Syntactic Analysis of Bangla-English Code-switching: A Study of Bengali Children

University of Dhaka

Department of Linguistics

A Thesis Submitted in Fulfillment of the Requirements for the Degree of Masters of Philosophy (M Phil) in Linguistics

Prepared by

Tanzia Siddiqua

Registration No.: 248; Session: 2012-2013

Supervisor

Syed Shahrier Rahman, PhD

Chair, Department of Linguistics,

Faculty of Arts, University of Dhaka

Date of Submission

January 1, 2018

Acknowledgements

It is an honor to thank Professor Syed Shahrier Rahman, the Chair of the Department of Linguistics, Faculty of Arts, University of Dhaka, for his supervision, guidance, and generosity from the initial to the final level in developing the thesis.

I am heartily thankful to University of Liberal Arts Bangladesh (ULAB) for being flexible with timing as I have been working there as a Lecturer while completing the thesis. I thank the administrative authorities of the schools for being welcoming and supportive during classroom observations and all the students for being co-operative during the surveys.

I wish to express my sincere gratitude and appreciation to my parents, siblings, and friends whose prayers, love, and best wishes were a source of inspiration, encouragement, and motivation for me as I was conducting the study.

Lastly, I offer my regards and blessings to all of those who supported in any respect during the completion of this research.

Abstract

The present research provides a syntactic overview of code-switching patterns available in the spoken discourse of Bengali bilingual children who speak Bangla as their L1 and English as L2. It looks into the lexical and functional categories and/or elements of their code-switched sentences and finds the ratio of this code-switching. In addition to that, the study also finds how significant these categories are against each element in the occurred code-switched sentences as well as how much these juxtapositions of L1 and L2 elements affect the well-formedness of sentences in Bangla language. Its parameters, hence, include the well-formedness judgments of sentences along with that of the sentential positions and code-switching arrangements to identify the main occurred lexical categories in bilingual children's conversation with cross-linguistic data, word order, and code-switching processes in Bangla language. It also looks into the sociolinguistic and psycholinguistic views to study the triggers, purposes, and attitudes of this phenomenon. In addition to these, the research also covers the concept of serial verbs, and its grammatical aspects in relation to this study. Its findings show that the children in this context tend to switch between codes in the classrooms and moreover, they switch mostly with the Nouns rather than Verbs which signifies that there might not be an influential change at the core in Bangla language. In most cases they switch between codes subconsciously and/or without much awareness of switching. In addition to that there is a difference with that of girls' and boys' code-switching ratio. Boys tend to be more frequent in adjunct and tag switching than girls. Another important factor for code-switching research is that the terms code-switching, code-mixing, and code-alternation are being used almost interchangeably in different researches. Thus, the term code-switching has been used here in the research from a general point of view. Since it is, indeed, one of the central issues of bilingual research, its findings contribute more information to the existing knowledge on code-switching as well as adding valuable information to second language acquisition, and bilingualism.

Table of Contents

List of Illustrations

List of Tables

Chapter One: Introduction

The present research provides a syntactic overview of code-switching patterns available in the spoken discourse of Bengali bilingual children who speak Bangla as their L1 and English as L2. It looks into the lexical and functional categories and/or elements of their code-switched sentences and finds the ratio of this code-switching. In general, one can say that a prerequisite for code-switching is a juxtaposition of [these/as mentioned] elements of two codes (Winford, 2003, p. 103). The terms code-switching, code-mixing, and code-alterations are being used almost interchangeably in different aspects in various literatures. For this research, the term code-switching has been used in general.

In addition to that, the study also finds how significant these categories are against each element in the occurred code-switched sentences as well as how much these juxtapositions of L1 and L2 elements affect the well-formedness of sentences in Bangla language. In order to work on such a research, an objective-based approach has been taken into account that includes a set of parameters. These are, the well-formedness judgments of sentences along with that of the sentential positions and code-switching arrangements, Minimalist Approach to identify the main occurred lexical categories in bilingual children's conversation with cross-linguistic data, word order, and code-switching processes in Bangla language. The research, hence, mainly focuses on the syntactic analysis of code-switching; i.e. the aim of the research is to analyze the syntactic distributions in children's spoken discourse within the sentence boundary. The objectives of the research can be formulated as list next.

1.1. Research Objectives

The main objectives of this research are to;

(a) provide syntactic descriptions of code-switching in the occurred sentences of Bengali bilingual children, and

Dhaka University Institutional Repository

(b) to explain the variations of their sentential constructions on the basis of the code-switching phenomenon.

1.2. Formulation of the Research

The research required gathering relevant data from a standard sample size of 60 Bengali children; age 9 to 12 years old. It is worth to clarify the reason of selecting children within the above mentioned age limit; i.e. it is plausible to consider age 9 as the standard age for getting enough input from their L1 (Hyltenstam and Abrahamsson, 2003, p. 59). The research includes spontaneous and natural responses from the participants. Therefore, traditional questionnaire or semi-structured interview has not been selected to reveal the facts and resolve the problems. As a way out of this situation, an experiment has been performed following the quantitative research methodology. Hence, a null hypothesis has been formulated along with an alternative hypothesis in case it rules out the null hypothesis.

The Null Hypothesis: Since the research questions have already been devised, formulation of the null hypothesis was relevant for the research. In that case, the hypothesis below has been considered first.

(a) Code-switching occasionally occurs as an unmarked feature in the sentence patterns of Bengali bilingual children. They use code-switching only for the stylistic purpose.

However, the following alternative hypothesis has been formulated, if the above null hypothesis rules out.

(b) Code-switching is sensitive to sentence patterns of Bengali bilingual children. A number of fundamental triggers are responsible for the code-switching available in their speech at a high frequency.

In order to conduct such a research, it was important to look into the educational settings and backgrounds of this field in the country which brings the next section.

Dhaka University Institutional Repository

1.3. Code-switching in Bangladesh

The history of English in the language behaviour of Bangladeshis (Bangladesh was a part of the then undivided India) dates approximately 500 years back when the British landed on the then India along with their language. People had to learn English, which was an official language, to get a better job in government sectors and students had to have a very good command over English because most of the books of occidental knowledge, history, philosophy and technology were written in English. In 1947 the British colonial rule in the then India ended but surprisingly English continued to stay back with the linguistic domain.

In 1952 the then Pakistani rulers attempted to establish Urdu, neglecting Bangla, which agitated the then East Pakistanis (now Bangladeshis) and it resulted in the Language Movement of 21 February 1952 when police fired on the agitators. Bangla was declared as one of the state languages of the then Pakistan at the cost of the martyrdom of patriots. It is a matter of great honour that 21st February has been declared as International Mother Language Day by UNESCO on 17 November in 1997 and it is the first ever formal step to recognize the honour of mother language. So naturally Bangla language is simultaneously an issue of both sensitivity and pride among Bangladeshis. After the Language Movement in 1952, the official activities used to be carried out in English to avoid language clash in two regions (East Pakistan and West Pakistan). On 16 December, 1971 the Pakistanis were ousted from the soil of Bangladesh and so was their language Urdu, but English still remained in the language behaviour of the Bangladeshis. In Bangladesh English is taught, in primary, secondary, higher secondary, and tertiary levels, in all three categories of education system: Bangla Medium, English Medium and Madrasa system. In most Bangla medium schools and colleges, the medium of instruction is Bangla and English is a mandatory subject, but Dakhil madrasas, recognized by the government, give much more importance on Arabic than Bangla and English. In the English medium schools, the medium of instruction is solely English though Bangla is taught to the

Dhaka University Institutional Repository

students. There is compulsory English course in tertiary level as well. At university levels, though there is a scope to choose the Bangla medium in public universities, in private universities the medium of instruction is English. So it is natural that students from all these categories have varied ranges of proficiency in English. English has a strong demand in white-collar job market, especially in multinational companies, UN projects, renowned NGOs, private banks, and renowned private companies, which is evident in their job advertisements and it has created a strong motivation among the Bangladeshis to be proficient in English (Alam, 2006, pp. 52- 53). Hence, children lately are mostly exposed to both the languages and more at their home settings and schools with often their parents being bilingual or multilingual.

In Bangladesh, it is plausible to consider age 9 as the standard age of getting enough input from their L1 (Hyltenstam, and Abrahamsson, 2003, p. 59). Therefore, grade 4 has been chosen with children's age of 10-12. The medium of instructions, in most cases, is in Bangla language. In the English medium schools code-switching is not allowed. As both private and public schools have been selected for collecting data, it is important to take it under consideration. It is also important to know how many languages are taught, what medium, and curriculums are followed, what is the class size, if the students' attendances are regular, and if observer is allowed in the classroom to collect data. All these standpoints have been discussed in the methodology chapter.

1.4. Rationale

A kind of in-depth analysis is necessary to explore the unique characteristics of the sentence patterns of the Bengali bilingual children. The research focuses on the analysis of Bengali bilingual children's produced sentence structures in spoken discourse who speak Bangla as their L1 and English as L2 and investigates the lexical and functional categories of their code-switched sentence patterns. The study helps to find the frequency of the occurred code-

Dhaka University Institutional Repository

switching among children as well as the fundamental triggers and reasons for children's code- switching during conversation.

1.5. The Research Layout

Considering all these factors the layout of the research has been formulated as below. The literature review chapter in this regard consists of the definitions of the key terms; code-switching, bilingualism, along with discussions of code-switching from psycholinguistic, sociolinguistic, and syntactic point of views, the reasons for bilingual code-switching, the patterns of code-switching, children's conversation and code-switching etc. and sets out the parameters for code-switching during conversations. The chapters that follow after is the methodology, followed by the literature review. It then connects with data analysis chapters that discusses and relates the data designing procedures with literature review to find information about children's code choices; i.e. if it depends on the syntactic descriptions or if they switch due to stylistic purposes. The Literature Review consists of the following categories,

(a) Key Terminologies: Code-alteration and Bilingualism
(b) The Background Studies: Sociolinguistic and Psycholinguistic Views: Psycholinguistic Views on Code-switching and Sociolinguistic Views on Code-switching along with Triggers, Purposes, and Attitudes for Code-switching
(c) Parameters Settings: Well-formedness Judgments, Sentential Positions and Code-switching Arrangements and Minimalist Approach: Main Categories in Bilingual Children's Conversation with Cross-Linguistic Data, Word Order and Sentence Structures in Bangla Language
(d) Morphosyntactic Issues in Syntax and Grammatical Aspects of Code-switching
(e) The Studies of Code-switching: Serial Verbs and Code-switching in Various Languages and Code-switching as a Means of Language Development

Dhaka University Institutional Repository

Given this criterion for finding a framework, this research attempts to provide a critical overview of the competing theories and models most prevalent in the study of the sentential structural dimensions of code-switching which has been devised with Linguistic tools which are, bilingualism, psycholinguistic views, Minimalist Approach, and sentence variations found in the research. However, the research may show a few limitations which has been discussed in the next section.

1.6. The Limitations

The participants for the research have been chosen from few specific areas rather than wide range coverage. The Bengali children have been chosen from Dhaka city as opposed to the entire country as it is a time consuming self-funded research. However, the research thoroughly reviews the sociolinguistic and psycholinguistic perspectives and builds an understanding for the background studies to take a closer look into the code-switched categories, types, preferences, etc. those occur in spoken discourses due to different socio-economic backgrounds and preferences. It has later been explained in relation to the syntactic development of children. But due to the shortage of time, the research could not be extended for the fifth grade children and further. The research leaves a scope for further studies in bilingual children's speech development, L2 development, and language production.

All in all, the research presents a systematic description of aspects related to code-switching patterns available in the language of Bengali bilingual children.

Dhaka University Institutional Repository

Chapter Two: Reviewing Literatures on the Syntactic Analyses of Code-Switching

The present chapter consists of two folds; the theoretical background and the reviewing of the theories in terms of the research. The theoretical background consists of the definitions of the key terms; code-switching, bilingualism; discussions of code-switching from psycholinguistic, sociolinguistic, morphological and syntactic point of views, Minimalist Approach, the reasons for bilingual code-switching, the patterns of code-switching, children's conversation and code-switching and sets out the parameters for code-switching in children's conversations in a context. These are pointed below in brief starting with the key terms.

2.1. The Theoretical Background

The theoretical background starts with the essential terminologies which are briefly described below in order to set a background for the research.

(a) Code-switching

Code-switching has been defined in a number of ways by different researchers over time, depending on the point of view of their studies. Sometimes the terminologies overlap and are used differently by different researchers (Milroy and Muysken, 1995, p. 12). Crystal (1987) asserts that code, or language switching occurs when an individual switches between two codes during his or her speech with another bilingual (p. 900). A person who is bilingual may be said to be one who is able to communicate alternately to varied extents in two codes (Weinreich, 1953, p. 01). To Silberstein (2001) code-switching is 'switching from one language to another in the same discourse, sometimes within the same utterances' (p. 104). Code-switching can be defined as the alternate use of two or more languages in the same utterance or conversation. Grosjean, (1982) describes code-switching as the use of two or more languages in the same conversation without a noticeable phonological

assimilation from one variety to the other (p. 145). In general, one can say that a prerequisite for code-switching is a juxtaposition of elements of two codes (Winford, 2003, p. 103).

In addition to the general definition, there are different approaches that look into code-switching from different point of views. For example, syntactic approaches to code-switching focus on the linguistic factors constraining code-switching, what kind of code-switching is allowable (Bailey, 2000, p. 166). Linguistic approach deals with a sentence, the attempt being to identify the linguistic principles and constraints that govern the production of code-switched utterances (Winford, 2003, p. 126). The social approach focuses on the motives and social meanings of code-switching. In that approach code-switching is seen as a communicative event, code-switching as happening between speakers (Yletyinen, 2004, p. 73).

Sometimes the term code-change is also used when referring to switching between sentences. However, both code-switching and code-mixing may also be used as cover terms, that is, they are used for any type of alternation (Kovács, 2001, p. 62). Auer (1995), in turn, uses the term code-alternation to refer to code-switching (p. 4). Switches can be either intra-sentential (switches within the same sentence, from single morpheme level to higher levels) or inter-sentential (switches from one language to the other between sentences); furthermore, intra- and intersentential code-switching often involve stretches of more than one word (Myers-Scotton, 1988, p. 157). The term extra-sentential code-switching is sometimes used to refer to switches that do not belong tightly to a sentence, for example tag questions (Milroy and Muysken, 1995, p. 8). Poplack (1980) employs the term tag-switching instead of extra-sentential switching to refer to switches such as tag questions or sentence fillers. There are four different code-switching patterns that may occur during conversations. These are written below.

1. Intra-sentencial code-switching: This type of code-switching occurs outside the sentence or clause level.

Dhaka University Institutional Repository

2. Inter-sentencial code-switching: This type of code-switching occurs within a sentence or clause.
3. Tag-switching: This type of code-switching is the switching of either a tag phrase, or a word, or both, from Language B to Language A.
4. Intra-word switching: This type of switching occurs within a word, itself.

According to his findings, people who are not fluent bilinguals will tend to rely heavily on intersentential code-switching, making only minimal use of the intrasententialty, and within the category of intrasentential code-switching, fluent bilinguals will make greater use of large-sized constituents. The terms code-switching and code-mixing are being used almost interchangeably in different aspects. Thus the term code-switching has been used here in the research to cover all types (p. 615).

(b) Bilingualism

'Bilingualism is the result of the use of more than one code by an individual or a society' (Bell, 1976, p. 135), which means a bilingual speaker, is able to use more than one code in the society. However, it depends on the social situations, the speaker's psychological state, ability, choice and many more. All speakers adopt various styles to suit varying purposes (Bell, 1976, p. 118) and many studies have taken place in order to find if the bilingual possesses one or two different systems. According to Hockett (1958), a bilingual is the one who has perfect control over more than one language (p. 129). That means a bilingual will have control over the choice of lexical items. Bell (1976) suggests that a bilingual constitutes a range of linguistic and/or social skills. In order to communicate effectively the speaker needs to control not only linguistic choices but also social situations (p. 130). It means that a bilingual also may change the domain or relationships among the speakers by language switch.

Dhaka University Institutional Repository

2.1.1. Psycholinguistic Views on Code-switching

Psycholinguistics is an interdisciplinary field of studies and is studied by researchers from a variety of different backgrounds, such as psychology, cognitive science, linguistics, and speech and language pathology. Scovel (1998) defines psycholinguistics as a window to the nature and structure of the human mind by the use of language and speech (p. 04). It focuses on how individuals comprehend, produce and acquire language. It seeks to discover the nature of mental representations that serve these functions and the nature of the cognitive operations those are employed when people understand and produce language.

In the early decades of the 20th century, linguists turned to psychologists for insights into how human beings use language. In the later period, psychologists turned to linguists for insights into the nature of language. In between these two periods, behaviourism dominated both fields (Carroll, 2005, p. 09). Early psycholinguistics primarily focused on syntax, more recently there has been an upsurge in interest in phonology, semantics, and pragmatics.

Psycholinguists discuss the theories of first language acquisition where Lightbown and Spada (1999) presented three different broad theoretical approaches to explain the first language acquisition, each of which can be corroborated by evidence. These theories are termed as Behaviourism, Innatism, Interactionism. Traditional behaviourists believed that language learning is the result of imitation, practice, feedback on success, and habit formation (p. 04-25). The linguist Chomsky (1981) claims that children are biologically programmed for language and that language develops in the child in just the same way the other biological functions develop. He further adds that the language the child is exposed to in the environment is full of confusing information (for example, false starts, incomplete sentences, and/or slips of the tongue) and does not provide all the information which the child needs. Furthermore, the evidence seems very strong that children are by no

Dhaka University Institutional Repository

means systematically corrected or instructed on language. Parental corrections of language errors have been observed to be inconsistent or even non-existent for children of pre-school age. When parents correct the errors, children often ignore the corrections, continuing to use their own ways of saying things. It is because children's minds are not blank slates to be filled merely by imitating language they hear in the environment. Instead, he claims that children are born with a special ability to discover for themselves the underlying rules of a language system (p. 148).

Lennenberg (1967), observed that the ability to develop normal behaviours and knowledge in a variety of environment do not continue indefinitely and that children who have never learned language (because of deafness or extreme isolation) cannot do so if these deprivations go on for too long. He argued that the language acquisition device, like other biological functions, works successfully only when it is stimulated at the right time. This notion that there is a specific and limited time period for language acquisition is referred to as the Critical Period Hypothesis (CPH). A third theoretical view of first language acquisition focuses on the role of the linguistic environment in interaction with the child's innate capacities in determining language development. The interactionism explains that language develops as a result of the complex interplay between the uniquely human characteristics of the child and the environment in which the child develops. Interactionists attribute considerable more importance to the environment than the innatists do. For example, unlike the innatists, most interactionists claim that language which is modified to suit the capability of the learner is a crucial element in the language acquisition process. They emphasize the importance of child-directed-speech; i.e. the language which is not addressed to children but adjusted in ways that make it easier for them to understand (pp. 09-24).

