Down Syndrome (DS) is a developmental disorder caused by a genetic chromosomal abnormality in the twenty-first chromosome that is characterized by poor cognitive and linguistic abilities. Several studies on the linguistic deviation in the DS population have reported deficits in the acquisition of language that persist from infancy until adulthood. However, most of the literature in this research area has been chiefly undertaken on English-speaking individuals. Hence, the current study endeavors to investigate the syntax of DP, IP, and CP in the language of an Egyptian DS individual within the theoretical framework of Generative Grammar. The rationale for selecting syntax and morphosyntax in DS for investigation is that it is one of the most affected areas by the intellectual disability caused by the syndrome. Thus, examination of the language disorder in an Arabic-speaking DS individual is expected to elucidate the linguistic characteristics of the syndrome further. The DS participant in this study came from a larger study investigating the phonological and syntactic impairments in a sample of Egyptian DS individuals. The primary objective of this study is to reveal the syntactic deviations in the participant’s language and compare them to the trends reported in the literature of typical language acquisition. The research hypothesizes that the syntactic errors are constrained by the rules of Universal Grammar. The analysis reveals the presence of syntactically operant functional heads in the underlying structure despite being phonetically null on the surface structure.

**Keywords:** Down Syndrome, Syntax, language impairment, language acquisition
1.1. Introduction

Down Syndrome (DS) is one of the most common causes of mild to severe intellectual disabilities characterized with an intelligence quotient IQ ranging between 30 to 70 (Elmasry et al., 2020). It is a developmental disorder arising from a genetic chromosomal abnormality in the twenty-first chromosome that occurs in roughly 1/750 live births in Egypt (Temtamy et al., 1998). The syndrome was first clinically described by the physician John Langdon Down who reported the common clinical features associated with the syndrome (Down, 1866). Individuals with DS have specific physical characteristics including upwardly slanted eyelids, depressed nasal bridge, midfacial hypoplasia, tongue protrusion, short stature in addition to occasional small malformations in the ears, hands, and feet (Epstein, 1989). They exhibit generalized cognitive inhibition impairments (Borella et al., 2013), and executive dysfunctions during infancy (Karrer et al., 1998), adolescence (Lanfranchi et al., 2010), and adulthood (Kittler, et al., 2006) which are typically accompanied by challenging linguistic impairments. (Chapman & Hesketh, 2000)

1.1.1. Objectives of the Study

Using the theoretical framework of Generative Grammar, the current research aims at:

1) investigating the syntactic structure of DPs, IPs, and CPs in the participant’s language.

2) comparing the linguistic features unveiled from the analysis to those reported in the literature of typical language acquisition and DS.

1.1.2. Research Hypotheses

The present study is meant to verify the following hypotheses:

1) The syntactic errors in the structure of DPs, IPs, and CPs are licensed by UG principles.

2) The participant’s utterances respect the basic word order of Egyptian Arabic.

1.1.3. Research Questions

The present study endeavors to answer the following research questions:

1) What are the syntactic errors which prevail in the structure of DPs, IPs, and CPs in the language of an Egyptian individual with DS?

2) What are the underlying UG principles that license these syntactic errors?
2.1. Review of the Literature

2.1.1. Review of the Theoretical Framework

The following section provides an overview of the theoretical framework employed in the analysis of the present study. The section begins with an introduction to the theory of Generative Grammar followed by an exploration of the acquisition of language in the TD population with specific emphasis on the acquisition of functional categories (FC), which form the primary concern of this paper.

2.1.1.1. Language Acquisition: Theoretical background

There are varying assumptions underlying contemporary LA theories. The inherent complexity and infinity that characterize the nature of linguistic knowledge entail that it cannot be derived by inductive theories of learning whereby mimicry would be the driving force of language learning. The theory of Generative Grammar postulates that an internalized biologically programmed language faculty dictates the acquisition of language through a formal set of rules that direct and license the well-formedness of sentence structures and allocate structural relations to the minimal syntactic units defined as “formatives”. Based on the principles of UG, children formulate a grammar that corresponds to a small sample of well-formed sentences extracted from the “primary linguistic data” they are exposed to (Chomsky, 1965).

