Object
1	 <p>Isitulo/ Chair</p>
2	 <p>Isihlangu/ Shoe</p>
3	 <p>Umthi/ Tree</p>
4	 <p>Umnqwazi/ Hat</p>
5	 <p>Isikere/ Scissors</p>


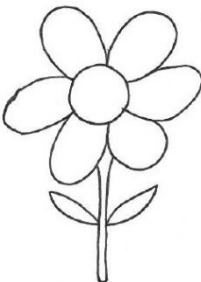


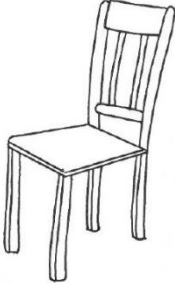
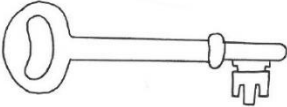

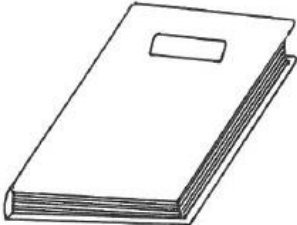
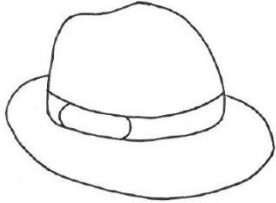
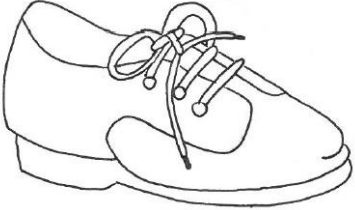
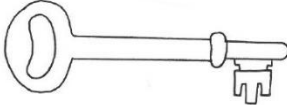

6	 <p>Ileri/ ladder</p>
7	 <p>Umpu/ Gun</p>
8	 <p>Umtshayelo/ Broom</p>
9	 <p>Inja/ Dog</p>
10	 <p>Intyatyambo/ Flower</p>

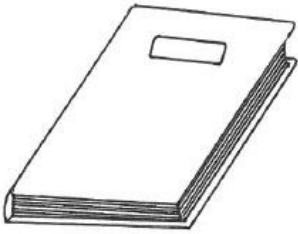
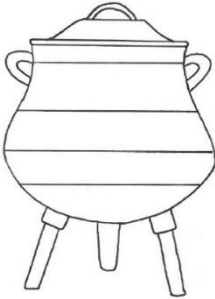
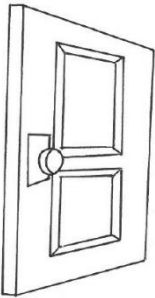

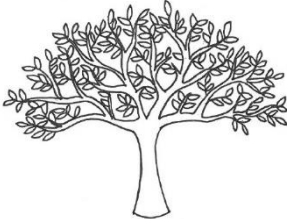


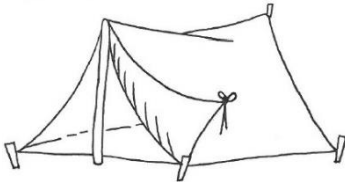
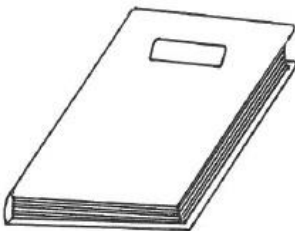
11	 <p>Umnwe/ Finger</p>
12	 <p>Isitshixo/ Key</p>
13	 <p>Indlu/ House</p>
14	 <p>Incwadi/ Book</p>
15	 <p>Imbiza/ Pot</p>

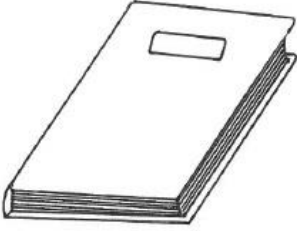
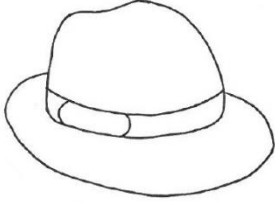
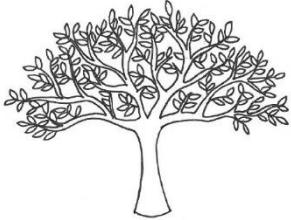
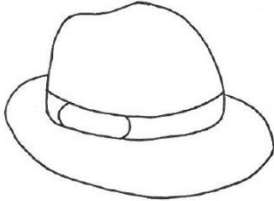