The theories of first language acquisition play an important role in the studies of error corrections, child-directed speech, critical thinking abilities, interaction patterns etc. and provide solutions for the real-life problems in

Dhaka University Institutional Repository

child first language acquisition, language teaching, language disorders, disabilities, etc.

According to Carroll (2005) Psycholinguistics has a rich heritage that includes contributions from diverse intellectual traditions. Two primary psycholinguistic questions are, 'What mental processes are involved in language use?' and 'What linguistic knowledge is involved in language use?' These questions reemerge in different forms in studies of adult language comprehension and production, the social use of language, language use in Aphasia, and language in children (pp.03-08).

Scovel (1998), in this regard, introduces four research questions in psycholinguistics which are considered as its sub-fields. The questions are; (1) how are language and speech acquired? (2) how are language and speech produced (3) how are language and speech comprehended? and (4) how are language and speech lost? The questions are explained below in separate paragraphs. Developmental psycholinguistics examines how speech emerges over time and how children go about constructing the complex structures of their mother tongue. The emergence of speech is not only an apt chronological stage to begin our reflections on the nature of the human mind; it is also the stage where we can glean the least complicated data. The child's one-word stage is referred as the holophrastic stage where one word is used to express the entire meaning. Then the two-word stage emerges (p. 10- 45).

Brown (1973) and his colleagues, in the first, elaborate chronology of how children acquire English grammar, published in 1973, demonstrated that children progress through different stages of grammatical development, measured largely by the average number of words occurring per utterance. They do not randomly rotate words between first and second position, for example; certain words (pivots) tend to be used initially or finally, and other words then can be used to fill in the slot either after or before these so-called pivots. They have a word order. The child's output can be symbolized by a

Dhaka University Institutional Repository

simple set of phrase structure rules where each rule is a logical linguistic extension of the previous rule. The child at this stage is able to create new sentences which they never heard. Thus from two to four children produce all kinds of expressions and show creative constructions. The emergence of the 'foreign accents' in the speech of bilingual children at about the age of twelve suggests to some psycholinguists that there exists a critical period for first language learning which is biologically determined (p. 449).

One of the most influential psycholinguistic models for speech production, developed by Levert (1966), introduces progression of four successive stages: (a) conceptualization, (b) formulation, (c) articulation, (d) self-monitoring (p. 20-45). Psycholinguist McNeill (1933), in his theory, discussed an interesting mentalistic account of how speech is first conceptualized in the human mind. He proposed two modes of thoughts: syntactic thinking which spawns the sequence of words which we typically think of when we talk about how language is initiated, and imagistic thinking which creates a more holistic and visual mode of communication. Formulation sees how speech is formulated. Over the past few decades, psycholinguists have become excited about a new way discovering how we put words into our mouths: they look at what happens when we trip over our tongues (p. 95).

The larynx or the 'voice box' and other organs are used to articulate after formulation takes place. The final stage is self-monitoring which is important in the studies of Second Language Acquisition (SLA), Chomsky's (1981) distinction of competence and performance (p. 14).

Comprehension of sounds, words, sentences, and texts are studied in the area of Comprehension stage. The act of comprehension is not passive; even the slightest of changes in discourse influences comprehension. It is not a simple item-by-item analysis of words in a linear sequence either.

Dhaka University Institutional Repository

Languages do not always fall neatly into one hemisphere or the other. The brain is divided into sub-structures: Frontal, Parietal, Temporal, and Occipital where the Frontal is responsible for planning, prediction, speech, discrete movements of the body; Parietal includes reading ability, sensation of pain, temperature, touch, pressure, taste; Occipital does visual processing, Temporal does audition, memory processing, sensory integration etc. autopsy (or post-mortem) studies. Bell (1976) explains that 'verbal planning' is the result of the switch of the linguistic codes or utterances of a bilingual individual. It permits the switching from one language to another subconsciously. The message the speaker wishes to convey from the perception received or from the thoughts is often affected because of the lack of lexical items, or appropriate words (pp. 141-142).

According to Levelt (1975), the lexical entries meaning or 'lemma' plays a crucial role in the bilingual speakers' code choice. However, in his description was based on the monolingual speaker (p. 95). Poulisse and Bongaerts (1994) add that a bilingual speaker also contains information about which language the lexical entry belongs to (pp. 44-45). Spolsky (1998), in this regard, discussed how children acquire language and social skills together. From an early age, children learn that there is more than one variety of language. There are in fact a vast set of social rules about language that a child must acquire to be successfully socialized. Knowing when to speak and when to be silent, how to enter a conversation, when to speak quietly, and when clearly, are all part of the conversational rules that children have to learn. Learning these social conventions is a key component of socialization. One of the most revealing opportunities for studying language socialization is the case of children growing up bilingually, for they manage not just to keep the two languages separate, but to learn quickly which language to use to which person. They also realize which people can be addressed in a mixture of the two languages. In this way, bilingual children can be said to develop control over three distinct varieties of languages. The study of bilingualism provides an excellent

Dhaka University Institutional Repository

laboratory for learning how a child can learn to be a member of two (or more) distinct societies (pp. 44-45).

According to Hudson (1996), code-switching ‘is the inevitable consequence of bilingualism (or, more generally, multilingualism).’ He further claimed that, ‘Anyone who speaks more than one language chooses between them according to circumstances. The first consideration, of course, is which language will be comprehensible to the person address; generally speaking, speakers choose a language which the other person can understand’ (p. 51).

According to Lightbown and Spada (1999) majority of children are exposed to more than one language in their early childhood. The children who are exposed to two languages from birth are referred as ‘simultaneous bilinguals’, whereas those who are exposed to two languages one after another; i.e. one as a first language and another as a second language, are referred as ‘sequential bilinguals’. If bilingual children are cut off from their family language when they are ‘submerged’ in a second language for long periods in early schooling or day care, they may begin to lose their family language before they have developed an age-appropriate mastery of a new language, they are referred as ‘subtractive bilinguals’ (p. 03).

Brown (1973) and his colleagues, in the first, elaborate chronology of how children acquire English grammar, demonstrated that children progress through different stages of grammatical development, measured largely by the average number of words occurring per utterance. They do not randomly rotate words between first and second position, for example; certain words (pivots) tend to be used initially or finally, and other words then can be used to fill in the slot either after or before these so-called pivots. They have a word order. The child’s output can be symbolized by a simple set of phrase structure rules where each rule is a logical linguistic extension of the previous rule (p. 449).

Dhaka University Institutional Repository

2.1.2. Sociolinguistic Views on Code-switching

Sociolinguists indicate that bilingual code-switch happens because of the functional roles of the linguistic codes in the society. People belong to different speech communities and social groups. The choice or variation of the linguistic codes is related to social factors. Geography and social mobility, gender and power, age, audience, identity, social network relations all build a frame for the language choice and its usage. Holmes (2001) presents Fishman (1971)'s chart while explaining the social factors that affect code choice of the speaker (p. 21). Because of certain social factors such as the social groups and interactions, settings, topics etc. a speaker might tend to switch codes.

Domain	Addressee	Setting	Topic	Variety/ Code
Family	Parent	Home	Planning a family party	
Friendship	Friend	Beach	How to play beach tennis	
Religion	Priest	Church	Choosing the Sunday liturgy	
Education	Teacher	School	Solving a math problem	
Employment	Employment	Workplace	Applying for a promotion	

Table 01: Fishman's (1971) chart (Holmes, 2001, p. 21)

The table above shows that a speakers' code choice might vary depending on the participant, settings, topic, and social arena. When a speaker is at home with family planning for a family party with parents might use one particular code; when he or she is in a beach with friends and talking to them about playing beach tennis the speaker might use another code. Not only the choice of the code but also the variety of one language; high variety (H) or low variety (L); is depended on the above conditions.

Hawkins (2001), in his 'Second Language Syntax: A Generative Introduction' points out a number of significant factors for Syntax and Language

Dhaka University Institutional Repository

Acquisition. One crucial factor is that ‘the course of syntactic development is essentially the same; no matter what age one begins to acquiring a second language’. Few other factors involve ‘some grammatical morphemes in English are more difficult for child second language learners to acquire than others. Further, this relative difficulty is not affected by the length of exposure’ (pp. 22-40). According to Zentella (1988), a good deal of code-switching takes place for the sake of switching; opposed to obeying specific communicative purposes. The stylistic purposes are communicative purposes themselves and are the most important ones (p. 208).

2.1.3. Minimalist Approach and Code-switching

The leading aim of the MP is the elimination of all mechanisms that are not necessary and essential on conceptual grounds alone; thus, only the minimal theoretical assumptions may be made to account for linguistic data, privileging more simplistic and elegant accounts over complex ones. These assumptions would naturally favor accounts of code-switching which make use of independently motivated principles of grammar over those which posit rules, principles or other constructs specific to it. In a Minimalist approach to code-switching, lexical items may be drawn from the lexicon of either language to introduce features into the numeration, which must then be checked for convergence in just the same way as monolingual features must be checked, with no special mechanisms permitted. In this lexicalist approach, no ‘control structure’ is required to mediate contradictory requirements of the mixed systems. The requirements are simply carried along with the lexical items of the respective systems. Thus, it makes sense to formalize the grammar used for code switching as the union of the two lexicons, with no mediating mechanisms. Mahootian (1993) is not explicit about whether her formulation is a principle of grammar or a theory about which syntactic operations are relevant to code-switching, data considered here strongly suggest that the head-complement relation is far too narrow to account for the facts of code-switching (p. 95). The recent emergence of language and its stability are both consistent with the Strong Minimalist Thesis, which has at its core a single

Dhaka University Institutional Repository

repeatable operation that takes exactly two syntactic elements a and b and assembles them to form the set {a, b}. This hierarchical language structure is demonstrably present in humans along with conceptual atoms. Language, hence, is a computational cognitive mechanism that has hierarchical syntactic structure at its core (Chomsky, 1981, p.14). According to O'Grady (1987) '. . . the emergence of syntactic rules takes place in an orderly sequence. Beginning with the production of one-word utterances near the end of the first year of life, children gradually master the rules for sentence formation in their language' (p. 476). Given next is a table showing 'the development of phrase structure'.

Stage	Approx. Age	Developments
Holophrastic	1- 1.5 years	single word utterances; no structure. e.g. 'dada' which is used to express 'I see daddy', etc.
Two- word	1.5- 2 years	early work combinations; presence of syntactic categories unclear. e.g. 'Daddy hat', which is used to express 'Daddy give me the hat', etc.
Telegraphic	2- 2.5 years	emergence of phrase structure, especially head-complement and subject-VP patterns. e.g. 'I lost a shoe', etc.
Later	2.5 years up	emergence of non-lexical categories (Det, Aux) including those used as specifies

Table 02: The Development of Phrase Structure (O'Grady, 1987, p. 476)

From the table we understand that there are basically four stages in case of syntactic development. These are Holophrastic or One-word stage, Two-word stage, Telegraphic stage, and Later Developmental stage. The approximate age for the One-word stage is between twelve months to eighteen months.

Dhaka University Institutional Repository

According to O'Grady (1987), 'a basic property of these one-word utterances is that they can be used to express the type of meaning that would be associated with an entire sentence in adult speech. Thus, a child might use the word dada to assert 'I see Daddy', more to mean 'Give me more juice' . . .' (p. 476). Such utterances are called holophrases (literally 'whole sentences'). In forming holophrastic utterances, children seem to choose the most informative word that applies to the situation. For example, they will say 'juice' to say 'Give me more juice', etc. Within a few months of their first word utterances children begin to produce two-word 'mini-sentences', for example, 'Doggie bark' which means 'The dog is barking', etc. According to O'Grady (1987), 'the vast majority of two-word utterances employ an appropriate word order, suggesting a sensitivity to this feature of sentence structure. It is less clear whether children have acquired syntactic categories such as noun, verb, and adjectives at this point in their development'. A noteworthy feature of the Telegraphic stage is that despite the emergence of complex new syntactic structures, children make virtually no word order errors. After a period of several months, during which their speech is limited to one-word and two-word utterances, children begin to produce longer and more complex grammatical structures. Children says phrases such as 'Chair broken', 'Man ride bus today', 'What her name?', etc. language development from age two onward is rapid. In the years following the Telegraphic stage, children continue to acquire the complex grammar that underlies adult linguistic competence (pp. 477-480). The use of negation, insertion, Wh-questions, passivisation etc. starts to emerge sequentially. Several studies have been conducted to specifically explore code-switching behaviours in children. Findings suggest that bilingual children switch languages according to the cognitive demands of the tasks and the contextual demands such as participants and topics. However, these case studies usually focus on how children use languages in the home setting with adults/parents or their siblings. The basic conceptual points in the discussion of syntactic acquisition of children covers the discussion of categories, non-lexical categories, phrase structure that covers the discussion of head-complement, verb phrase, and

Dhaka University Institutional Repository

sentence structure. Adger (2003) pointed four major word classes in his writing, which are usually abbreviate as just N, V, A and P and which we could distinguish using the four features [N], [V], [A] and [P]. He termed these features as major category features (p. 28). Adger (2003) further provided the breaks as below.

a. Noun [+ N, - V]
b. Verb [-N , +V]
c. Adjective [+N, +V]
d. Preposition [-N, -V]

Thus, according to Minimalist Approach the major category features may be reducible to only Noun [N] and Verb [V] (p. 41). As the sentences are not complete it is not certain which categories these words are presenting. O'Grady (1987), in his discussion presents examples of word-level categories that are most central to the study of syntax in the table given next.

Lexical Categories	Examples
Noun (N)	Harry, boy, wheat, policy, moisture, bravery
Verb (V)	arrive, discuss, melt, hear, remain, dislike
Adjective (A)	good, tall, old, intelligent, beautiful, fond
Preposition (P)	to, in, on, near, at, by
Adverb (Adv)	silently, slowly, quietly, quickly, now
Non-Lexical Categories	Examples
Determiner (Det)	the, a this, these
Degree word (Deg)	too, so, very, more, quite
Qualifier (Qual)	always, perhaps, often, never, almost
Auxiliary (Aux)	will, can, may, must, should, could
Conjunction (Con)	and, or, but

Table 03: Categories (O'Grady, 1987, p. 41)

He further mentioned that the four most studied syntactic categories are noun (N), verb (V), adjective (A), and preposition (P). Some items can belong to more than one category (pp. 41-182).

Dhaka University Institutional Repository

Poplack (1980) suggested two syntactic constraints that govern code-switching: the free-morpheme constraint and the equivalence constraint.

a. Free Morpheme Constraint: No switch may occur between a bound morpheme and a lexical form unless the latter has been phonologically integrated into the language of the former.

b. Equivalence Constraint: The order of sentence constituents on either side of the switch point must be grammatical with respect to both languages.

Thus, the juxtaposition of these elements will not violate a syntactic rule of any of the languages, and there will be points where code-switching is permissible (p. 148). In the theoretical sense, a constraint is a principle or rule of grammar that bars one or another structure. Figure: 01 shown next, proposes two constraints.

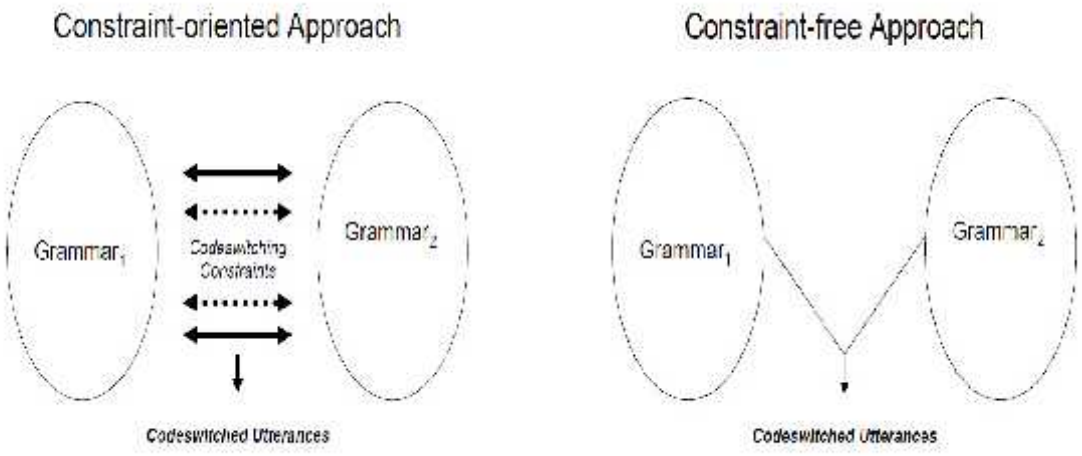


Figure 01: Constraints (MacSwan, 1999, p. 41)

To sum up, the sociolinguistic, psycholinguistic, and Minimalist Approach looks into a number of features in relation to code-switching. The psycholinguistic views ask the questions, ‘Is code-switching an acquired or a learned phenomenon?’, ‘What are the comprehension and production features

Dhaka University Institutional Repository

behind this?', 'What are the theoretical backgrounds are in relation to these concepts?', 'Does corrections work on the children?', etc. The sociolinguistic views look into the domain, addressee, settings, topics, and social interactions that triggers code-switching in a context. The Minimalist Approach looks into the lexical and non-lexical categories, the stages of development in relation to categories, the major categories, and the theoretical explanations of the juxtapositions of the categories, etc. The morphological development, on the other hand, looks into the grammatical morphemes to add to the studies of code-switching which is explained below.

2.1.4. Morphological Development and Code-switching

The morphological structure emerges over a period of several years. Initially, the words produced by English-speaking children seem to lack any internal morphological structure: affixes are systematically absent and most words consist of a single root morpheme. Because many common words have irregular inflection in English ('went' as the past tense form of 'go', 'ran' as the past form of 'run', 'men' as the plural form of 'man'), children sometimes begin by simply memorizing inflected words on a case-by-case basis without regard for general patterns or rules. As a result, they may initially use irregular forms such as 'men' and 'ran' correctly. However, when they subsequently observe the generality of '-s' as a plural marker and '-ed' as a past tense marker (usually around age two and a half), they sometimes use these suffixes for the irregular forms, producing words such as 'mans' and 'runned' (Errors that result from the overly broad application of a rule are called overgeneralizations or overregularizations.). Given next is the table showing the development of affixes.

Stage 1: Case-by-case learning (plural boys, men, etc.; past tense walked, ran, etc.)
Stage 2: Overuse of general rule (plural mans; past tense runned)
Stage 3: Mastery of exceptions to the general rule (plural men; past tense ran)

Table 04: The Development of Affixes (Brown, 1973, p. 449)

Dhaka University Institutional Repository

Although inflectional overgeneralization is very noticeable in young children's speech and can last into the school years, it doesn't affect all irregular verbs all the time. In fact, pre-school children seem to overregularize verbs less than 25 percent of the time at any point in development. This suggests that the overgeneralization errors observed in early speech reflect lapses in accessing the appropriate irregular form from the lexicon rather than the failure to learn irregular forms per se.