2.1.1.2. Distinction between I-Language and E-Language

Chomsky (1965) distinguishes between competence, i.e., The hearer-listener’s internalized knowledge of his own language and “performance”, i.e., The speaker’s actual linguistic output. According to this, children acquire language by mapping the speech stream to figure out the underlying rules of language. The term “competence” is now known as I-language (internalized linguistic ability) and “performance has come to be known as E-language (external language output that is apprehensible and tangible and includes social and communicative features of language) (Börjars, 2021).

2.1.1.3. Principles and Parameters (P&P)

An innate schema enables children to address linguistic data to figure out the grammar of the language they are acquiring from all the other sets of potential grammars available within UG. The existence of these universals implies that all languages can be traced down to the same pattern (Chomsky, 1965). The notion of
Principles and Parameters (P&P) is a key concept in UG which holds that all languages share a formal set of universal principles and parameters encoded within the Language Faculty that operate during LA. These parameters could be either switched on or off for specific languages. Despite the parametric variation between languages that results in variations in the surface structure (SS), all languages operate on the same underlying universal common core (Börjars, 2021). If these Principles and Parameters (P&P) are inherently encoded and in operation from birth, why do children make mistakes during LA? What principles does early child language (ECL) operate on? The following section will briefly attempt to illustrate the universal parameters that dictate LA in TDC and display some of the competing assumptions regarding LA and ECL.

2.1.1.4. The acquisition of Syntax in TDC

There are substantial basics that must be accessible to children early on to acquire language. These essential principles include knowledge of formattives that form the constituent structure of language, their hierarchal organization, as well as the plain distinction between “functional” and “content” categories. Functional categories are closed classes of words that provide a grammatical function yet no semantic content such as Complementizers, Conjunctions, Determiners, and inflectional markers. FC play an indispensable role in LA as they lay the foundation for transformational operations that constitute recursion and provide structure for content words that provide semantic meaning to the sentence such as nouns, verbs, adjectives, and adverbs (Lust, 2006, pp.182-197).

Children’s early simple and complex sentences abide by the basic word order as well as the word order of adjuncts. Use of transformational operations to make variable word order licensed by constituent structure rules is evident in ECL. Recursive operations such as conjoined clauses and early forms of embedded clauses in addition to differentiation between main and subordinate clauses are accessible in ECL. However, ECL starts with holophrases whereby children convey a complete message through a single word. Telegraphic speech characterizes their early multiword utterances. Deviations from the adult model are evident in the deletion of subjects, arguments, and verbal and nominal inflections in addition to the lack of FC (2006, pp.194-198). Are these deviations licensed by UG constraints or do they
result from a pre-developmental stage of FC? The following section illustrates competing assumptions on the acquisition of FC.

2.1.1.5. Hypotheses of the acquisition of Functional Categories

The following section presents some of the most relevant hypotheses of how functional categories are acquired in typically developing children and demonstrates how the three epistemological functional categories (Determiner phrase DP, Inflectional phrase IP, Complementizer phrase CP) are presumably intact during the earliest utterances.

2.1.1.5.1. The Maturational Hypothesis (MH)

Gathercole & Williams (1994) review a maturation hypothesis (MH) posed by Radford (1990) whereby a child’s acquisition of grammar passes through three biologically determined stages: First, a pre-categorical stage that is characterized by one-word utterances and the absence of functional categories, Second, the Lexical Categorical Stage that is characterized by the development of a category X’ that allows for any lexical category projection branching into a head and a complement or specifier. The absence of the Determiner category (D), Inflection Category (I), and Complementizer category (C) are characteristic of this stage and are assumed to develop later in a third stage. However, the hypothesis of a biological constraint on children’s competence for FCs can be disconfirmed due to the crosslinguistic evidence on ECL.

2.1.1.5.2. The Functional Projection Hypothesis (FPH)

In contrast to the MH, other researchers hypothesize that despite the frequent omission of FC in children’s production, their knowledge of FCs exceeds what is overt in their production as they are aware of their existence and are aided in production and comprehension by them (Whitman et al., 1991, as cited in Lust, 2006, p.198). The Functional Projection Hypothesis (FPH) postulates that children’s language is licensed by the rules of UG and has the same form as the corresponding adult model in the U-structure based on the assumption that they have the functional heads and their projections, yet they are phonetically null on the S-structure. For example, \([CP [C e] [IP [NP e] [1 e] [VP doing what there]]]\)? (Boser et al., 1992).