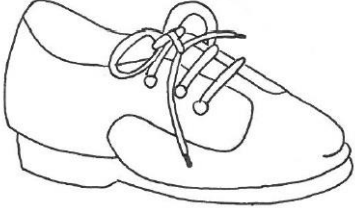
16	 <p data-bbox="300 510 470 544">Ucango/ Door</p>
17	 <p data-bbox="300 808 502 842">Ikomityi/ Teacup</p>
18	 <p data-bbox="300 1088 464 1122">Intente/ Tent</p>

8.3. Condition III: Label Condition

TRIAL	A	X	B
1	 <p>Isitulo / Chair</p>	 <p>Isihlangu/ Shoe</p>	 <p>Umthi/ Tree</p>
2	 <p>Umnqwazi/ Hat</p>	 <p>Isikere/ Scissors</p>	 <p>Isihlangu/ Shoe</p>
3	 <p>Ileri/ Ladder</p>	 <p>Umpu/ Gun</p>	 <p>Umtshayelo/ Broom</p>

4	 <p>Inja/ Dog</p>	 <p>Intyatyambo/ Flower</p>	 <p>Umnwe/ Finger</p>
5	 <p>Umtshayelo/ Broom</p>	 <p>Isitulo/ Chair</p>	 <p>Isitshixo/ Key</p>
6	 <p>Indlu/ House</p>	 <p>Incwadi/ Book</p>	 <p>Umnqwazi/ Hat</p>
7	 <p>Isihlangu/ Shoe</p>	 <p>Isitshixo/ Key</p>	 <p>Umthi/ Tree</p>

8	 <p>Incwadi/ Book</p>	 <p>Imbiza/ Pot</p>	 <p>Ucango/ Door</p>
9	 <p>Umpu/ Gun</p>	 <p>Umthi/ Tree</p>	 <p>Ikomityi/ Teacup</p>
10	 <p>Umpu/ Gun</p>	 <p>Intente/ Tent</p>	 <p>Incwadi/ Book</p>

11	 <p data-bbox="172 517 344 551">Incwadi/ Book</p>	 <p data-bbox="582 517 770 551">Umnqwazi/ Hat</p>	 <p data-bbox="994 517 1139 551">Umthi/ Tree</p>
12	 <p data-bbox="172 913 360 947">Umnqwazi/ Hat</p>	 <p data-bbox="582 965 823 999">Umtshayelo/ Broom</p>	 <p data-bbox="994 947 1177 981">Isihlangu/ Shoe</p>

9. Addendum II: Background Questionnaire

Age: ____ Gender: M/ F

- (1) Please indicate which language(s) you speak and rate your proficiency in each one of them using the following scale: 1<- - - -2- - - -3 - - - -4 - - - ->5

	Rudimentary	Excellent
Language_____	Self-rated proficiency (1-5) _____	
Language_____	Self-rated proficiency (1-5) _____	
Language_____	Self-rated proficiency (1-5) _____	
Language_____	Self-rated proficiency (1-5) _____	

- (2) Please indicate how often you use these languages in your everyday, oral communication, using the following scale: 1<- - - -2- - - -3 - - - -4 - - - ->5

	Rudimentary	Excellent
Language_____	Frequency of use (1-5) _____	
Language_____	Frequency of use (1-5) _____	
Language_____	Frequency of use (1-5) _____	
Language_____	Frequency of use (1-5) _____	

- (3) Which language(s) did you first learn, that is, as a baby? _____

- (4) If you speak any other languages than the one(s) you learnt first, please indicate which ones, where you learnt them (e.g. school, playground etc.) and at what age you learnt them:

Language_____	Where it was learnt_____	Age of learning__
Language_____	Where it was learnt_____	Age of learning__
Language_____	Where it was learnt_____	Age of learning__
Language_____	Where it was learnt_____	Age of learning__

- (5) Please specify:

Main language(s) spoken to family: _____

Main language(s) spoken to friends: _____

Main language(s) of primary school: _____

Main language(s) of high school: _____

Which language(s) do you prefer for reading? _____

Which language(s) do you prefer for writing? _____