An important result of early work on child language was the discovery that the development of bound morphemes and functional categories (such as determiners and auxiliaries) takes place in an orderly fashion that is quite similar across children. In a pioneering study of three children between the ages of twenty and thirty-six months, the developmental sequence in the table below was found to be typical. Typical developmental sequence for non-lexical morphemes is given next.

1. -ing	5. past tense –ed
2. plural -s	6. third person singular –s
3. possessive -'s	7. auxiliary be
4. the, a	

Table 05: Brown's Grammatical Morphemes (1973, p. 449)

An interesting feature of this developmental sequence is that it seems to be at least partly independent of the frequency with which the various morphemes occur in adult speech. For example, the determiners 'the' and 'a' are the most frequent morphemes in the children's environment even though they are acquired relatively late. Typical relative frequency of morphemes in parental speech is given next.

Dhaka University Institutional Repository

1. the, a	5. possessive -’s
2. -ing	6. third person singular –s
3. plural -s	7. past tense -ed
4. auxiliary be	

Table 06: Morphemes in Parental Speech (Brown, 1973, p. 449)

Research on a variety of languages suggests that several factors are involved. These are frequent occurrence, especially in utterance-final position Children show a greater tendency to notice and remember elements that occur at the end of the utterance than those found in any other position. Syllabicity Children seem to take greater notice of morphemes such as ‘-ing’, which can constitute syllables on their own, than the plural or possessive suffix “-’s”, whose principal allomorphs (/-s/, /-z/, and /-əz/) are single consonants. The resulting complication in the relationship between form and meaning may impede acquisition. Few or no exceptions in the way it is used whereas all singular nouns form the possessive with “-’s”, not all verbs use ‘-ed’ to mark the past tense (saw, read, drove). Such exceptions hinder the language acquisition process. Allomorphic invariance whereas the affix ‘-ing’ has the same form for all verbs, the past tense ending ‘-ed’ has three major allomorphs; ‘/-t/’ for verbs such as chase, ‘/-d/’ for forms such as crave and ‘/-əd/’ for verbs such as recite. This type of allomorphic variation, which also occurs with the plural, possessive, and third person singular affixes in English, slows morphological development. Clearly discernible semantic function Whereas morphemes such as plural ‘-s’ express easily identifiable meanings, some morphemes (such as the third person singular ‘-s’, as in She works hard) make no obvious contribution to the meaning of the sentence. Acquisition of this latter type of morpheme is relatively slow. Gradually children develop the word formation processes (O’Grady, pp. 471-476). Nelson (1973) notes that the child’s early nouns most often refer to things with which the child can interact: objects that are not fixed, unmovable parts of his environment. Generally, the child’s early vocabulary includes nouns and words related to action. Also, words that refer

Dhaka University Institutional Repository

to attributes of objects, states, or locations; such as pretty, big, allgone, hot, outside, and a few 'social' words like yes, no, please, and ouch. There are also several functional words; prepositions, articles, auxiliary verbs, interrogative words, etc. The particular words used, and even the kind of words, vary greatly from child to child (p. 31).

2.1.5. The Studies of Code-switching: Triggers, Purposes, Attitudes, and Relation to L2 Learning

There are several triggers and reasons for code-switching. The first is simply because the speaker does not have the facility in the primary language to express himself effectively or is translating for someone else with limited English proficiency. The speaker shifts to the second language in order to capture his or her thinking processes or to reflect the inadequate understanding of the other person (Cook, 2003). This generally occurs when the speaker is upset, tired, or distracted (p. 14). When code-switching is used to compensate for a language difficulty, it may be viewed as interference (Skiba, 1997). However, this type of code-switching may be considered strength when it is used as a sociolinguistic tool to aid the understanding of another person who is not facile in both languages. The second purpose for code-switching is that the individual may want to establish him- or herself as a member of a particular group (p. 900).

Gumperz (1982) noted that code-switching is motivated by the listener and/or purpose of the conversational interaction. Code-switching is typically situation motivated. A change in the social situation can motivate a change in code, such as the arrival of a new speaker, or the focus of the topic may facilitate a change to the other language. For example, a speaker may change upon the arrival of a new listener, "Sabes qué Tomas viene a la session? (Did you know that Thomas is coming to the session?) Oh, hi,Tom." He refers to this language solidarity as a "we code". In essence, "rapport is established between

Dhaka University Institutional Repository

the speaker and the listener when the listener responds with a similar switch" (p. 03). Code-switching is perceived as a mode of speech that is reserved for group members only and a way in which speakers can demonstrate their bilingual and bicultural identity. Similarly, code-switching can be used to exclude other members of a group who are not as familiar with the language.

Labov (2001), while conducting sociolinguistic interviews, designated two types of spoken styles which is different than code-switching; casual and formal; and three types of reading style (a reading passage, a word list, and a minimal pair list). Code-switching takes place when linguistic codes are altered and style shifting happens when there is a shift between styles of speech included in a linguistic repertoire of an individual speaker where styles may also be called as a register. Analysing style-shifting he postulated that 'styles can be arranged along a single dimension, measured by the amount of attention paid to speech' (pp. 97-120).

Sapir (1921) states that through language, we express our reality and 'no two languages are ever sufficiently similar to be considered as representing the same social reality' (p. 4). Therefore, when a bilingual speaker decides to code-switch, it is possible that her or his identity is exposed. Of course, there are many other explanations as to why code-switching occurs.

Defining who is 'in' and who is 'out' of a particular group is an effective manner of establishing membership or loyalty to a particular social group (Labov, 2001, pp. 97-120). These uniting phrases and expressions are often called 'shibboleths' because they serve to unite members of a cultural group and differentiate them from members of other groups. Such phrases and expressions are symbols of separation from the dominant cultural group and, as such, are subject to misinterpretation or stereotyping by outsiders, and yet, paradoxically, they act as symbols of pride in a shared cultural identity by insiders.

Dhaka University Institutional Repository

Finally, code-switching can be used as a sociolinguistic tool. Whereas some speakers can convey a certain effect or attitude by changing the formality of their speech, bilingual speakers can code-switch (Skiba, 1997, p. 900). Code-switching allows the speaker to alert the listener that the upcoming phrase is to be interpreted differently with a shift in emphasis. Bilingual speakers also can avoid miscommunication by using a term more adequately expressed in the other languages. Code-switching is used for clarification, emphasis, to separate facts from feelings, and to achieve a certain dramatic effect. Different languages may have different concepts and it is the contrasted use of these languages that may allow a multilingual speaker to more clearly make his or her point. For example, the subtle difference in connotation found between the French adieu (goodbye, means don't know when I'll see you again) and aurevoir (goodbye, means see you soon) is not one that can be captured in the English goodbye. Humor is an effect often created by code-switching (Cook, 2003, p. 14).

Bilinguals often switch between codes when they cannot find an appropriate word or expression or when the language being used does not have the items or the appropriate translations for the vocabulary they aim for. In addition, they are more likely to code-switch when they have not learned or are not equally familiar with the terms in both languages. Very often a bilingual knows a word in both language X and language Y, but the language Y word is more readily available at that moment when speaking language X. He or she may switch to language Y to say the word but later on in the conversation will use the equivalent word in language X (Grosjean, 1982, p. 182).

Gumperz (1982) claims that code-switching is meaningful in much the same way that lexical choice is meaningful; it is a verbal strategy, used in much the same way that a skillful writer might switch styles in a short story. For many bilinguals, code-switching helps them to amplify or emphasize a point (p. 152).

Dhaka University Institutional Repository

In several studies on bilingual first language acquisition it has been observed that almost all children pass through a stage in which they mix to a very large extent in both of their languages, but there is no consensus how to analyze these mixes, namely as instances of a lack of language separation, as a result of missing equivalent words or as code-switching. Children do not differentiate their two language systems, which have been brought up by some studies, have largely been disconfirmed by several studies. It seems a clear fact that children do separate their two languages from the very early onwards. Lexical need as the trigger for mixing an element into the other language could be an explanation for some mixes, but is definitely not the only reason. Therefore, it remains an open question why there is this stage of high mixing at the beginning of language acquisition, that is in the one-word stage and at the beginning of the two-words stage. We won‘t go into this discussion since it is not the topic of the present research to explain the reasons for this early stage of language mixing.

What can be said is that the children give evidence of being capable of using their language in a proper context. Given this fact, we will consider mixes as instances of code-switching from the beginning on. Nevertheless, we won‘t take the earliest mixes into account for our analysis, for the simple reason that, as mentioned above, in this stage children‘s utterances are rarely longer than one or two words, so that it is very difficult to analyze them from a syntactic point of view.

We know today from several studies that code-switching functions primarily as a symbol of group identity and solidarity among members of the speech community (Milroy and Muysken, 1995, p. 04). In fact, Gumperz (1982) referred to the two codes in switching as the we-code and the they-code, categorizing them in terms of their primary function; i.e., solidarity. While the former is associated with in-group relations and informal activities, and is aesthetically undervalued, the latter refers to the majority language that often serves as the communication tool for out-group relations with the mainstream

Dhaka University Institutional Repository

community (p. 152). Grosjean (1982) provides a concise but comprehensive outline of the factors that potentially explain speakers' choice of we-code or they-code (p. 136).

Grosjean's (1982, p. 136) List on Factors Influencing Language Choice

FACTORS INFLUENCING LANGUAGE CHOICE

Participants	*Situation*
Language proficiency	Location/Setting
Language preference	Presence of monolinguals
Socioeconomic status	Degree of formality
Age	Degree of intimacy
Sex	
Occupation	*Content of Discourse*
Education	
Ethnic Background	Topic
History of speakers' linguistic interaction	Type of vocabulary
Kinship relation	
Intimacy	*Function of Interaction*
Power relation	
Attitude toward languages	To raise status
Outside pressure	To create social distance
	To exclude someone
	To request or command

Table 07: Factors Influencing Language Choice (Grosjean, 1982, p. 182)

Gumperz (1982) talks about conversational code-switching that he defines as 'the juxtaposition within the same speech exchange of passages of speech belonging to two different grammatical systems or subsystems' (p. 59). He suggests a number of conversational functions of code-switching. They are as follows: quotations, addressee specification, interjections, reiteration, message qualification and personalization versus objectivization. As far as classroom discourse is concerned, Gumperz's (1982) categories are somewhat difficult to apply to classroom discourse. This is because his aim was to find

Dhaka University Institutional Repository

conversational functions; in classrooms there are different rules in discourse than outside the classroom. For instance, in classroom discourse the teacher usually selects the next speaker; there is rarely self-selection. However, his functions serve as valuable background information to the present research on functions of code-switching on language classrooms. Teachers and evaluators are exhorted to be linguistically sensitive to the needs of their students by making every effort to diagnose a true language disability in both languages and not simplify the difficulties found in normal second language acquisition. When bilingual students can switch between their two codes with ease and can maintain grammaticality of both languages, then this appears to be evidence of advanced language and higher order thinking skills. Code-switching thus appears to be evidence of intelligent behavior that requires significant manipulation of language, grammatical structure, nuances, and subtleties. The examination of a possible relationship between code-switching and intellectual abilities lead further studies (p. 152). When it is used due to a lack of linguistic expression, code-switching provides continuity in speech rather than presenting interference in language (Skiba, 1997, p. 900). Code-switching should be perceived as providing a linguistic advantage rather than an obstruction to communication. Through code-switching, speakers can convey attitudes, share membership within a cultural group, and exclude others from that insider status. The use of the second language allows speakers to more effectively communicate nuances of meaning that are restricted within one language. Skiba (1997) maintains that ‘language development takes place through samples of language which are appropriate and code-switching may be signaling the need for provision of appropriate samples’. He further says that, ‘the listeners in this case, are able to provide translation into the second language, thus providing learning and developing activity’. This, he says in turn, ‘will allow for a reduced amount of switching and less subsequent interference as time progresses’. These principles may also be applied in the second language (p. 900).

Dhaka University Institutional Repository

Cook (2003) asserts that code-switching may be integrated into the activities used for the teaching of a second language. At beginners' level, students may use second language for obtaining information from materials, such as a trained brochure or a phone message to answer comprehensive questions in the first language. At advanced stages, students may be required to conduct researches on different topics and provide reports in the first language. This approach is one which uses code- switching as a foundation of the development of a second language learner who can stand between the two languages and use whichever is most appropriate to the situation, rather than becoming an imitation native speaker (p. 14).

2.1.6. Sentence Structures of Bangla Language

In linguistics, word order refers to the study of the order of the syntactic constituents of a language, and how different languages can employ different orders. The basic word order for most languages can be defined by making a distinction between the subject and the direct object. There are six theoretically possible basic word orders for the sentences: subject verb object (SVO), subject object verb (SOV), verb subject object (VSO), verb object subject (VOS), object subject verb (OSV), and object verb subject (OVS). The overwhelming majority of the world's languages are either SVO or SOV, with a much smaller but still significant portion using VSO word order. The remaining three arrangements are exceptionally rare, with VOS being slightly more common than OSV, and OVS being significantly rarer than the two preceding orders. Example of Subject Verb Object (SVO) is below.

Sentence: He goes to school.

Parts: S V O

In Bangla language the occurred sentences follow the SOV pattern, hence it is fixed. There may be some exceptions for the sentences in Bangla depending on the disposition of words. For example: in the sentence 'ঈশ্বর গ্রামে, ভদ্রপল্লীতে থাকেন।' SOV can be changed into 'ঈশ্বর থাকেন ঐ গ্রামে, ভদ্রপল্লীতে।' SVO pattern. In that case, the occured sentences will follow the SVO pattern.

Dhaka University Institutional Repository

The sentences that occur from Bangla-English code-switching, have the subjects is in its specifier positions. Determiners, quantifiers, postpositions, clitics or grammatical particles etc. are added with the Bangla Noun words and placed in the specifier argument position. In Bangla Noun phrase, the determiners co-occur with the noun and not with other word-classes; for example: in the sentence 'বলটি পানিতে পড়ে গেল।' (English Translation: The ball fell into water) 'বল' is noun and 'টি' is the singular marker added with the noun word. Again, পানি is a noun word and তে is a grammatical particle Bivokti (বিভক্তি).টা, টি, খান, খানা, খানি, গাছা, গাছি, ছড়া, etc. singular marker can be added after noun words. For example: ছেলেটি, লোকটি, কাপড়খান, চিঠিখানা, বইখানি, চুড়িগাছি, হারছড়া etc.

The singular marker এক can be added before noun. For example: এক ছিলেন রাজা। (English Translation: There was a king.). টা, টি, খান, খানা, খানি, গাছা, গাছি, ছড়া, etc. singular marker can be added with এক and before noun words. For example: একটা লোক, একটি পাখি , একখান কাপড়, একখানা বই, একখানি চিঠি, একগাছা চুড়ি, একগাছি হার, একছড়া তেঁতুল, etc. এ, রা, এরা, দের, দেরকে, এদের, গুলো, গুলি, দল, সব, etc. plural marker and quantifiers are added after noun words. For example: পাগলে, জেলেরা, ছেলেদের, তাদেরকে, বইগুলো, লোকগুলি, ছাত্রদল, পাখিসব, etc. সব, সকল, সমস্ত, এত, কত, etc. are added before noun. For example: সব নদী, সকল মানুষ, সমস্ত পথ, এত লোক, কত টাকা।Often noun words are repeated and used as compound noun phrase. For example: লোকে লোকে লোকারণ্য। Degree words for the Adjective phrases can also take the specifier positions. For example: বিশ পৃষ্ঠা, ভাল মানুষ etc. If we think in terms of case marking, we see that Nominatives and Accusatives always take the specifier position as subjects of the occurred sentences. With the addition of grammatical particles or clitics, the Genitives also can be placed in the subject argument position.

The sentences that occur from Bangla-English code-switching usually have the interjectional phrases in the adjunct positions. The adjuncts usually appear at the beginning of the sentences. For example, ও, ওঃ, ওরে, ওহে, বাঃ, আহা, বেশ, চমৎকার, না-না, ছিঃ, ছিঃছিঃ, নিশ্চয়ই, আচ্ছা, অবশ্যই, আঃ, উঃ, হা, etc. are usually

Dhaka University Institutional Repository

replaced by the English words ‘Oh!’, ‘sure’, ‘wow’, ‘definitely’, ‘aha’, ‘of course’, ‘okay’ etc. in the occurred sentences. সুতরাং, তাই, অধিকন্তু, etc. Conjunctional phrases also take the adjunct position and take the English words ‘so,’ ‘moreover’ etc. while the code-switching occurs. If we look at the example (b) it can be seen that the word definitely is a single word, is used in the adjunct position, and is optional.

2.2. Setting Parameters

2.2.1. Well-formedness Judgments

In the small-scale study the sentences are analyzed in terms of well-formedness and ill-formedness. In theoretical linguistics, a speaker's judgment on the well-formedness of a linguistic utterance; called a grammaticality judgment; is based on whether the sentence is produced and interpreted in accordance with the rules and constraints of the relevant grammar. If the rules and constraints of the particular language are followed, then the sentence is considered to be grammatical or well-formed. In contrast, an ungrammatical or ill-formed sentence is one that violates the rules of the given language. Poplack (1980) work within the framework of a third context-free phrase structure grammar built from the two monolingual grammars. He proposed two constraints, presented below.

a. Free Morpheme Constraint: No switch may occur between a bound morpheme and a lexical form unless the latter has been phonologically integrated into the language of the former.

b. Equivalence Constraint: The order of sentence constituents on either side of the switch point must be grammatical with respect to both languages (p. 148).

2.2.2. Sentential Positions and Code-switching Arrangements

In case of Bangla-English code-switching, the total number of switched words is to be measured along with non-switched ones. In order to look into the code-switched items, there needs to be a look at the different sentential

Dhaka University Institutional Repository

positions for code-switching. It can occur with both adjuncts and arguments. Given below are some examples and brief discussions of these kinds of code-switching.

(a) Switching with Argument

Sentence	: জুঁই	homework	শেষ	করলো।
Transliteration	: Jui	homework	shesh	korlo.
Parts	: N.S3	N.	V.	V.PST. S3

(b) Switching with Adjunct

Sentence	: Definitely	আমি	তোমাকে	ডেকেছিলাম।
Transliteration	: Definitely	ami	tomake	dekechilam.
Parts	: ADV.	P.	P.S3	V.PST.S3

In the first example (a), the sentence ‘Jui homework shesh korlo’ contains two arguments; ‘Jui’ is the subject argument and ‘homework’ is the object argument of verb predicate ‘shesh korlo’. ‘Jui’ is in the specifier argument and ‘homework’ is the complement argument. Example (b) shows that the word ‘definitely’ is added optionally with ‘ami toma-ke dekechilam’, thus here the switching is happening with adjunct with the word ‘definitely’. From these, it can be seen that at the example (a), there is a use of serial verbs in the occurred sentence. The words ‘shesh korlo’ has two verbs ‘shesh’ means ‘to finish’ which is the infinitive form of verb for the word ‘korlo’ that means ‘finished’. There are many examples of this pattern of serial verbs which gives rise to a third type of switching; switching with the verbs. Hence, another example of this type of switching is given next.