2.1.1.5.2.1 The Determiner Phrase (DP)

The parameters of UG allow DPs to be headed by null D. According to the FPH, the category D-zero is accessible to children in early stages of LA even when
it is phonetically null. Children’s omission of D in ECL is thus, constrained by UG rules. Moreover, the pro-drop parameter (null subjects) evidenced in diverse languages is assumed to be children’s first hypothesis about DPs. Later, they set the parameter on either +pro-drop or - pro-drop according to the specific language grammar they are acquiring. (Lust, 2006, p.201)

In Egyptian Arabic, the definite article attaches to the beginning of the noun. It is phonetically realized as /il/ yet in contexts where the noun begins in a coronal consonant, the /l/ assimilates to the initial coronal consonant by a /l/ assimilation rule. (Gadalla, 2000, p.141) Distinction between masculine and feminine nouns is shows by use of the feminine suffixes [-it] as in /ward-it il-walad/ ‘the rose of the boy’ when followed by a defining genitive or a pronominal suffix and the pausal form /a(h)/ in word final position as in /ward-a/ ‘a rose’. (pp.147-148) Inflection for number is indicated for both dual and plural. The dual the dual suffix: [-een] attaches to the unmarked singular form as in /?il-bint-een/ “the-girl-dual”. Egyptian Arabic distinguishes between two types of plurals: regular Sound plural that includes retaining both the feminine and masculine forms of the noun with no changes and attaching a suffix. Irregular broken plurals on the other hand contain changes in the internal structure of the noun. The plural suffix-iin is used with masculine plurals as in “muhandis-iin/ “engineers”, but the suffix -aat is used for both feminine plurals as in /muhandis-aat/ “engineers-FEM and plural forms of loan words as in /tilifizyun-aat/ “televisions” (pp.151-154).

2.1.1.5.2.2. The Inflectional Phrase

IP is headed by I-zero and has a complement which consists of v-zero and complement. Inflections carry indicators of tense, aspect, and modality. They can also show person, number, and gender agreement. While the knowledge of the Formal Features necessary for the acquisition and assignment of inflection is language-specific, knowledge of the basic IP structure and its head is determined by UG. The acquisition of specific language inflection develops slowly and gradually yet it operates under UG constraints (Lust, 2006, p.202).

2.1.1.5.2.2.1 The Null Auxiliary Hypothesis vs. the Optional Infinitive Stage Hypothesis

The Optional Infinitive Stage Hypothesis suggests that finite and nonfinite forms are at first in free variation. Then, finite forms move to their correct position. However, this hypothesis has been challenged as utterances that lack auxiliaries and
overt tense inflections in child language ought not be analyzed as infinitives. They are rather finite within a phonetically Null Auxiliary Hypothesis licensed by context. Despite the omission of the auxiliary in the child’s language, the child is aware of its existence (Lust, 2006, p.203-205).

There are two types of verb stems in Arabic: primary ones which solely consist of a simple root and derived ones where one or two derivational affixes attach to the root. In addition, verb stems in Arabic signify two forms of aspect: perfect completed actions and imperfect incomplete actions (Gadalla, 2000, p.58). Both the simple present and progressive aspect are represented in Egyptian Arabic by a combination of the performative bi- with the imperfect stem. Thus, The verb pattern (bi-yif'al) expresses both regular and instant events in the present. The past continuous tense in Egyptian Arabic makes use of the auxiliary “kān” followed by a combination of the performative bi- with the imperfect stem. Hence, the verb pattern (kān bi-yif'al) expresses progressive and regular actions in the past. (Petrova, 2014)

2.1.1.5.2.3. The Complementizer Phrase

Despite the deletion of COMP in child language, they are continuously accessed as the general structure of the child’s first complex utterances indicate that there is an underlying COMP head even when it is not overt. For example, in German child language, despite the COMP head being phonetically null, the child is aware of the CP structure of main and subordinate clauses in German. Although the child’s language lacks the overt COMP head, it has an intact verb-final word order which corresponds to the presence of a subordinate clause (Lust, 2006, p.206).

2.1.1.6. Inductive Areas of LA

The acquisition of gender, case, and grammatical categories has been reported to show developmental delay in TD as they involve inductive learning of arbitrary language-specific grammars and lexicons yet formal grammatical analysis processes guide the acquisition of these areas until they are fully acquired (Lust, 2006, p.242-250).

2.1.1.7. Perception, Comprehension & Production

Clark & Hecht (1983) demonstrate that integrating what can be produced with what can be understood is undoubtedly an integral part of LA. However, there is a discrepancy in some respects between both comprehension and production. Comprehension denotes a process of apprehending and perceiving the meaning of an utterance while production deploys a process of information retrieval from
memory to produce an utterance. Production does not match comprehension as a discrepancy between what children produce and what they can comprehend has been reported in child LA. For children to understand the meaning of an utterance, they need to recognize word shapes in the acoustic forms and access previously stored word meanings to link them to each other, to conceptual categories, and to the essential knowledge they have of these categories, yet production involves recalling the appropriate intended words from memory in conjunction with the articulatory phonetic system required to produce these words.

As demonstrated above, ECL is licensed by UG principles and parameters. Despite the frequent omission of FC at the SS, children are aware of them and consult them to map the speech stream. Deviations from the adult model in ECL does not indicate the absence of FC in ECL. It rather suggests that they are phonetically null on the surface structure. ECL respects basic word order and displays an awareness of the basic rules of DP, IP, and CP. Delays in certain areas of LA in TDC only involve areas that are not innate and require inductive learning such as gender, case, grammatical categories. This paper endeavors to deploy the principles and parameters of UG to demonstrate the structure of DPs, IPs, and CPs in the language of an eighteen-year-old individual with DS.

3.1. Review of Related Studies

A significant amount of literature has been conducted on language impairments among individuals with DS. The following section presents a review of the most relevant studies carried out on the subject matter of this research to demonstrate the similarities and differences between the current study and previous studies. The section summarizes studies executed on the linguistic deficiency in the DS population with specific reference to the acquisition of syntax, and morphosyntax.

3.1.1. Related Studies on the acquisition of syntax and morphosyntax in DS

Studies conducted on language comprehension in DS report a deficiency in this area. Chapman, Schwartz, & Kay-Raining Bird (1991) proclaimed that DS children and adolescents aged 5 to 20 years old compared to TD controls aged between 2 to 6 years old exhibit a less developed syntax comprehension compared to the comprehension of vocabulary. Similarly, Abbeduto et al. (2003) reported lower language comprehension skills in adolescent and young adult DS participants in comparison to two groups of MA matched controls and Fragile X syndrome. The
score of the DS group in the Test of Auditory Comprehension of Language in this study signified lower comprehension of grammatical morphemes and elaborated sentences than word classes and relations which coincides with the findings of Chapman, Schwartz, & Kay-Raining Bird (1991). Moreover, Chapman (2006) demonstrated a syndrome-specific language comprehension impairment in adolescents with DS indicated by their significantly worse performance in language comprehension tests including syntax and vocabulary comprehension compared to adolescents with cognitive impairment of unknown origin. In a study that assessed the comprehension of word categories in three groups of DS, non-specific intellectual disability, and TD, Loveall et al. (2016) found that the two groups of DS and TD participants displayed better performance in the comprehension of nouns than verbs and attributes which indicates that verbs are not as easily comprehended as nouns. The non-specific intellectual disability group exhibited better scores in nouns and verbs than attributes unlike the DS group which suggests that they have better verb comprehension than the DS group. An investigation of the growth of receptive vocabulary in two hundred and six individuals with DS aged between two years old to twenty-nine years revealed that the rate of receptive vocabulary in the DS children and adolescents was lower than the TD controls. The study also reported continuous growth of receptive vocabulary until the age of 20 then it drops (Cuskelly, Povey, & Jobling, 2016).

Like comprehension, studies on language production in DS reveal deficits specially in syntax and morpho-syntax. Hesketh and Chapman (1998) reported more variability yet less usage of lexical and grammatical verbs in the narrative of 29 individuals with DS compared to TD controls. Such variability could be owing to the more years of language exposure and word-learning within the DS group. Despite this variety, a shortcoming in their auditory short-term memory renders them less able to employ them. However, no significant variation was reported in their syntactic complexity and types of word combinations. Moreover, The DS participants’ production showed a high tendency to avoid using verbs. These findings corroborate the claim that language of DS lacks synchrony as some areas could be intact whereas others are impaired. Thordardottir et al. (2002) studied complex sentences production in adolescents with DS and found that they use complex syntax unlike the notion that the language of individuals with DS does not surpass simple syntax.
An investigation of phonological working memory, the acquisition of new morphemes, and speech perception in 8 participants with DS compared to TD controls showed they had poorer phonological working memory as well as lower performance in the test for the acquisition of new morphemes (Keller-Bell, 2000). Paterson (2000) reported an inconsistent pattern of receptive and productive vocabulary and a deficiency with syntactic structures in the performance of DS participants in the tests of knowledge of language and number. An assessment of the knowledge of binding among two groups of English and Serbo-Croatian adolescents with DS compared to TD controls unveiled a selective grammatical deficiency in assigning binding relations between the anaphor and its antecedent and showed no difficulties in binding principle B unlike the TD controls who displayed no difficulty in binding principle A (Perovic, 2004).