(c) Switching with Verb

Sentence	: জুঁই	TV	on	করলো।
Transliteration	: Jui	TV	on	korlo.
Parts	: N.S3	N.	PREP.	V.PST.S3

Again, it has been found that ‘on’ is used as the infinitive form of verb for the word ‘korlo’ that means ‘finished’ and hence serial verbs have occurred. From the above sentences it can be found that the occurred sentences follow SOV

Dhaka University Institutional Repository

(Subject-Object-Verb) pattern in all case. There may be some exceptions for the sentences in Bangla depending on the disposition of words.

2.2.3. Verb Serialization

A different but very common strategy, known as verb serialization, occurs widely in the world's languages, for instance in Chinese, in many African languages, and in many of the languages of New Guinea. Example below illustrates a serial verb construction from Nupe (a language of Nigeria), showing two finite verbs simply following one after the other.

Musa be la ebi. (Nupe)

Musa came took knife

'Musa came to take the knife.' (Tallerman, 2011, p. 96)

Serial verb construction, broadly defined, is a syntactic structure in which two or more verbs are juxtaposed to form a complex predicate to express a series of related actions within a single clause with some general characteristics cross-linguistically: a. the verbs share the same grammatical subject; b. there are no connective markings to indicate the relationships of the verbs; c. the verbs are under the same grammatical categories, e.g., tense, aspect, and/or modality; and d. the verbs are in a fixed order with varied relationships based on the verb semantics (Tao, 2009, p. 210). In some languages, though, if the first of the two serial verbs is transitive, an object noun phrase can occur between them, as in the example below. Here, the object of the transitive verb mu 'took' (iwe, 'book') intervenes in this way between the serial verbs mu and wa, 'came':

o mu iwe wA!_(Yoruba)

he took book came

'He brought the book.'

The serial verbs cannot be marked independently for such grammatical categories as tense, aspect or mood, but must share the same tense etc. This is either marked on each verb, or else occurs just once but is shared by both verbs (Tallerman, 2011, p. 96). Another important matter is that according to morphological descriptions, all complex words whether productively or

Dhaka University Institutional Repository

unproductively derived are created by rules (Haspelmath, 2002, p. 42). It is also seen that many languages have a special verb forms making relative clauses are called participles and that verbs are derived from other verbs (Bauer, 2002, pp. 67 - 68). The inherent inflection comprises categories that, like derivation, convey a certain amount of independent information and that are not forced on the speaker by the syntactic context. Thus, a speaker may freely choose the verb's tense and aspect categories, the nominal number categories and also nominal inherent cases where the term inherent refers to cases such as locative that make its own semantic contributions and are mostly not syntactically determined. It has also been found that inflectional rules are inflectional rules apply only after the syntactic rules have applied (Haspelmath, 2002, pp. 77-82).

2.2.4. Minimalist Approach

Adger (2003) points out four major word classes in his writing, which are usually abbreviate as just N, V, A and P and which is distinguished using the four features [N], [V], [A] and [P]. He termed these features as major category features (p. 28). The further breaks shows that the major category features may be reducible to only Noun [N] and Verb [V] (p. 41). He further mentioned that the four most studied syntactic categories are Noun (N), Verb (V), Adjective (A), and Preposition (P). Some items can belong to more than one category (p. 182). The leading aim of the MP is the elimination of all mechanisms that are not necessary and essential on conceptual grounds alone; thus, only the minimal theoretical assumptions may be made to account for linguistic data, privileging more simplistic and elegant accounts over complex ones. These assumptions would naturally favor accounts of code-switching which make use of independently motivated principles of grammar over those which posit rules, principles, and/or other constraints specific to it. In a Minimalist approach to code-switching, lexical items may be drawn from the lexicon of either language to introduce features into the numeration, which must then be checked for convergence in just the same way as monolingual features must be checked, with no special mechanisms permitted. In this Lexicalist Approach,

Dhaka University Institutional Repository

no ‘control structure’ is required to mediate contradictory requirements of the mixed systems. The requirements are simply carried along with the lexical items of the respective systems. Thus, it makes sense to formalize the grammar used for code-switching as the union of the two lexicons, with no mediating mechanisms. While Mahootian (1993) is not explicit about whether her formulation is a principle of grammar or a theory about which syntactic operations are relevant to code-switching, data considered here strongly suggest that the head-complement relation is far too narrow to account for the facts of code-switching (p. 95).

2.2.5. Morphosyntactic Issues in Syntax

Adger (2003) defined morphosyntactic features as ‘a property of words that the syntax is sensitive to and which may determine the particular shape that a word has. Features seem to be the core elements of languages that relate sound and meaning.’ He further claimed that these features ‘allow us to explain the morphological, syntactic, and semantic behavior of words in sentences’ and presented the most important features in a table. The table and its brief discussion is next.

Categories	Features	Comments
Tense	[past]	need [future] as well, for Irish
Number	[singular], [plural]	feature bundle [singular, plural] for dual number
Person	[1], [2]	[1,2] gives ‘Fourth’ person
Gender	[masc], [fem]	need others for different languages
Case	[nom], [acc], [gen]	again, may need others
Category	[N], [V], [A], [P]	may be reducible to just [N], [V]
Others	[part], [inf]	appear on verbs

Table 08: Morphosyntactic Features (Adger, 2003, p. 39)

He discussed that participles come in two broad classes in English: one class can be distinguished morphologically by the fact that it suffixes ‘-ing’ to the verb, while the other is morphologically more heterogeneous and may suffix ‘-

Dhaka University Institutional Repository

en', or '-ed' or may employ a vowel change. If a verb like 'be' is taken, which has the richest set of morphological forms in English, it can be found that, in addition to the present and past forms of the verb discussed above, there are three other forms that it takes: be, being, been. The latter two of these are participles. These verb forms appear when the tense feature is not marked directly on the verb. This can happen because there is no tense specification in the sentence, or because the tense marking is carried by something else (another verb -traditionally called the auxiliary verb). For example: 'He has been happy'. The form marked by the suffix '-ing' is traditionally called the present participle. The present participle can occur after the verb be to signify that an action is conceived of as ongoing, or continuous. This contrasts with the past participle, marked by '-en', '-ed', or a vowel change, which occurs mainly after the verb 'have', to signify that an action has been completed. The semantic distinction between ongoing and completed action is one of Aspect. Participial morphology, in conjunction with particular auxiliaries, is used in English to make certain aspectual distinctions. The participles from non-participles can be, thus, distinguished by the use of a feature [part], so that a present participle will be [V, part] and a past participle will be [V, past, part] (pp. 39-40).

Dhaka University Institutional Repository

Chapter Three: Methodology for the Research

In Litosseliti's (2010) editing of Research Methods in Linguistics, she mentioned that the research methods and techniques adopted in any research project depend upon the focus of the researcher which plays a major role in conducting a research since it is directly related to the validity and reliability of the research (p. 227).

3.1. General Overview of Quantitative Research

A researcher can choose to make it a qualitative, quantitative, or mixed method based on the type of research needed to be conducted. Put briefly, qualitative research is concerned with structures and patterns, and how something is; quantitative research, however, focuses on how much or how many there is/are of a particular characteristic or item. The great advantage of quantitative research is that it enables us to compare relatively large numbers of things/people by using a comparatively easy index. There is another fundamental difference between qualitative and quantitative studies. Qualitative studies are, by their very nature, inductive: theory is derived from the results of our research.

In a Quantitative research a hypothesis/many hypotheses can be formed which is/are statement(s) about the potential and/or suggested relationship between at least two variables, such as 'the older a learner, the less swear words they use' (two variables) or 'age and gender influence language use' (three variables). A hypothesis must be proven right or wrong, and hence, it is important for it to be well defined.

Kumar (1999), in this regard of quantitative and qualitative choice of research presented a chart that represents the types of research based on the functions and approaches of the research methods. The quantitative and qualitative research falls under the enquiry mode of research that concerns the process

Dhaka University Institutional Repository

one adopts to find answers to the research questions. Broadly, there are two approaches to enquiry; 1. the structured approach, and 2. the unstructured approach.

In the structured approach everything that forms the research process; objectives, design, sample, and the questions that one plans to ask of respondents; is predetermined. The unstructured approach, by contrast, allows flexibility in all these aspects of the process. The structured approach is more appropriate to determine the extent of a problem, issue or phenomenon, whereas the unstructured approach is predominantly used to explore its *nature*, in other words, variation/diversity per se in a phenomenon, issue, problem or attitude towards an issue. For example, if one wants to conduct a research on the different perspectives of an issue, the problems experienced by people living in a community or the different views people hold towards an issue, then these are better explored using unstructured enquiries. On the other hand, to find out how many people have a particular perspective, how many people have a particular problem, or how many people hold a particular view, one needs to have a structured approach to enquiry. Before undertaking a structured enquiry, in the author's opinion, an unstructured enquiry must be undertaken to ascertain the diversity in a phenomenon which can then be quantified through the structured enquiry. Both approaches have their place in research. Both have their strengths and weaknesses. Therefore, one should not 'lock' oneself solely into a structured or unstructured approach. The structured approach to enquiry is usually classified as quantitative research and unstructured as qualitative research. Given next is the chart showing the types of researches.

Dhaka University Institutional Repository

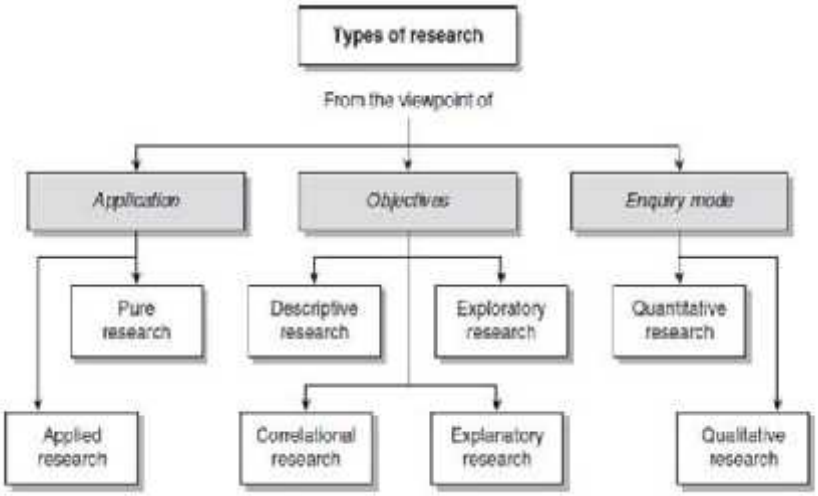


Figure 03: Types of Research (Kumar, 1999, p. 30)

Differences in philosophical perspectives in each paradigm combined with the aims of a study, to a large extent, determine the focus, approach and mode of enquiry which, in turn, determine the structural aspects of a study design. In quantitative research, the measurement and classification requirements of the information that is gathered demand that study designs are more structured, rigid, fixed and predetermined in their use to ensure accuracy in measurement and classification. Quantitative study designs have more clarity and distinction between designs and methods of data collection. Some designs are basically methods of data collection. For example, in-depth interviewing is a design as well as a method of data collection and so are oral history and participant observation. In quantitative research respondent concordance does not occupy an important place. Sometimes it is assumed to be achieved by circulating or sharing the findings with those who participated in the study. The 'power-gap' between the researcher and the study population in qualitative research is far smaller than in quantitative research because of the informality in structure and situation in which data is collected. In this research enough detail about a study design is provided for it to be replicated for verification and reassurance. If the interest is in focusing in the measurement of the magnitude of that variation, 'how many people have a particular value, belief, etc.?', the quantitative designs are more appropriate. For good quantitative research it is

Dhaka University Institutional Repository

important to combine quantitative skills with qualitative ones when ascertaining the nature and extent of diversity and variation in a phenomenon. Some of the commonly used designs in quantitative studies can be classified by examining them from three different perspectives; 1. the number of contacts with the study population, 2. the reference period of the study, and 3. the nature of the investigation. Every study design can be classified from each one of these perspectives. These perspectives are arbitrary bases of classification; hence, the terminology used to describe them is not universal. However, the names of the designs within each classification base are universally used. It is to be noted that the designs within each category are mutually exclusive; that is, if a particular study is cross-sectional in nature it cannot be at the same time a before-and-after or a longitudinal study, but it can be a non-experimental or experimental study.

Based on the number of contacts with the study population, designs can be classified into three groups; 1. cross-sectional studies, 2. before-and-after studies, and 3. longitudinal studies. Cross-sectional studies, also known as one-shot or status studies, are the most commonly used design in the social sciences. This design is best suited to studies aimed at finding the prevalence of a phenomenon, situation, problem, attitude or issue, by taking a cross-section of the population. They are useful in obtaining an overall ‘picture’ as it stands at the time of the study. They are ‘designed to study some phenomenon by taking a cross-section of it at one time’. Such studies are cross-sectional with regard to both the study population and the time of investigation. This particular research is a cross-sectional one since the samples have been taken into account from different participants of different schools. Simultaneously it can be considered as an experimental study as well since it is based on a task-based experiment.

Talking about quantitative methods and data inevitably means talking about variables. The Oxford English Dictionary (OED) defines variable (noun) as something which is liable to vary or change; a changeable factor, feature, or

Dhaka University Institutional Repository

element. In slightly different words, a variable is a feature of a particular case, and a particular case can take one of a set of possible features. In general, one distinguishes between two basic kinds of variables: categorical variables and continuous variables. Categorical variables are those variables whose values can be easily separated into discrete categories. Categorical variables are common in linguistics. Continuous variables, however, cannot be easily classified into categories this way. Rather, they are variables whose values exist on a mathematical scale. A canonical example of a continuous variable is age, where one variable value is straightforwardly larger than another and smaller than a third The difference between these values is also mathematically meaningful. Given next is a tree to show how to select the variables for a research (pp. 31- 75).

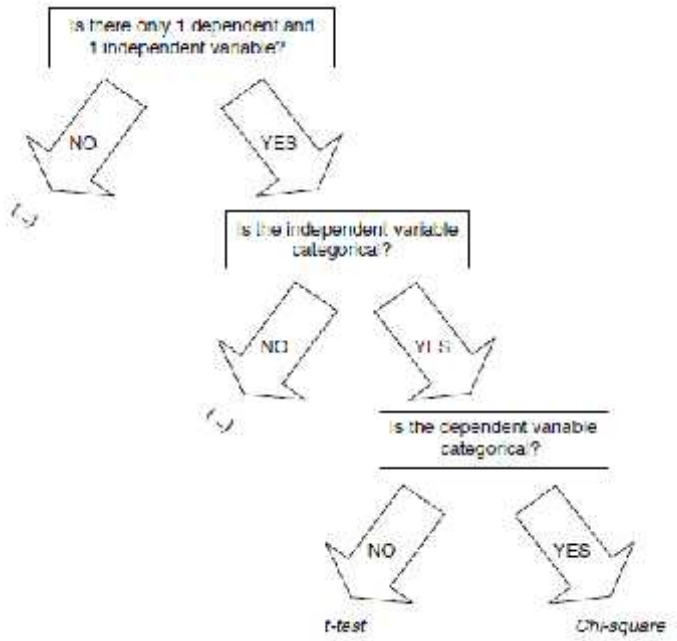


Figure 04: Tree Diagram to Select Tests Depending on Variables
(Kumar, 1999, p. 70)

According to Walliman (2011) research Methods are the tools and techniques for doing research. Research is a term used liberally for any kind of investigation that is intended to uncover interesting or new facts. As with all activities, the rigour with which this activity is carried out will be reflected in

Dhaka University Institutional Repository

the quality of the results (p. 07). Given below is a table showing how to move towards more concrete buildings for a research from abstract concepts.

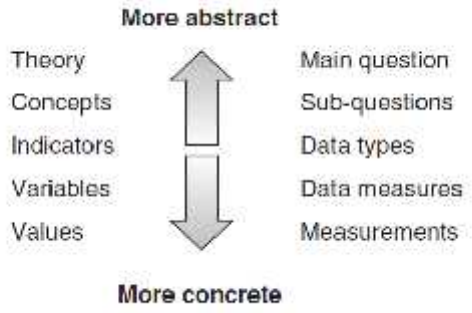


Figure 05: Structure of Concepts (Kumar, 1999, p. 70)

The table above shows how the data plays a significant role in measurements of research concepts; how the variables add values to the given research and builds towards the concepts or hypotheses to the theories and how the data types directly connects to the main aim(s) and objectives of a research. According to him the data can be sub-divided into two categories; primary and the secondary. There are four basic types of primary data, distinguished by the way they are collected:

(a) Measurement: collections of numbers indicating amounts, e.g. voting polls, exam results, car mileages, oven temperatures etc.

(b) Observation: records of events, situations or things experienced with own senses and perhaps with the help of an instrument, e.g. camera, tape recorder, microscope, etc.

(c) Interrogation: data gained by asking and probing, e.g. information about people's convictions, likes and dislikes etc.

(d) Participation: data gained by experiences of doing things e.g. the experience of learning to ride a bike tells different things about balance, dealing with traffic etc., rather than just observing.

According to Walliman (2011) Quantitative data can be measured, more or less accurately because it contains some form of magnitude, usually expressed in numbers. One can use mathematical procedures to analyze the numerical

Dhaka University Institutional Repository

data. These can be extremely simple, such as counts or percentages, or more sophisticated, such as statistical tests or mathematical models. Although some forms of data are obviously expressed as numbers, e.g. population counts, economic data, scientific measurements etc. Others that seem remote from quantitative measures can also be converted to numbers. For example, people's opinions about the performance of political parties look difficult to quantify. But if a set choice of answers is given in a questionnaire then you can then count the numbers of the various responses. The data can then be treated as quantitative. Census figures (population, income, living density, etc.), economic data (share prices, gross national product, tax regimes, etc.), performance data (e.g. sport statistics, medical measurements, engineering calculations, etc.) and all measurements in scientific endeavor are all typical examples of quantitative data. Data can be measured in different ways depending on their nature. These are commonly referred to as levels of measurement; nominal, ordinal, interval and ratio. Nominal measurement is very basic; it divides the data into separate categories that can then be compared with each other. By sorting out the data using names or labels can build up a classification of types or categories. For example, buildings may be classified into many types, e.g. commercial, industrial, educational, religious etc. Some definitions allow only two types, e.g. sex (male or female), while others fall into a set number such as marital status (single, married, separated, divorced or widowed). Nominal data can be analyzed using only simple graphic and statistical techniques. Bar graphs, for example, can be used to compare the sizes of categories and simple statistical properties such as the percentage relationship of one subgroup to another or of one subgroup to the total group can be explored. The ordinal type of measurement puts the data into order with regard to a particular property that they all share, such as size, income, strength, etc. Precise measurement of the property is not required, only the perception of whether one is more or less than the other. For example, a class of children can be lined up in order of size without measuring their heights; the runners in a marathon can be sorted by the order in which they finished the race. Likewise, we can measure members of the workforce on an

Dhaka University Institutional Repository

ordinal scale by calling them unskilled, semi-skilled or skilled. The ordinal scale of measurement increases the range of statistical techniques that can be applied to the data. With this form of measurement, the data must be able to be measured precisely on a regular scale of some sort, without there being a meaningful zero. For example, temperature scales in the Fahrenheit, Celsius and Rainier scales, the gradation between each degree is equal to all the others, but the zero point has been established arbitrarily. They each precisely measure the temperature, but the nought degrees of each are different. Another example is the calendar date; e.g. compare the Chinese and Western calendars. The ratio level of measurement is the most complete level of measurement, having a true zero: the point where the value is truly equal to nought. Most familiar concepts in physical science are both theoretically and operationally conceptualized at a ratio level of quantification, e.g. time, distance, velocity, mass etc. A characteristic difference between the ratio scale and all other scales is that the ratio scale can express values in terms of multiples of fractional parts, and the ratios are true ratios. For example, a metre is a multiple (by 100) of a centimeter distance, a millimetre is a tenth (a fractional part) of a centimetre. The ratios are 1:100 and 1:10. There is no ambiguity in the statements ‘twice as far’, ‘twice as fast’ and ‘twice as heavy’. Of all levels of measurement, the ratio scale is amenable to the greatest range of statistical tests. In summary, one can use the following simple test to determine which kind of data measurement that he or she can use on the values of a variable. If one can say that:

(a) one value is different from another; it has a nominal scale;
(b) one value is bigger, better or more of anything than another, it has an ordinal scale;
(c) one value is so many units (degrees, inches) more or less than another, it has an interval scale;
(d) one value is so many times as big or bright or tall or heavy as another, it has a ratio scale.

Dhaka University Institutional Repository

In case of secondary data, he lists a few types. These are given below with a bit of explanations:

(a) Written Materials: organizational records such as internal reports, annual reports, production records, personnel data, committee reports and minutes of meetings; communications such as emails, letters, notes; publications, such as books, journals, newspapers, advertising copy, government publications of all kinds etc.

(b) Non-Written Materials: television programs, radio programs, tape recordings, video tapes, films of all types, including documentary, live reporting, interviews, etc. works of art, historical artefacts etc.

(c) Survey Data: government census of population, employment, household surveys, economic data, organizational surveys of markets, sales, economic forecasts, employee attitudes. These may be carried out on a periodic basis, with frequent regularity or continuously, or ad hoc or one-off occasions. They may also be limited to sector, time, area (pp. 72-80).

In terms of data collection procedure, for the research a sampling method has been chosen. Given below is a figure showing how sampling framing is done following his writing;

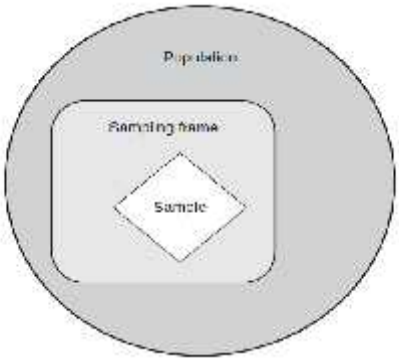


Figure 06: Sampling (Kumar, 1999, p. 60)

As a method of data collection, the questionnaire is a very flexible tool that has the advantages of having a structured format, is easy and convenient for respondents, and is cheap and quick to administer to a large number of cases

Dhaka University Institutional Repository

covering large geographical areas. There is also no personal influence of the researcher, and embarrassing questions can be asked with a fair chance of getting a true reply. However, they do require a lot of time and skill to design and develop. They need to be short and simple to follow, so complex question structures are not possible. Not everyone is able to complete questionnaires. There are three methods of delivering questionnaires, personally and by post or through the Internet. The advantages of personal delivery are that respondents can be helped to overcome difficulties with the questions, and can be persuaded and reminded in order to ensure a high response rate. Obviously, there are problems both in time and geographical location that limit the scope and extent to which this method of delivery can be used. Postal questionnaires are used when a large number of responses are sought, particularly when they are in different locations. The correct address for each respondent is required and postal costs must also be taken into account. The rate of response for postal questionnaires is difficult to predict or control, particularly if there is no system of follow-up. Internet questionnaires are the cheapest and least time consuming method of delivery. Although it is easy to get a blanket coverage by random delivery, response rates tend to be very low and it is difficult to know how representative the sample will be. For more structured deliveries, email addresses are required to pinpoint responses from the chosen sample. Follow up reminders are easily administered. It is common practice to pre-test the questionnaire on a small number of people before it is used in earnest. This is called a pilot study.

There are a range of tests that can be applied to discern the variance depending on the number of groups. For a single group, say the performance of students on a particular course compared with the mean results of all the other courses in the university you can use the chi-square or the one group *t*-test. For two groups, e.g. comparing the results from the same course at two different universities, you can use the two group *t*-tests, which compares the means of two groups. There are two types of test, one for paired scores, i.e. where the same persons provided scores under each condition, or for unpaired scores

Dhaka University Institutional Repository

where this is not the case. For three or more groups e.g. the performance of three different age groups in a test. It is necessary to identify the dependent and independent variables that will be tested. A simple test using SPSS is ANOVA (analysis of variance).

3.2. Selected Design Tools, and Scoring Systems

According to Dörnyei, (2007) a quantitative research involves data collection procedures that result primarily in numerical data which is then analyzed primarily by statistical methods. Typical example: survey research using a questionnaire, analyzed by statistical software such as SPSS. Following the idea, a quantitative method has been considered for entire data design and analysis procedures for the research since it requires numerical data as the frequency level of the occurred code-switching will be looked into in selected sentences. He also specified that in quantitative research decisions must be taken early in the overall planning process because they will considerably affect the necessary initial arrangements, the timing and scheduling of the project as well as the various costs involved (pp. 24-96). Hence right after the decision has been made a general criterion has been set for data design to collect relevant raw data. Given below are a few specifications including participants and target populations, experimental research techniques and storage, Anova and Post-Hoc Tests, school profiles, etc.

The populations for this research are Bengali children who speak Bangla as their L1 and English as their L2, and the sample are the selected participants of age group 10 to 12 (as mentioned above). This particular age group of participants is also relevant as they are before the age of Critical Period. For this research a purposive sampling method has been selected since a purposive sample is a non-probability sample that is selected based on characteristics of a population and the objective of the study. Purposive sampling is also known as judgmental, selective, or subjective sampling and the research has a selected questionnaire which is based on the objective of the research and calculated the ratio of the categories. Using a questionnaire enables one to

Dhaka University Institutional Repository

organize the questions and receive replies without actually having to talk to every respondent. The population over here happens to be 120 Bengali children of age 10-12 years old. It is worth to clarify here the reason of selecting children within the above mentioned age limit. It is plausible to consider age 10 as the standard age of getting enough input from their L1 (Hyltenstam and Abrahamsson, 2003, p. 59). For this research, participation of the learners has been chosen leaving scopes for measurements, interrogation, and observation if that adds to the research. The research, hence, is a semi-structured one with a set questionnaire and other possible options for gather the primary data in case.

The present study needs spontaneous and natural response from the participants. Therefore, traditional questionnaire is not capable enough to reveal the facts and resolve the problem. As a way out of this situation, an experiment will be designed for collecting natural data from them. This experiment will be performed within a flexible guideline of the quantitative research technique which will be a task-based approached. The data questionnaire will be basically presented to the students in a worksheet format. It will be because the age group of these students falls into 10-12 where they are already familiar with worksheets as classworks and assessments. This will be done purely because to get the students' attention along with not scaring them in the process. There will be thirteen sentences that fall into different lexical and non-lexical categories including the different features such as tense, number, etc. Given below are the sentences along with the areas focused:

1. Tense – Ritu *cleaned* her room today.
2. Number – My *friends* visited me when I was *sick*.
3. Noun- I got my *result*.
4. Adjectives – Her *room* is *really nice*.
5. Transitive – The *guard closed* the *gate.*
6. Intransitive- He *always complains.*
7. Ditransitive- Rabbi *passed* Rohan the ball.

Dhaka University Institutional Repository

8. Adverb- I did not *completely* understand the topic.
9. Preposition- She walked *in* the room.
10. Conjunction- We wanted to play outside *but* it is raining.
11. Interjection- *Oh!* The flower vase got broken.
12. Adjunct- *Submit* your homework *by tomorrow*.
13. Ditransitive – Son *gave* mom a flower.

The sentences will be presented in five different variations including the code-switched and non-code-switched forms along with pictures to understand the concepts for each. As in, each picture will be presented with five variations of a sentence with blank spaces to rank from one to five where one is the best option and gradually goes down to five being the worst. It will be kept in mind that the students would need clear instructions to fill those blank spaces to rank. The pictures will be printed horizontally or in a landscape format to make it more presentable. The data designing by default supports chances for code-switching. As in, even if a student collects 5 points for a non-code-switched sentence and ranks the other ones following the other rank sequences it would automatically turn out as preferring code-switching. This means that the data designing has been planned to find out about the code-switching ratio. In order to measure the ratio better at first, the total versus non code-switched items will be looked into. If there is a significant amount of code-switching that is taking place, I looked into the percentage of code-switching that is happening and from there the specific categorical code-switching from for Noun and Verb words will be measured along with particles and Adjectives since according to Adger (2003) the main categories happen to be the Nouns and the Verbs (p. 41). From the data I was also able to collect the boys' versus girls' participation ratio for different code-switching and choices on its types. The raw data will be analyzed following the parameters set earlier which includes judging if the sentences are well-formed and on their acceptance level as the students shall rank the sentences according to their judgment of very good, good, medium, bad, very bad sentences. The sentences will also show the SVO or SOV structure along with other sentential formations. It will also

Dhaka University Institutional Repository

be easy to measure the types of code-switching that occurs from the data received. Since the data is being collected for each sentence only, the intra-sentential switching has been omitted. While working on raw data the reliability and validity will be taken under consideration.

According to Dörnyei (2007) QUAN proponents usually emphasize that at its best the quantitative inquiry is systematic, rigorous, focused, and tightly controlled, involving precise measurement and producing reliable and replicable data that is generalizable to other contexts. The research needs to have three parts: (a) reliability, (b) measurement validity, (c) research validity. The term reliability comes from measurement theory and refers to the 'consistencies of data, scores or observations obtained using elicitation instruments, which can include a range of tools from standardized tests administered in educational settings to tasks completed by participants in a research study'. In other words, reliability indicates the extent to which our measurement instruments and procedures produce consistent results in a given population in different circumstances. The variation of the circumstances can involve differences in administrative procedures, changes in test takers over time, differences in various forms of the test and differences in raters. If these variations cause inconsistencies, or measurement error, then our results are unreliable. The concept of validity from a measurement perspective has traditionally been summarized by the simple phrase: a test is valid if it measures what it is supposed to measure. The research validity has two aspects: internal validity and external validity.

A research study or experiment has internal validity if the outcome is a function of the variables that are measured, controlled or manipulated in the study. The findings of a study are internally invalid if they have been affected by factors other than those thought to have caused them. External validity is the extent to which we can generalize our findings to a larger group, to other contexts or to different times. A study is externally invalid if the results apply only to the unique sample or setting in which they were found (pp. 34-52). In

Dhaka University Institutional Repository

order to ensure the validity, reliability, and significance of the research ANOVA test and Post-Hoc test shall be conducted. The data will be collected using checklist and on pen-and-paper using observation method and stored anonymously, with softcopies. I used Microsoft's excel to calculate the results and make bar-diagrams and pie-charts. I used 'SPSS' (Statistical Package for the·Social Sciences), produced by SPSS, Inc. in Chicago, USA. The collected data, according to the specifications mentioned above, has been used to support or reject the null hypothesis; i.e. code-switching occasionally occurs as an unmarked feature in the sentence patterns of Bengali bilingual children and that they use code-switching only for the stylistic purpose if the ANOVA test is significant.

However, if the test doesn't show a significant difference then the alternative hypothesis will be considered which emphasizes on the sensitiveness of sentence patterns due to code-switching for Bengali bilingual children and that the children may have language acquisition or product concerns since it might affect the sentence structure building. The Post-Hoc Tests will be performed to confirm on the data validity and reliability. The data will be shown in charts to present the gathered information graphically.

In addition to that the fundamental triggers will be measured to identify the high frequency rates following the collected raw data. The selected categories will also be looked into in order to find the sentential elements; the Nouns and Verbs categories along with Particles. It shall also be considered how the Nouns and Verbs are arranged in the sentential positions. The sentential positions and types of code-switching will also be measured considering the Adjuncts and Tag-switched items. The position of Subjects, Objects, and Verbs will also be looked into for further results and information.

The data have been collected from two selected primary schools where one is a public school and another is a private one. The schools are selected in this way so that children of different backgrounds in terms of financial situations

Dhaka University Institutional Repository

can take part in the data collection. The schools will be selected on the basis of the proposed criteria. Given next is the checklist for the school selection.

Checklist: School Profile	
Name of the School: Location:	
Checklist Items	
1. Type of the school: 2. Medium of instruction: 3. Registered: 4. Co-educational or Single-sex school: 5. Public or Private:	6. Languages taught: 7. School curriculum 8. Class size: 9. Students' attendance: 10. Observer allowed:

Table 09: Checklist of the School Profile

Name of the school and location are not required but it is important to record for future data collection or analysis. The type of school has to be a primary one as the students' age limit is from 10-12. The medium of instruction needs to be in Bangla language as majority of the students in Bangladesh get admitted to schools that follow Bangla language as their medium of instruction for all the subjects. This will allow more social variations in the classroom and also will bring out the usual picture of children in the country. Also that in the English medium schools code-switching is not allowed and there will be less data in this regard. It is important that the school is a registered one, and is a co-educational school so that the data is natural and accurate in terms of gender balance. As both private and public schools are to be selected for collecting data, it is important to take notes on it. It is important to know how many languages are taught, and confirm that English and Bangla languages are taught as subjects according to the school curriculums. It is important to the class size and if the students' attendances are regular. Finally, it is important to note if observer is allowed in the classroom to collect data.

Dhaka University Institutional Repository

Chapter Four: Data Analyses for the Study

The present research is a quantitative one since the research focuses on code-switching ratio or frequency of the occurred switching. It has been discussed that in general, one has to distinguish between two basic kinds of variables: categorical variables and continuous variables. Categorical variables are those variables whose values can be easily separated into discrete categories. Categorical variables are common in linguistics. Continuous variables, however, cannot be easily classified into categories this way. Rather, they are variables whose values exist on a mathematical scale. A canonical example of a continuous variable is age, where one variable value is straightforwardly larger than another and smaller than a third. The difference between these values is also mathematically meaningful. For the present study, the variables are categorical and there are basically five different categories. Its variables have one value is so many times as big or bright or tall or heavy as another; i.e. ratio scaling. Hence, ANOVA test has been implemented in this case. It has also been discussed that based on the number of contacts with the study population, designs can be classified into three groups: cross-sectional studies; before-and-after studies; and longitudinal studies.

Cross-sectional studies, also known as one-shot or status studies are the most commonly used design in the social sciences. This design is best suited to studies aimed at finding out the prevalence of a phenomenon, situation, problem, attitude or issue, by taking a cross-section of the population. They are useful in obtaining an overall ‘picture’ as it stands at the time of the study. They are designed to study some phenomenon by taking a cross-section of it at one time. Such studies are cross-sectional (Kumar, 1999, pp. 29- 106). This particular research is a cross-sectional one since the samples have been taken into account from different participants of different schools. Simultaneously it can be considered as an experimental study as well since it is based on a task-based experiment. For this research, participation of the learners has been

Dhaka University Institutional Repository

chosen leaving scopes for measurements, interrogation, and observation if that adds to the research. The research, hence, is a semi-structured one with a set questionnaire and other possible options for gather the primary data in case. The present study needs spontaneous and natural response from the participants. Therefore, traditional questionnaire is not capable enough to reveal the facts and resolve the problem. As a way out of this situation, an experiment will be designed for collecting natural data from them. This experiment will be performed within a flexible guideline of the quantitative research technique which will be a task-based approached. The data questionnaire will be basically presented to the students in a worksheet format. It will be because the age group of these students falls into 10-12 where they are already familiar with worksheets as classworks and assessments. This will be done purely because to get the students' attention along with not scaring them in the process. There will be thirteen sentences that fall into different lexical and non-lexical categories including the different features such as tense, number, etc. Given next are the sentences along with the areas focused.

1. Tense – Ritu *cleaned* her room today.
2. Number – My *friends* visited me when I was *sick*.
3. Noun- I got my *result*.
4. Adjectives – Her *room* is *really nice*.
5. Transitive – The *guard closed* the *gate.*
6. Intransitive- He *always complains.*
7. Ditransitive- Rabbi *passed* Rohan the ball.
8. Adverb- I did not *completely* understand the topic.
9. Preposition- She walked *in* the room.
10. Conjunction- We wanted to play outside *but* it is raining.
11. Interjection- *Oh!* The flower vase got broken.
12. Adjunct- *Submit* your homework *by tomorrow*.
13. Ditransitive – Son *gave* mom a flower.

Following the framework, the data is analyzed in two segments; the first one provides with a ratio analysis and later relates to the linguistic analysis.

Dhaka University Institutional Repository

4.1. Ratio Analyses

In order to analyze the data, the questionnaire needed to be sorted out first in terms of participants. The participants were from two different schools. In Civil Aviation School there were 48 male participants present out of 50 and all 50 female participants were present who are in their 10 to 12 years of age. In BAF Shaheen College Tejgaon Dhaka there were 19 students in one section where there were 9 female students and 10 male students leaving one absent student. The report was presented according to the pictures in the questionnaire; each picture was presented with five variations of the thirteen sentences for the students to rank.

The students of the first school is presented with CAB and each participant has been tagged with numbers as in 001, 002, etc. Therefore, CAB-001 means the first male participant from the school Civil Aviation. In the same manner, the girls' numbering was being done leaving them to CAG-001 to CAG-50. The students of the second school were presented as BAF, B-001 for first male participant and BAF, G-001 for first female participant. All these students were in their grade five. It was kept in mind that a number of students, attempted for non-code-switched sentences and that the students might rank randomly as they please due to the questionnaire options settings as open. The sentences were read to find the nouns, verbs, adjuncts, and particles switching along with particles switching along with original pictures for each. For example, given in the next page is a picture and the sentences for it.