A study that investigated verb production in the narrative of DS individuals compared to two control groups of TD participants and participants with mixed- etiology intellectual disability revealed that there is a disparity between the quantity and the variety of verb production in the narrative of DS Participants. While the quantity of verbs produced by the DS group was significantly lower, the variety of the verbs used was relatively similar. They tended to produce less lexical verbs that the TD controls. This suggests that those with DS avoid using verbs despite having a significant diversity of verbs in their lexicon due to syntactic rather than semantic or lexical deficiencies (Loveall et al., 2018).

The review of previous studies on DS language defects reveals that the DS population display poor language comprehension skills including syntax and vocabulary. The comprehension of syntax is lower than that of vocabulary. The comprehension of grammatical morphemes and elaborated sentences is worse than word classes. The comprehension of nouns is better than that of verbs and the growth of receptive vocabulary is lower. The syndrome is characterized with a deficiency in the production of syntax and morpho-syntax and a tendency to use less lexical and grammatical verbs. The use of complex sentences and word combinations is evident in the production of the DS population. A deficiency in assigning anaphoric binding relations and the acquisition of novel morphemes has been reported.

4. Sampling, Methods, and Procedures

This research is a linguistic study that mainly addresses the syntax of an Egyptian DS individual. What specifically makes a descriptive study in this research
point predominant is that most of the previous studies have been chiefly undertaken on English-speaking individuals. Few research papers were conducted on semitic non-Indo-European language varieties like Egyptian Arabic which is a morphologically rich language. Thus, this investigation is expected to elaborate the linguistic profile of the syndrome more. Determining such linguistic deviations can help in tailoring language intervention programs that target the specific language impairment in DS. It can also help in developing focused language curriculum for the DS population in Egypt by predicting their most challenging language areas to acquire and targeting them.

Data Collection:

This research deploys the following procedures to collect a representative sample of the participant’s language. First, video and picture prompts from the Electronic Language Test to Measure the Development of Language Skills and Concepts (Othman & Othman, 2021) were employed to elicit the targeted oral language responses. Second, to elicit a relatively lengthy oral discourse, narration contexts were deployed. A narrative story generation task was undertaken. The subject was shown a wordless picture story and was directed to tell the story to the examiner. The duration of exposure was set to be 12 seconds and a duration of 5 seconds was given after the subject stopped talking before turning to the next page. The narrative was audio-recorded and transcribed later for the descriptive analysis. The wordless picture story used for this task was initially set to be (Mercer Mayer’s Frog on His Own), a wordless picture book widely used for narrative language sampling from individuals with intellectual disabilities. However, the subject was unresponsive to this wordless picture story. Thus, it was replaced by the illustrations of (T. Albert’s Hide and Seek) which was chosen because it was found to be closer to Egyptian children’s experience and culture. Two narrative story retelling tasks were executed as well. The participant was shown two videos of two narrated stories and was asked to retell them after each video. The videorecorded stories used for these tasks were part of the language content section in the previously mentioned language assessment program. Finally, the whole language output produced by the subject during the experimental sessions was recorded and transcribed later for the purpose of the descriptive analysis. Moreover, a conversational language sample was obtained by engaging the participant in a conversation with the examiner that included questions about what he does at school and what he loves about it, his
favorite activities, and friends, and what he does after school. The examiner engaged with the participant by questioning and commenting during that time. The sessions took place in an empty classroom at the participant’s school. Whenever the participant needed a break during the whole test duration, he was given a break at his convenience. If the participant was unwilling to respond or felt bored, the session was postponed to another day.