☐ রিতু আজকে তার room clean করল।
☐ রিতু আজকে তার room পরিষ্কার করল।
☐ রিতু আজকে তার ঘর পরিষ্কার করল।
☐ Ritu cleaned her room today, তাই না?
☐ রিতু আজকে তার ঘর পরিষ্কার করল, right?

Figure 07: Sample Questionnaire Table

Dhaka University Institutional Repository

In the above picture, we have five variations for the sentence ‘Ritu cleaned her room today.’ where tense is given an importance. We have Ritu a noun, clean being the verb, her is pronoun, and today is adverb. The first variation has a noun and a verb being switched and the following sentences have noun switch, no code-switching, the rest two have a tag switching variation. It was closely monitored that the students have understood the instructions before beginning the ranking.

Due to this, students came up with their own rankings for each. Some of them preferred two ‘threes’ some preferred ‘blank’ to not answer anything, some preferred ‘five’ for non-code-switched items leaving the rest blank or a few blanks. Hence, the responses varied and were genuine. The students gradually filled up the questionnaire.

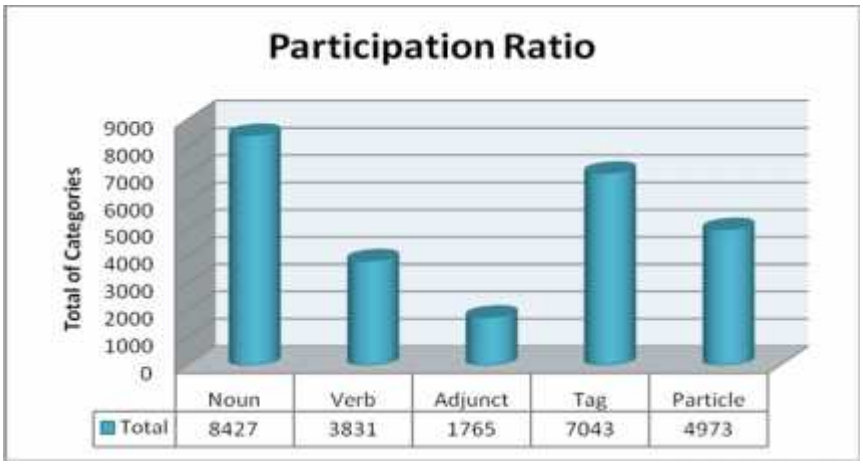


Figure 08: Bar Diagram Showing Total Participation

The bar diagram above presents the total of each categories; Noun, Verb, Adjunct, Tag, Particle. Given the data, it can be said that the switching with Nouns is more frequent than switching with Verbs. According to frequencies, the sequence of code-switching happens more with Nouns, then comes Tag switching, Particles, Verbs, then Adjuncts. Tag-switching happens at the phrase level which is at the end of a sentence and this does not affect a

Dhaka University Institutional Repository

sentence's structure at the core, i.e. SOV (for Bangla) and SVO (for English). Particles are being associated with Nouns. For example: in the sentence 'আমার friend-রা আমাকে দেখতে এসেছিল।' (English Translation: My friends came to see me.) 'friend' is noun and 'রা' is the singular marker added with the noun word. Grammatical particle Bivokti (বিভক্তি). টা, টি, খান, খানা, খানি, গাছা, গাছি, ছড়া, etc. singular marker can be added after noun words. For example: ছেলেটি, লোকটি, কাপড়খান, চিঠিখানা, বইখানি, চুড়িগাছি, হারছড়া, etc. Verb switching is less frequent as it seems in comparison to switching with Noun words. These data were further analyzed following one-way Anova test with Post-Hoc Tukey HSD Test Calculator. For the test, A, B, C, D, and E were considered as Nouns, Verbs, Adjuncts, Tags, and Particles. With all the calculations, the test results show a few interesting phenomenon. First of all, it shows the p-value to be 1.1102e-16 which means there is a significant factor that exists in the data; i.e. one or more pairs of treatments are significantly different. In order to validate the significance a Post-Hoc test has been performed as there is a chance of errors that might exist; i.e. 4.6242 or 3.8697. Even in Post-Hoc test all 20 each categories; A versus B, A versus C, A versus D, A versus E, B versus A, B versus C, B versus D, B versus E, C versus A, C versus B, C versus D, C versus E, D versus A, D versus B, D versus C, D versus E, E versus A, E versus B, E versus C, E versus D show significant percentages; i.e. p-value is below 0.01. This result entirely confirms that there exist a few traits that might be looked into. Given below is the chart showing p-value and further details of the test procedures and result is shown in the Apendix section for further addition to the research.

One-way ANOVA of the k=5 independent treatments:

source	sum of squares SS	degrees of freedom ν	mean square MS	F statistic	p-value
treatment	233,345.6678	4	58,336.4169	859.6875	1.1102e-16
error	39,696.7542	585	67.8577		
total	273,042.4220	589			

Figure 09: ANOVA Test Results

To check further on this, the bar diagrams are considered as it shows the number of categories that occurred in the selected sentences. The Nouns occur significantly more than the Verbs and other categories. It also shows that the particles that tag along with Nouns aren't switching and staying as Bangla which makes the switched words being Nouns. It is a 25.68% of times the particles are attached with Nouns for girls and 24.05% times for boys. Another interesting phenomenon is that the there is a significant number of serial verbs that are present in the raw data. Adjunct switching happens outside the sentencial level hence switching with adjuncts may also play less of an effect on change of sentence structure at the core.

Following the methodologies, hence it can be concluded that this data received supports the Null Hypothesis which was Code-switching occasionally occurs as an unmarked feature in the sentence patterns of Bengali bilingual children and that they use code-switching only for the stylistic purpose as the ANOVA test is significant. Hence the alternative hypothesis is not considered which emphasizes on the sensitiveness of the sentence patterns due to code-switching for Bengali bilingual children and that the children may have language acquisition or product concerns since it might affect the sentence structure building. However, an interesting factor was noticed from the data; i.e. there were quite an amount of serial verbs that were present in the sentences preferred.

This study also shows the different participation ratio of boys and girls. Boys tend to be more frequent in adjunct switching than girls. Boys also have a higher percentage in tag switching. On the contrary girls seem to be switching more with particles, nouns and verbs.

Dhaka University Institutional Repository

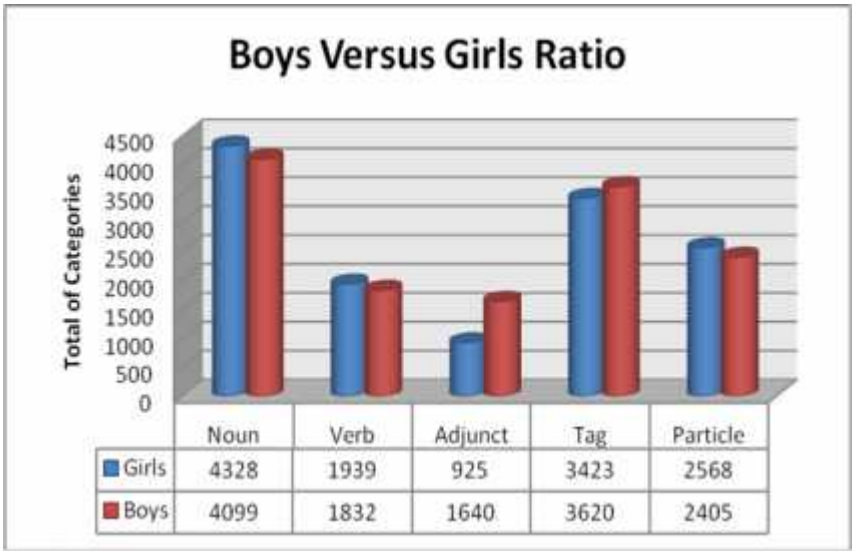


Figure 10: Bar Diagram with Participation Differences

Another important data received from the survey is that the Intra-word switching is taking place at 25.68% for girls and 24.05% for boys. The tag-switching happens to be 34.23% for girls and 36.2% for boys. Inter-sentential on the other hand is 62.67% for girls and 59.31 for boys. These data is being shown in a bar-diagram below.

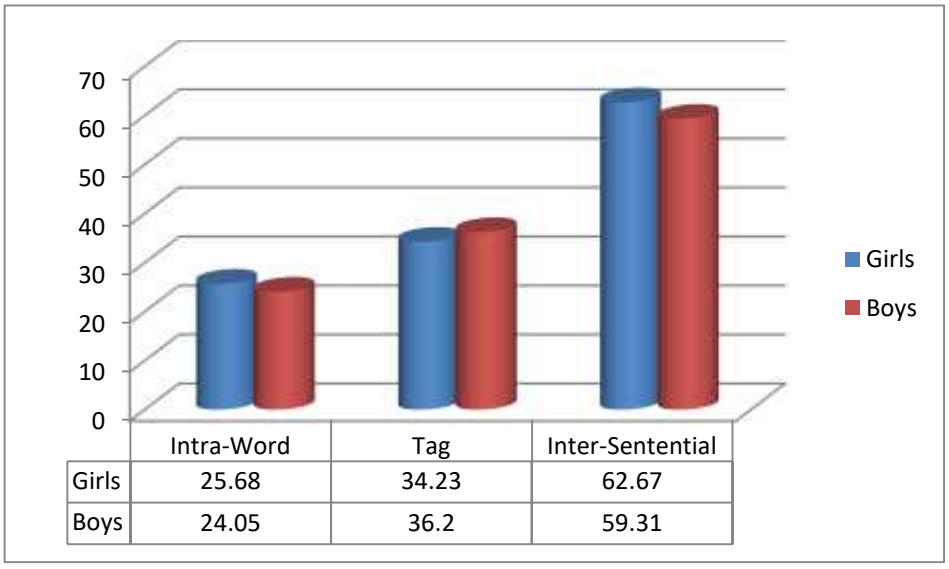


Figure 11: Ratio of Types of Occurred Code-switching in Sentences

At the end it can be said that the data supports the Null Hypothesis which is Code-switching occasionally occurs as an unmarked feature in the sentence

Dhaka University Institutional Repository

patterns of Bengali bilingual children. They use code-switching only for the stylistic purpose.

However, during the data collection procedure there had a few difficulties that may be considered as limitations. First of all, there was a time constraint for collecting data. The data had to be collected during a regular class time and it was not enough a time to conduct a small interview with the students afterwards. The questionnaire had to be explained to the children and even an example had to be shown on the board. This took much time as well.

The teachers were conscious about the observed sessions and it also took time explaining the procedures to them. The study could not be done in a broader scale, as in the data could not be collected other than the city due to lack of time as well. The questionnaire was designed for the students. Hence the numbering was done to make it easy for them. However, during data analyzing the numbering had to be reversed. It could be conducted differently. There was noise outside the classroom and it was a disturbance when monkeys got in the class. However, on the contrary it was also good for rapport building with the students of one of the sections as they listened to the instructions delivered. Due to shortage of time a longitudinal study report could not be prepared.

4.2. Linguistic Analyses in Relation to Literature Review and Received Data

According to Chomsky, children are born with a special ability to discover for themselves the underlying rules of a language system that prevents the child from going off on lots of wrong trails in trying to discover the rules of the language. Children's code-switched sentences hence can be the data to understand the nature of language itself. Despite of having the environment filled with confusing information (for example, false starts, incomplete sentences, or slips of the tongue) children keep code-switching it seems. Teachers' corrections of language errors have been observed to be inconsistent

Dhaka University Institutional Repository

or even non-existent to the children. Children do go about constructing the complex and novel structures which is not random, appropriate, and coherent. This phenomenon might have occurred due to interaction as well as according to the interactionists' position, language develops as a result of the complex interplay between the uniquely human characteristics of the child and the environment in which the child develops.

Children, as they code-switch, must have succeeded in the conceptualization and formulation before they have articulated and self-monitored the code-switched sentences according to Levert's model (1966, pp. 20-45). The self-monitoring must be a subconscious one here as the children seemed quite unaware that they were accepting the code-switched sentences as correct ones. Verbal planning, lack of lexical items, etc. are a few factors behind children's code-switching. One of the most revealing opportunities for studying language socialization is in the case of children growing up bilingually, for they manage not just to keep the two languages separate, but to learn quickly which language to use to which person.

In the small-scale study the sentences are analyzed in terms of well-formedness and ill-formedness. In theoretical linguistics, a speaker's judgment on the well-formedness of a linguistic utterance; i.e. called a grammaticality judgment; is based on whether the sentence is produced and interpreted in accordance with the rules and constraints of the relevant grammar. If the rules and constraints of the particular language are followed, then the sentence is considered to be grammatical or well-formed. In contrast, an ungrammatical or ill-formed sentence is one that violates the rules of the given language.

Poulisse and Bongaerts (1994) claimed that a bilingual speakers' L2 knowledge is typically incomplete. L2 speech of a bilingual often carries the traces of L1; because of L1 interference a speaker may lack lexical items and thus switch codes. In a bilingual speakers' mind; while speaking; the sub-sets activate words for the perception received by the speaker or the concept in the

Dhaka University Institutional Repository

speakers' mind. The speaker, in this way may keep the linguistic codes apart. However, the hypothesis cannot explain how the choice for the words is made through this process (pp. 44-45). According to Southerland and Katamba (1987) no natural language is in any sense 'pure' or free from all influence from other languages and cultures where lingua francas are used to communicate among speakers of different languages (pp. 571-572).

According to Reyes (2010), research on children's code-switching has shown that simultaneous bilingual children develop knowledge on how and when to use their two languages depending on the addressee, the topic of the conversation, and the situation (pp. 01-05). More recently, it has been found that the children, even two-year-olds develop the ability to use and adjust each of their languages differentially and appropriately with parents and an unfamiliar interlocutor as part of their communicative competence. Scientific evidences from studies with young Spanish–English bilinguals (Zentella, 1988) report that younger children show more lexical item code-switching than older children. One common assumption and reason is that they cannot find appropriate lexical items to express thoughts and thus switch into another code (p. 86).

Poplack (1980) work within the framework of a third context-free phrase structure grammar built from the two monolingual grammars. They propose two constraints, presented below.

a. Free Morpheme Constraint: No switch may occur between a bound morpheme and a lexical form unless the latter has been phonologically integrated into the language of the former.

b. Equivalence Constraint: The order of sentence constituents on either side of the switch point must be grammatical with respect to both languages.

The sentence structures do not necessarily violate the juxtapositions of the grammatical elements. However, there is a presence of inflectional particles switching and serial verbs. The sentences regardless being well-formed or ill-

Dhaka University Institutional Repository

formed are being used naturally by children of grade 4 in the study who are at their age 10 to 12. The children here are at their later developmental stage (p. 148).

In Bangladesh, Bangla language is the standard or official language and also is the lingua franca as English is used as a second language, there is the compulsory Arabic language studies for majority of the people being Muslims, there are many vernacular languages or tribal languages in use and there exists the influence of Hindi language from the surrounding or neighbor country. Thus, children of this bilingual or multilingual country develop control over distinct varieties of languages from their early childhood. The study of bilingualism and multilingualism provides an explanation on how a child acquires language in this context. In case of Bangla-English code-switching, the total number of switched words is to be measured along with non-switched ones. In order to look into the code-switched items, I looked at the different sentential positions for code-switching. The code-switching has taken place in term of Nouns, Verbs, Adjunct positions along with Tags and Particles.

Brown (1973) and his colleagues, in the first, elaborate chronology of how children acquire English grammar, demonstrated that children progress through different stages of grammatical development, measured largely by the average number of words occurring per utterance. They do not randomly rotate words between first and second position, for example; certain words (pivots) tend to be used initially or finally, and other words then can be used to fill in the slot either after or before these so-called pivots. They have a word order. Here too, this has been the case (p. 449).

Nearly all studies according to Cantone (2007) on early bilingualism have established that children mix their languages, independently of the environment being monolingual or not. Since grammar develops naturally in children, structural rules will not be applicable at an early stage of language acquisition. Thus, language mixing either follows no rules, or it depends on

Dhaka University Institutional Repository

rules which are different from those governing adult mixing. Given that early child mixing is considered to be structurally different from later mixing, it must also be defined differently. The basic conceptual points in the discussion of syntactic acquisition of children covers the discussion of categories, non-lexical categories, phrase structure that covers the discussion of head-complement, verb phrase, etc. (p. 115).

In a Minimalist Approach to code-switching, lexical items may be drawn from the lexicon of either language to introduce features into the numeration, which must then be checked for convergence in just the same way as monolingual features must be checked, with no special mechanisms permitted. In this lexicalist approach, no 'control structure' is required to mediate contradictory requirements of the mixed systems. The requirements are simply carried along with the lexical items of the respective systems. Thus, it makes sense to formalize the grammar used for code-switching as the union of the two lexicons, with no mediating mechanisms.

It is also seen that many languages have a special verb forms making relative clauses are called participles and that verbs are derived from other verbs (Bauer, 2002, pp. 67-68). The inherent inflection comprises categories that, like derivation, convey a certain amount of independent information and that are not forced on the speaker by the syntactic context. Thus, a speaker may freely choose the verb's tense and aspect categories, the nominal number categories and also nominal inherent cases where the term inherent refers to cases such as locative that make its own semantic contribution and are mostly not syntactically determined. It has also been found that inflectional rules are applied only after the syntactic rules have been applied (Haspelmath, 2002, pp. 77-82). Thinking morphologically, there is a significant presence of inflectional particles which are not changed from that of their L1; i.e. Bangla. Only the noun words added to the particles are being switched.

Dhaka University Institutional Repository

Considering Minimalist Approach, the major two categories are the Nouns and Verbs (Adger, 2003, p.41). Nelson (1973) notes that the child's early nouns most often refer to things with which the child can interact: objects that are not fixed, unmovable parts of his environment. Generally, the child's early vocabulary includes nouns and words related to actions. Also, words that refer to attributes of objects, states, or locations, such as pretty, big, allgone, hot, outside, and a few social words like 'yes', 'no', 'please', and 'ouch'. There are also several functional words: prepositions, articles, auxiliary verbs, interrogative words, etc. The particular words used, and even the kind of words, vary greatly from child to child (p. 31). In McNeill's (1933) view young children already know a great deal about the grammatical relations which simple sentences convey (p. 95).

The trend of thought over the past 40 years has been that bilingual children enjoy either equal abilities with or cognitive advantages over their monolingual peers (Vygotsky, 1962, p. 19). He stressed that being able to express the same thought in more than one language enables a bilingual child to compare and contrast his or her two language systems. This ability thus allows a greater cognitive-metalinguistic awareness. However, although it is clear that bilingual children are not cognitively disadvantaged, it is not clear what role cognitive strengths play in the development and use of code-switching. A later study by Lambert and Tucker (1972) argued that as children gained proficiency in immersion programs that developed high levels of language proficiency; they learned to contrast the syntax and vocabulary of their two languages. It is apparent that bilingual children have to learn two names for everything. Certainly, the use of vocabulary and code-switching has been somewhat addressed in the field of special education, where psychologists, teachers, and administrators have been repeatedly cautioned that code-switching should not be viewed as a characteristic of language problems. Distinguishing the bilingual child with language disabilities from the child who is struggling with a new language can be challenging. The leading aim of the MP is the elimination of all mechanisms that are not

Dhaka University Institutional Repository

necessary and essential on conceptual grounds alone; thus, only the minimal theoretical assumptions may be made to account for linguistic data, privileging more simplistic and elegant accounts over complex and cumbersome ones. These assumptions would naturally favor accounts of code-switching which make use of independently motivated principles of grammar over those which posit rules, principles or other constructs specific to it. In a Minimalist approach to code-switching, lexical items may be drawn from the lexicon of either language to introduce features into the numeration, which must then be checked for convergence in just the same way as monolingual features must be checked, with no special mechanisms permitted. In this lexicalist approach, no "control structure" is required to mediate contradictory requirements of the mixed systems. The requirements are simply carried along with the lexical items of the respective systems. Thus, it makes sense to formalize the grammar used for code switching as the union of the two lexicons, with no mediating mechanisms (p. 97). While Mahootian (1993) is not explicit about whether her formulation is a principle of grammar or a theory about which syntactic operations are relevant to code-switching, data considered here strongly suggest that the head-complement relation is far too narrow to account for the facts of code-switching (p. 95).

The present study needs spontaneous and natural response from the participants. Therefore, traditional questionnaire is not capable enough to reveal the facts and resolve the problem. As a way out of this situation, an experiment has been designed for collecting natural data from them. This experiment will be performed within a flexible guideline of the quantitative research technique which will be a task-based approached. The data questionnaire was basically presented to the students in a worksheet format. It will be because the age group of these students falls into 10-12 where they are already familiar with worksheets as classworks and assessments. This will be done purely because to get the students' attention along with not scaring them in the process. There will be thirteen sentences that fall into different lexical

Dhaka University Institutional Repository

and non-lexical categories including the different features such as tense, number, etc. Given next are the sentences along with the areas focused.

1. Tense – Ritu cleaned her room today.
2. Number – My friends visited me when I was sick.
3. Noun- I got my result.
4. Adjectives – Her room is really nice.
5. Transitive – The guard closed the gate.
6. Intransitive- He always complains.
7. Ditransitive- Rabbi passed Rohan the ball.
8. Adverb- I did not completely understand the topic.
9. Preposition- She walked in the room.
10. Conjunction- We wanted to play outside but it is raining.
11. Interjection- Oh! The flower vase got broken.
12. Adjunct- Submit your homework by tomorrow.
13. Ditransitive – Son gave mom a flower.

The sentences were presented in five different variations including the code-switched and non-code-switched forms along with pictures to understand the concepts for each. As in, each picture will be presented with five variations of a sentence with blank spaces to rank from one to five where one is the best option and gradually goes down to five being the worst. It will be kept in mind that the students would need clear instructions to fill those blank spaces to rank. The pictures will be printed horizontally or in a landscape format to make it more presentable. The data designing by default supports chances for code-switching. As in, even if a student collects 5 points for a non-code-switched sentence and ranks the other ones following the other rank sequences it would automatically turn out as preferring code-switching. This means that the data designing has been planned to find the code-switching ratio. In order to measure the ratio better at first, the total versus non code-switched items will be looked into. If there is a significant amount of code-switching that is taking place, I shall look into the percentage of code-switching that is happening and from there the specific categorical code-switching from for

Dhaka University Institutional Repository

Noun and Verb words will be measured along with particles and Adjectives since according to Adger (2003) the main categories happen to be the Nouns and the Verbs (p. 41). From the data I shall also be able to collect the boys' versus girls' participation ratio for different code-switching and choices on its types. The raw data will be analyzed following the parameters set earlier which include judging if the sentences are well-formed and on their acceptance level as the students shall rank the sentences according to their judgment of very good, good, medium, bad, very bad sentences. The sentences will also show the SVO or SOV structure along with other sentential formations. It will also be easy to measure the types of code-switching that occurs from the data received. Since the data is being collected for each sentence only, the intra-sentential switching has been omitted. While working on raw data the reliability and validity will be taken under consideration.

Dhaka University Institutional Repository

Chapter Five: Conclusion

In this era of globalization, technological innovations, and connections code-switching is a common phenomenon. It can be concerning if these tendencies change the structure of a language. Significant studies and researches have been conducted to follow-up with the changing attitudes towards code-switching and to measure the pros and cons of language changes. The classroom teaching and everyday lives have been questioned and brought under concern due to the influences of code-switching. This study has shown that children tend to switch between codes where their L1 is Bangla and L2 is English. They tend to switch mostly with the Noun words rather than Verbs which signifies that there might not be an influential change at the core in Bangla language. In most cases they switch between codes subconsciously and/or without much awareness of switching. Another factor is that there is a difference with that of girls' and boys' code-switching ratio. Boys tend to be more frequent in adjunct and tag switching than girls. Although this thesis is far from being established and contains many open questions, it offers many findings in code-switching which add to the studies of Bilingualism, Multilingualism, Code-switching itself, and many other areas of Linguistics along with the studies of the nature of language.

Dhaka University Institutional Repository

Reference List

Adger, D. (2003). *Core Syntax: A Minimalist Approach (Core Linguistics).* UK: Oxford University Press.

Alam, S. (2006). *Code-Mixing in Bangladesh: A Case Study of Non-Government White-Collar Service Holders and Professionals* (Asian Affairs, Vol. 28, No. 4, 52-70). Dhaka: CDRB Publication.

Auer, P. (1995). *Code-Switching in Conversation.* London: Routledge.

Bailey, B. (2000). *The Language of Multiple Identities among Dominican Americans.* Journal of Linguistic Anthropology. USA: American Anthropological Association.

Bauer, E. B. (2002). *The Pragmatic Role of Codeswitching in Play Contexts.* The International Journal of Bilingualism. London: SAGE Publications.

Bell., R. T. (1976). *Sociolinguistics.* New York: St. Martin's Press.

Brown, R. (1973). *A First Language: The Early Stages.* London: George Allen and Unwin.

Cantone, K. F. (2007). *Code-Switching in Bilingual Children.* USA: Springer Publishing Co.

Carroll, D. (2005). *Vowel-Marking as an Interactional Resource in Japanese Novice ESL Conversation.* UK: Palgrave Macmillan.

Chomsky, N. (1981). *Aspects of the Theory of Syntax*. Massachusetts: MIT Press.

Cook, V. (2003). *Second Language Learning and Language Teaching* (2nd ed.: 1996). London: Edward Arnold Publishers Ltd.

Crystal, D. (1987). *The Cambridge Encyclopedia of Language.* USA: Cambridge University Press.

Dörnyei, Z. (2007). *Research Methods in Applied Linguistics.* New York: Oxford University Press.

Fishman, J. A. (1971). *Sociolinguistics: A Brief Introduction*. US: Newbury House Publishers.

Grosjean, F. (1982). *Life with Two Languages. An Introduction to Bilingualism*. Massachusetts: Harvard University Press.

Gumperz, J. J. (1982) *Discourse Strategies*. USA: Cambridge University Press.

Haspelmath, M. (2002). *Understanding Morphology*. UK: Hodder Education.

Hawkins, R. (2001). *Second Language Syntax.* New York: Oxford University Press.

Hockett, C. (1958). *Sociolinguistics.* New York: St. Martin's Press.

Holmes, J. (2001). *An Introduction to Sociolinguistics* (2nd ed.: 2001). New Zealand: Pearson Education Limited.

Hudson, R. A. (1996). Sociolinguistics. USA: Cambridge University Press.

Hyltenstam, K. and Abrahamsson, N. (2003). *Maturational Constraints in SLA.* In Doughty, C. J. and Long, M. H. (Eds.). *The Handbook of Second Language Acquisition.* Malden: Blackwell Publications.

Jacobson, R. (2001). *Closing Statements: Linguistics and Poetics, Style in Language, T.A. Sebeok.* Massachusetts: MIT Press.

Kovács, M. (2001). *Code-Switching and Language Shift in Australian Finnish in Comparison with Australian Hungarian.* Finland: Åbo Akademis Förlag.

Kumar, R. (1999). *Research Methodologies*. London: SAGE Publications Ltd.

Dhaka University Institutional Repository

Labov, W. (2001). *Principles of Linguistic Change (*Volume II: Social Factors). US: Blackwell Publications.

Lambert, H. E. and Tucker, B. V. (1972). *Immersion Education for the Millennium: What We Have Learned from 30 Years of Research on Second Language Immersion.* USA: CARLA.

Lennenberg, E. (1967). *How Languages are Learned.* UK: Oxford University Press.

Levelt, W. J. M. (1975). *What became of LAD?* Holland: Foris Publications.

Levert, B. (1966). *Psycholinguistics.* UK: Oxford University Press.

Lightbown, P. M. and Spada, N. (1999). *How Languages are Learned.* UK: Oxford University Press.

Litosseliti, L. (2010). *Research Methods in Linguistics*. New York: Continuum International Publishing Group.

MacSwan, J. (1999). *A Minimalist Approach to Intrasentential Code Switching.* New York: Garland Publishing, Inc.

Mahootian, W. (1993). *A Minimalist Approach to Intrasentential Code Switching.* New York: Garland Publishing, Inc.

McNeill, D. (1933). *Psycholinguistics.* UK: Oxford University Press.

Milroy, L. and Muysken, P. (1995). *One Speaker, Two Languages: Cross-Disciplinary Perspectives on Code-Switching*. USA: Cambridge University Press.

Myers-Scotton, C. (1988). *Dueling Languages: Grammatical Structure in Code-Switching*. UK: Clarendon Press.

Nelson, K. (1973). *First Steps in Language Acquisition*. USA: The Academy of Sciences.

Dhaka University Institutional Repository

O'Grady, W. (1987). *Contemporary Linguistics an Introduction*. UK: Pearson Education Limited.

Poplack, S. (1980). *Distinguishing Language Contact Phenomena: Evidence from Finnish-English Bilingualism.* Helsinki: University of Helsinki Press.

Poulisse, N., and Bongaerts, T. (1994). *First Language Use in Second Language Production.* UK: Oxford University Press.

Reyes, I. (2010). *Functions of Code Switching in Schoolchildren's Conversations.* UK: Taylor and Francis Group.

Sapir, E. (1921). *Language: An Introduction to the Study of Speech, Harcourt, Brace.* Psycholinguistics. UK: Oxford University Press.

Scovel, T. (1998). *Psycholinguistics.* UK: Oxford University Press.

Silberstein, S. (2001). Sociolinguistics. USA: Cambridge University Press.

Skiba, R. (1997). *Code Switching as a Countenance of Language Interference*. Tokyo: The TESL Journal Publications.

Southerland, R. H. and Katamba, F. (1987). *Contemporary Linguistics an Introduction* (1st ed.: 1987). UK: Pearson Education Limited.

Spolsky, B. (1998). *Sociolinguistics* (Series editor H. J. Widdowson). UK: Oxford University Press.

Tallerman, M. (2011). *Understanding Syntax* (3rd ed.). UK: Hodder Education.

Tao, L. (2009). *Serial Verb Construction in Mandarin Chinese: The Interface of Syntax and Semantics* (Proceedings of the 21st North American Conference on Chinese Linguistics (NACCL-21). 2009. Volume 2.). USA: Bryant University.

Vygotsky, L. S. (1962). *Thought and Language.* USA: MIT Press.

Walliman, N. (2011). *Research Methods the Basics*. UK: Routledge.

Dhaka University Institutional Repository

Weinreich, U. (1953). *Languages in Contact: Findings and Problems.* USA: Blackwell Publishing.

Winford, D. (2003). *An Introduction to Contact Linguistics.* USA: Blackwell Publishing.

Yletyinen, H. (2004). *The Functions of Code-Switching in EFL Classroom.* Finland: University of Jvyoskyl.

Zentella, A.C. (1988). *Growing up Bilingual: Puerto Rican Children in New York City.* UK: Basil Blackwell.

Dhaka University Institutional Repository

Appendix 1

A Questionnaire

(Applicable for Students)

Dhaka University Institutional Repository

Questionnaire for Students

Name: _____Class: ____Sec: _____ Roll: ____ Date: _____

Instructions:

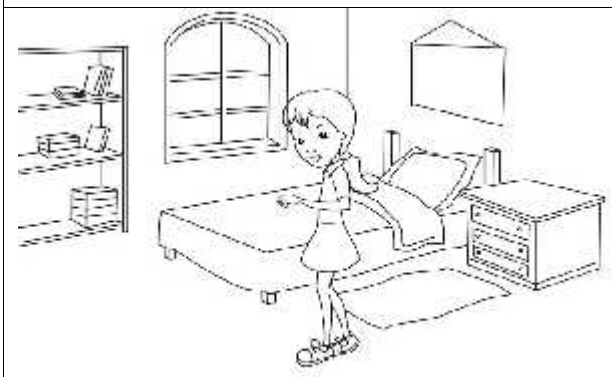
Given below are pictures with five sentences for each.

(a) **Read** the sentences.

(b) **Rank** the sentences where **1 = Very Good, 2 = Good, 3 = Medium, 4 = Bad, 5 = Very Bad.**

Pictures	Sentences
	☐ রিতু আজকে তার room clean করল। ☐ রিতু আজকে তার room পরিষ্কার করল। ☐ রিতু আজকে তার ঘর পরিষ্কার করল। ☐ Ritu cleaned her room today, তাই না? ☐ রিতু আজকে তার ঘর পরিষ্কার করল, right?

Dhaka University Institutional Repository

	☐ যখন আমি sick ছিলাম, আমার friends-রা আমাকে দেখতে এসেছিল। ☐ যখন আমি sick ছিলাম, আমার friends-রা আমাকে visit করতে এসেছিল। ☐ যখন আমি অসুস্থ ছিলাম, আমার বন্ধুরা আমাকে দেখতে এসেছিল। ☐ যখন আমি অসুস্থ ছিলাম, আমার বন্ধুরা আমাকে দেখতে এসেছিল, right? ☐ My friends visited me when I was sick, তাই না?
	☐ আমি আজকে আমার result পেয়েছি। ☐ আমি আজকে আমার ফলাফল পেয়েছি। ☐ I got my result today, দেখেছ? ☐ আমি আমার ফলাফল পেয়েছি, see? ☐ আমি আমার result পেয়েছি, see?
	☐ তার room-টা really nice. ☐ তার ঘরটা অনেক সুন্দর। ☐ তার room-টা অনেক nice. ☐ Her room is really nice, তাই না? ☐ তার ঘরটা অনেক সুন্দর, right?

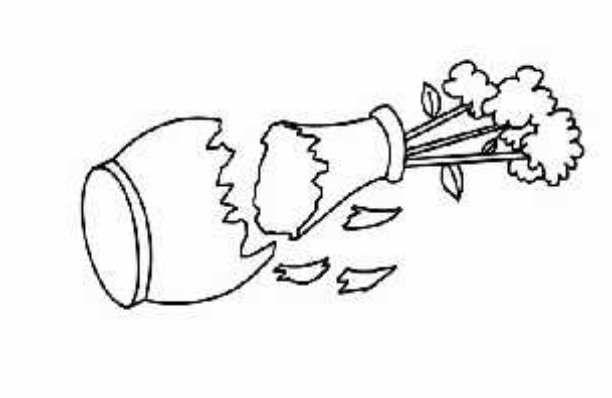
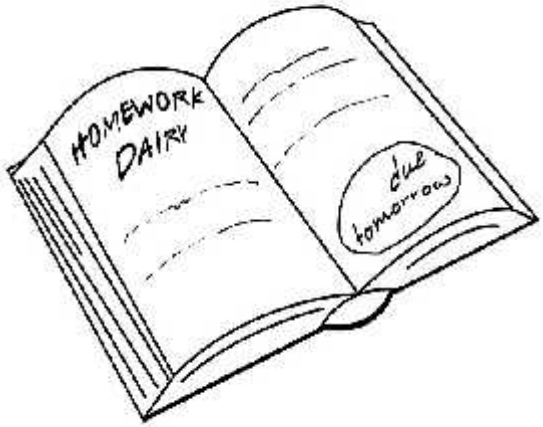
Dhaka University Institutional Repository

	☐ দারোয়ান সদর দরজাটা বন্ধ করে দিল। ☐ দারোয়ান gate-টা close করে দিল। ☐ দারোয়ান gate-টা বন্ধ করে দিল। ☐ দারোয়ান সদর দরজাটা বন্ধ করে দিল, right? ☐ The guard closed the gate, তাই না?
	☐ সে always complain করে। ☐ সে সবসময় complain করে। ☐ Always সে complain করে। ☐ সে সবসময় অভিযোগ করে। ☐ He always complains, তাই না?
	☐ রাব্বি রোহানকে বলটা pass করল। ☐ রাব্বি রোহানকে ball - টা pass করল। ☐ রাব্বি রোহানকে বলটা প্রেরণ করল। ☐ রাব্বি রোহানকে বলটা প্রেরণ করল, right? ☐ Rabbi passed Rohan the ball, তাই না?

Dhaka University Institutional Repository

	☐ আমি topic - টি completely বুঝতে পারিনি। ☐ আমি topic - টি সম্পূণ বুঝতে পারিনি। ☐ Topic – টি সম্পূণ বুঝতে পারিনি। ☐ আমি বিষয়টি সম্পূণ বুঝতে পারিনি। ☐ আমি বিষয়টি সম্পূণ বুঝতে পারিনি, can you say again?
	☐ সে room - এ in করল। ☐ সে কক্ষে প্রবেশ করল। ☐ Room - এ in করল সে। ☐ সে কক্ষে প্রবেশ করল, right? ☐ She walked in the room, তাই না?
	☐ তারা বাইরে খেলতে চাইছিল but it is raining now. ☐ তারা বাইরে খেলতে চাইছিল but এখন বৃষ্টি হচ্ছে। ☐ তারা বাইরে খেলতে চাইছিল কিন্তু এখন বৃষ্টি হচ্ছে। ☐ তারা বাইরে খেলতে চাইছিল কিন্তু এখন বৃষ্টি হচ্ছে, right? ☐ We wanted to play outside but it is raining, তাই না?

Dhaka University Institutional Repository

	☐ Oh! The flower vase got broken! ☐ Oh! Flower vase-টা ভেঙে গেল! ☐ Oh! ফুলদানিটা ভেঙে গেল! ☐ ওঃ ফুলদানিটা got broken! ☐ ওঃ ফুলদানিটা ভেঙে গেল, right?
	☐ By tomorrow, home work জমা দিবে। ☐ By tomorrow, home work submit করবে। ☐ আগামিকালের মধ্যে home work submit করবে। ☐ আগামিকালের মধ্যে home work জমা দিবে। ☐ আগামিকালের মধ্যে বাড়ির কাজ জমা দিবে।
	☐ খোকা মাকে একটি ফুল দিল। ☐ খোকা মাকে একটি flower দিল। ☐ খোকা mom-কে একটি ফুল দিল। ☐ খোকা মাকে একটি ফুল দিল, right? ☐ Son gave mom a flower, তাই না?

Thank you!

Dhaka University Institutional Repository

Appendix 2

ANOVA and Post-Hoc Test

Dhaka University Institutional Repository

One-way ANOVA with post-hoc Tukey HSD Test Calculator

.....with Scheffé, Bonferroni and Holm multiple comparison calculation also provided

Your input data on k=5 independent treatments:

Treatment →	A	B	C	D	E
Input Data →	76.0	39.0	20.0	47.0	48.0
	66.0	37.0	20.0	54.0	43.0
	76.0	37.0	14.0	56.0	45.0
	62.0	31.0	19.0	67.0	32.0
	78.0	39.0	12.0	42.0	51.0
	73.0	33.0	12.0	53.0	46.0
	73.0	33.0	12.0	53.0	44.0
	67.0	33.0	15.0	59.0	41.0
	78.0	36.0	14.0	69.0	46.0
	82.0	39.0	22.0	47.0	52.0
	68.0	35.0	20.0	46.0	46.0
	74.0	40.0	22.0	62.0	44.0
	69.0	38.0	18.0	51.0	40.0
	78.0	39.0	20.0	81.0	48.0
	79.0	37.0	22.0	78.0	49.0
	71.0	41.0	20.0	55.0	45.0
	72.0	41.0	18.0	49.0	46.0
	65.0	30.0	16.0	73.0	39.0
	63.0	26.0	15.0	72.0	36.0
	66.0	16.0	12.0	39.0	31.0
	51.0	28.0	9.0	61.0	28.0
	67.0	35.0	19.0	63.0	41.0
	50.0	27.0	10.0	78.0	30.0
	74.0	35.0	19.0	44.0	45.0
	74.0	35.0	14.0	48.0	45.0
	68.0	25.0	16.0	55.0	40.0
	63.0	30.0	15.0	55.0	37.0
	79.0	34.0	19.0	60.0	49.0
	66.0	28.0	15.0	79.0	38.0
	82.0	30.0	14.0	51.0	47.0
	67.0	23.0	13.0	60.0	34.0
	50.0	26.0	14.0	68.0	27.0
	86.0	30.0	13.0	59.0	45.0
	85.0	34.0	13.0	43.0	55.0
	84.0	34.0	14.0	43.0	55.0
	78.0	34.0	16.0	61.0	46.0
	76.0	34.0	15.0	62.0	43.0
	79.0	25.0	12.0	72.0	41.0
	57.0	28.0	8.0	48.0	35.0
	51.0	25.0	13.0	73.0	23.0

Dhaka University Institutional Repository

Treatment →	A	B	C	D	E
	75.0	36.0	12.0	64.0	49.0
	69.0	36.0	18.0	54.0	43.0
	83.0	38.0	19.0	35.0	50.0
	76.0	19.0	18.0	55.0	41.0
	78.0	42.0	17.0	35.0	48.0
	73.0	37.0	20.0	62.0	45.0
	73.0	35.0	15.0	65.0	43.0
	66.0	22.0	9.0	77.0	35.0
	73.0	36.0	17.0	75.0	44.0
	71.0	28.0	10.0	70.0	43.0
	67.0	31.0	17.0	62.0	40.0
	72.0	27.0	6.0	63.0	42.0
	62.0	28.0	14.0	52.0	39.0
	79.0	31.0	13.0	71.0	47.0
	73.0	22.0	9.0	59.0	36.0
	82.0	22.0	20.0	69.0	47.0
	74.0	40.0	14.0	49.0	42.0
	80.0	33.0	18.0	61.0	50.0
	55.0	38.0	13.0	77.0	27.0
	85.0	37.0	15.0	59.0	49.0
	73.0	32.0	11.0	67.0	40.0
	65.0	22.0	9.0	71.0	31.0
	64.0	31.0	9.0	55.0	38.0
	71.0	34.0	14.0	69.0	45.0
	65.0	33.0	13.0	65.0	41.0
	79.0	42.0	19.0	69.0	44.0
	70.0	31.0	20.0	58.0	38.0
	68.0	36.0	22.0	67.0	43.0
	80.0	41.0	11.0	51.0	50.0
	53.0	25.0	10.0	58.0	26.0
	73.0	42.0	9.0	57.0	47.0
	72.0	37.0	14.0	67.0	43.0
	72.0	33.0	10.0	35.0	46.0
	83.0	33.0	11.0	79.0	47.0
	48.0	24.0	14.0	69.0	28.0
	78.0	36.0	22.0	43.0	49.0
	76.0	38.0	20.0	77.0	47.0
	75.0	37.0	14.0	54.0	47.0

Dhaka University Institutional Repository

Treatment →	A	B	C	D	E
	68.0	31.0	20.0	54.0	42.0
	66.0	30.0	10.0	58.0	36.0
	44.0	22.0	10.0	88.0	24.0
	73.0	36.0	20.0	78.0	44.0
	77.0	33.0	13.0	50.0	48.0
	78.0	39.0	16.0	50.0	52.0
	75.0	39.0	16.0	55.0	46.0
	69.0	33.0	15.0	67.0	38.0
	75.0	32.0	14.0	35.0	47.0
	68.0	29.0	16.0	78.0	35.0
	79.0	40.0	17.0	92.0	44.0
	79.0	38.0	12.0	49.0	44.0
	70.0	31.0	20.0	85.0	41.0
	62.0	36.0	16.0	54.0	35.0
	66.0	30.0	14.0	59.0	39.0
	80.0	41.0	20.0	82.0	49.0
	59.0	26.0	10.0	58.0	32.0
	65.0	32.0	10.0	68.0	42.0
	68.0	28.0	18.0	60.0	39.0
	75.0	32.0	11.0	64.0	42.0
	62.0	28.0	18.0	63.0	35.0
	84.0	24.0	15.0	52.0	48.0
	73.0	34.0	20.0	58.0	42.0
	70.0	31.0	14.0	37.0	43.0
	84.0	39.0	13.0	55.0	53.0
	81.0	31.0	18.0	55.0	42.0
	71.0	32.0	9.0	57.0	42.0
	63.0	28.0	11.0	45.0	38.0
	98.0	28.0	18.0	41.0	55.0
	77.0	32.0	11.0	33.0	48.0
	64.0	18.0	12.0	74.0	32.0
	87.0	40.0	19.0	60.0	58.0
	89.0	37.0	16.0	69.0	47.0
	87.0	36.0	12.0	47.0	49.0
	69.0	31.0	12.0	44.0	42.0
	58.0	28.0	9.0	71.0	30.0
	75.0	31.0	18.0	72.0	46.0
	69.0	34.0	16.0	42.0	46.0
	68.0	33.0	20.0	65.0	40.0
	48.0	33.0	16.0	58.0	32.0

Dhaka University Institutional Repository

Descriptive statistics of your k=5 independent treatments:

Treatment →	A	B	C	D	E	Pooled Total
observations N	118	118	118	118	118	590
sum $\sum x_i$	8,427.0000	3,831.0000	1,765.0000	7,043.0000	4,973.0000	26,039.0000
mean $\bar{x}$	71.4153	32.4661	14.9576	59.6864	42.1441	44.1339
sum of squares $\sum x_i^2$	612,259.0000	128,075.0000	28,103.0000	438,547.0000	215,261.0000	1,422,245.0000
sample variance s^2	89.2534	31.6014	14.5537	155.3453	48.5346	463.5695
sample std. dev. s	9.4474	5.6215	3.8149	12.4638	6.9667	21.5307
std. dev. of mean $SE_{\bar{x}}$	0.8697	0.5175	0.3512	1.1474	0.6413	0.8864

One-way ANOVA of your k=5 Independent treatments:

source	sum of squares SS	degrees of freedom ν	mean square MS	F statistic	p-value
treatment	233,345.6678	4	58,336.4169	859.6875	1.1102e-16
error	39,696.7542	585	67.8577		
total	273,042.4220	589			

Dhaka University Institutional Repository

Conclusion from Anova:

The p-value corresponing to the F-statistic of one-way ANOVA is lower than 0.05, suggesting that the one or more treatments are significantly different. The Tukey HSD test, Scheffé, Bonferroni and Holm multiple comparison tests follow. These post-hoc tests would likely identify which of the pairs of treatments are significantly differerent from each other.

Tukey HSD Test:

The p-value corrresponing to the F-statistic of one-way ANOVA is lower than 0.01 which strongly suggests that one or more pairs of treatments are significantly different. You have $k = 5$ treatments, for which we shall apply Tukey's HSD test to each of the 10 pairs to pinpoint which of them exhibits statistially significant difference.

We first establish the critical value of the Tukey-Kramer HSD Q statistic based on the $k = 5$ treatments and $\nu = 585$ degrees of freedom for the error term, for significance level α= 0.01 and 0.05 (p-values) in the Studentized Range distribution. We obtain these ctitical values for Q, for α of 0.01 and 0.05, as $Q_{critical}^{\alpha=0.01,k=5,\nu=585}$ = 4.6242 and $Q_{critical}^{\alpha=0.05,k=5,\nu=585}$ = 3.8697, respectively. These critical values may be verified at several published tables of the inverse Studentized Range distribution, such as this table at Duke University.

Next, we establish a Tukey test statistic from our sample columns to compare with the appropriate critical value of the studentized range distribution. We take the Tukey-Kramer confidence limits as documented in the NIST Engineering Statistics Handbook and make simplyfying algebraic transformation. We calculate a parameter for each pair of columns being compared, which we loosely call here as the Tukey-Kramer HSD Q-statistic, or simply

the Tukey HSD Q-statistic, as:

$$Q_{i,j} = \frac{|\bar{x}_i - \bar{x}_j|}{s_{i,j}}$$

where the denominator in the above expression is:

$$s_{i,j} = \frac{\hat{\sigma}_\epsilon}{\sqrt{H_{i,j}}} \quad i, j = 1, \ldots, k;\ i \neq j.$$

The quantity $H_{i,j}$ is the *harmonic mean* of the number of observations in columns labeled i and j. Note that when the sample sizes in the columns are equal, then their harmonic mean is simply the common sample size. When the sample sizes of columns in a pair being compared are different, the harmonic mean lies somewhere in-between the two sample sizes. The relvant harmonic mean is required for applying the Tukey-Kramer procedure for columns with unequal sample sizes. The quantity $\hat{\sigma}_\epsilon$ = 8.2376 is the square root of the Mean Square Error = 67.8577 determined in the precursor one-way ANOVA procedure. Note that $\hat{\sigma}_\epsilon$ is same across all pairs being compared. The only factor that varies across pairs in the computation of $s_{i,j} = \frac{\hat{\sigma}_\epsilon}{\sqrt{H_{i,j}}}$ is the denominator, which is the harmonic mean of the sample sizes being compared.

The test of whether the NIST Tukey-Kramer confidence interval includes zero is equivalent to evaluating whether $Q_{i,j} > Q_{critical}$, the latter determined according to the desired level of significance α (p-value), the number of treatments k and the degrees of freedom for error ν, as described above.

post-hoc Tukey HSD Test Calculator results:

$k = 5$ treatments
degrees of freedom for the error term $\nu = 585$
Critical values of the Studentized Range Q statistic:

$Q_{critical}^{\alpha=0.01,k=5,\nu=585}$ = 4.6242 $\quad$ $Q_{critical}^{\alpha=0.05,k=5,\nu=585}$ = 3.8697

Dhaka University Institutional Repository

Tukey HSD results

treatments pair	Tukey HSD Q statistic	Tukey HSD p-value	Tukey HSD inferfence
A vs B	51.3617	0.0010053	** p<0.01
A vs C	74.4499	0.0010053	** p<0.01
A vs D	15.4666	0.0010053	** p<0.01
A vs E	38.5995	0.0010053	** p<0.01
B vs C	23.0882	0.0010053	** p<0.01
B vs D	35.8951	0.0010053	** p<0.01
B vs E	12.7622	0.0010053	** p<0.01
C vs D	58.9833	0.0010053	** p<0.01
C vs E	35.8504	0.0010053	** p<0.01
D vs E	23.1329	0.0010053	** p<0.01

Scheffé multiple comparison

We define a statistic named T as the ratio of unsigned contrast mean to contrast standard error, as explained in the NIST Engineering Statistics Handbook page for Schefe's method . It can be show that for contrasts that are treatment pairs (i, j) with unit coefficents,

$$T_{i,j} = \frac{Q_{i,j}}{\sqrt{2}}$$

where $Q_{i,j}$ is the Q-statistic that was created for the Tukey HSD test. This T-statistic has interesting properties.

The same NIST Engineering Statistics Handbook page for Scheffe's method provides a formula which directly leads to the Scheffé p value corresponding to an observed value of T as:

$$1 - F\left(\frac{T^2}{k-1}, k-1, \nu\right)$$

where $F()$ is the cumulative F distribution with its two degrees of freedom parameters $k-1$ and ν. Note that k is the number of treatments and ν is the degrees of freedom of error that were established earlier.

The Scheffé p-value of the observed T-statistic $T_{i,j}$ is shown below for all relevant pairs of treatments, along with color coded Scheffé inference (red for insignificant, green for significant) based on the p value.

Dhaka University Institutional Repository

Scheffé results

treatments pair	Scheffé T-statistic	Scheffé p-value	Scheffé interfence
A vs B	36.3182	1.1102e-16	** p<0.01
A vs C	52.6440	1.1102e-16	** p<0.01
A vs D	10.9366	1.1102e-16	** p<0.01
A vs E	27.2940	1.1102e-16	** p<0.01
B vs C	16.3258	1.1102e-16	** p<0.01
B vs D	25.3817	1.1102e-16	** p<0.01
B vs E	9.0242	9.9920e-16	** p<0.01
C vs D	41.7075	1.1102e-16	** p<0.01
C vs E	25.3500	1.1102e-16	** p<0.01
D vs E	16.3574	1.1102e-16	** p<0.01

Bonferroni and Holm multiple comparison

The same statistic T for the Scheffé method, along with the number of contrasts (pairs) q being simultaneously compared, leads to the Bonferroni formula. The NIST Engineering Statistics Handbook page for Bonferroni method provides a formula which directly leads to the Bonferroni p-value corresponding to an observed value of T in the context of simultaneous comparison of q contrasts as:

Bonferroni p-value: $P_{i,j}^{Bonferroni} = P_{i,j}^{unadjusted} q$ where

$$P_{i,j}^{unadjusted} = \left[1 - t\left(\frac{T^2}{k-1}, \nu\right)\right] 2$$

and where $t()$ is the cumulative Student's t distribution with its degree of freedom parameter ν. Note that ν is the degrees of freedom of error that were established earlier. Also note that the p-value of Bonferroni simultaneous comparison is directly proportional to q, the number of contrasts (pairs) being simultaneously compared.

The Holm procedure described in Aickin and Gensler (1996) review paper requires sorting the $P_{i,j}^{unadjusted}$ as above in *ascending* order and determining the sort rank $R_{i,j}$ of each unique pair (i,j). These sort ranks run from 1 through q. The Holm p-value for comparing a given pair (i,j) in the context of multiple comparison of q such pairs simultaneously is:

Holm p-value: $P_{i,j}^{Holm} = P_{i,j}^{unadjusted} (q - R_{i,j} + 1)$

In this first combined Bonferroni and Holm table below, we consider all possible contrasts (pairs) for simultaneous comparion, thus q=10. The Bonferoni and Holm p-values of the observed T-statistic $T_{i,j}$ for all relevant q=10 pairs of treatments is shown below, along with color coded Bonferroni and Holm inferences (red for insignificant, green for significant) based on the p-value.

Dhaka University Institutional Repository

Bonferroni and Holm results: all pairs simultaneously compared

treatments pair	Bonferroni and Holm T-statistic	Bonferroni p-value	Bonferroni inferfence	Holm p-value	Holm inferfence
A vs B	36.3182	0.0000e+00	** p<0.01	0.0000e+00	** p<0.01
A vs C	52.6440	0.0000e+00	** p<0.01	0.0000e+00	** p<0.01
A vs D	10.9366	0.0000e+00	** p<0.01	0.0000e+00	** p<0.01
A vs E	27.2940	0.0000e+00	** p<0.01	0.0000e+00	** p<0.01
B vs C	16.3258	0.0000e+00	** p<0.01	0.0000e+00	** p<0.01
B vs D	25.3817	0.0000e+00	** p<0.01	0.0000e+00	** p<0.01
B vs E	9.0242	0.0000e+00	** p<0.01	0.0000e+00	** p<0.01
C vs D	41.7075	0.0000e+00	** p<0.01	0.0000e+00	** p<0.01
C vs E	25.3500	0.0000e+00	** p<0.01	0.0000e+00	** p<0.01
D vs E	16.3574	0.0000e+00	** p<0.01	0.0000e+00	** p<0.01

In this second Bonferroni and Holm table below, we consider a subset of contrasts (pairs) for simultaneous comparion, of only pairs relative to treatment A. Such a situation may be relevant when treatment A is the control, and the experimenter is interested only in differences of treatments relative to control, thus q=4. The Bonferoni and Holm p-values of the observed T-statistic $T_{i,j}$ for q=4 relevant pairs of treatments, along with color coded Bonferroni inference (red for insignificant, green for significant) based on the p-value.

Bonferroni and Holm results: only pairs relative to A simultaneously compared

treatments pair	Bonferroni and Holm T-statistic	Bonferroni p-value	Bonferroni inferfence	Holm p-value	Holm inferfence
A vs B	36.3182	0.0000e+00	** p<0.01	0.0000e+00	** p<0.01
A vs C	52.6440	0.0000e+00	** p<0.01	0.0000e+00	** p<0.01
A vs D	10.9366	0.0000e+00	** p<0.01	0.0000e+00	** p<0.01
A vs E	27.2940	0.0000e+00	** p<0.01	0.0000e+00	** p<0.01

Dhaka University Institutional Repository

Appendix 3

Photographs Attached

Dhaka University Institutional Repository

Image 01: CAB - Boys

Image 02: The building and classrooms for Boys Day Shift

Dhaka University Institutional Repository

Image 03: CAG - Girls

Image 04: BAF, Co-educational Class

Dhaka University Institutional Repository