5. The Analysis

This section displays the prospective analysis of DPs, IPs, and CPs following the framework of UG. It is organized into three principal sections; The first section showcases the analysis of DPs. The second section presents an analysis of the IPs while the third section examines the properties of CPs. The analysis is an endeavor to exhibit the syntactic and morpho-syntactic properties of the participant’s linguistic production in detail.

5.1. The Analysis of DPs

Table (1)

<table>
<thead>
<tr>
<th>Type of Deviation: Omission of the definite article</th>
<th>Utterance</th>
<th>Adult model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. *ʔallāga æhī (answering the question where is the fridge?)</td>
<td>*Fridge this</td>
<td>i-tallāgah ahī</td>
</tr>
<tr>
<td></td>
<td>*This is fridge.</td>
<td>The-fridge is this</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This is the fridge.</td>
</tr>
<tr>
<td>2. *nihʃā fū (answering the question where is the carpenter?)</td>
<td>Carpenter up</td>
<td>i-nnagār fūʔ</td>
</tr>
<tr>
<td></td>
<td>Carpenter is up.</td>
<td>The-carpenter up</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The carpenter is up.</td>
</tr>
<tr>
<td>3. *hawa sakkuh (Referring to the door being closed by the air)</td>
<td>Air closed-it-ACC</td>
<td>il- hawa sakkuh</td>
</tr>
<tr>
<td></td>
<td>Air closed it.</td>
<td>The-air closed-it</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The air closed it.</td>
</tr>
<tr>
<td>4. *ʃabi ʕaṣī (Referring to the juice in front of the examiner)</td>
<td>*Drink juice</td>
<td>iʃrabi il-ʕaṣīr</td>
</tr>
<tr>
<td></td>
<td>Drink juice</td>
<td>Drink the-juice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drink the juice</td>
</tr>
</tbody>
</table>
5. *ḥuṭ tifūn (Referring to the mobile in the examiner’s hand)  
*put mobile  
Put mobile down

6. *nū tadʕah (Referring to the lights going off)  
Light cut  
Light went off

7. *jajah laʕ fū (Answering the question where is the plane?)  
Plane ascend up  
Plane ascend up

8. *waḥ masah? (Threatening to leave the school)  
Leave school  
Do you want me to leave school?

9. *wuḥ tafnah (referring to his uncle’s funeral)  
Went funeral  
I went to funeral

10. *jī taʕ jū (answering the question what is he doing?)  
remove thing see  
He remove thing see

Inconsistent use of the definite article was detected as it was frequently omitted in contexts where the referent noun had already been established thus, use of the definite article was required. The table showcases contexts where the participant omits the definite article. Although this elision does not match the adult model, it is licenced by UG parameters that allow a phonetically null D. Hence, the UR of the previous data follows the same pattern as this example:

\[
[\text{DP} [D \emptyset] [NP [N hawa]] [VP sakkuh]]. \quad \rightarrow \quad \text{Adult model: } [\text{DP} [D il] [NP [N hawa]] [VP sakkuh]].
\]
<table>
<thead>
<tr>
<th>Table (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of Deviation:</strong> number and gender marking in DPs</td>
</tr>
<tr>
<td><strong>Utterance</strong></td>
</tr>
<tr>
<td>-------------------------------</td>
</tr>
<tr>
<td>1. *tūssī tasarah Chair-MASC broken-FEM</td>
</tr>
<tr>
<td>2. *tūssī ibīrah Chair-MASC big-FEM</td>
</tr>
<tr>
<td>3. *tū ṣīr Ball-FEM small-MASC</td>
</tr>
<tr>
<td>4. *dih ṣuhjja dih kibi (comparing a short girl and a tall one)</td>
</tr>
<tr>
<td>5. *wāḥtah tānj (referring to “kubbājah” (cup) One-FEM second-MASC</td>
</tr>
<tr>
<td>6. *ahuh il-bit (referring to a group of girls studying) this-SG the-girl-SG</td>
</tr>
<tr>
<td>7. *wurūn (referring to a picture of many trousers) trousers-SG</td>
</tr>
<tr>
<td>8. *Dih ṣuhia (referring to a group of small chairs) this-SG small-SG</td>
</tr>
<tr>
<td>9. *tūlah (referring to two balls) ball-SG</td>
</tr>
<tr>
<td>10. *talam (referring to a picture of two pens)</td>
</tr>
</tbody>
</table>
Investigating the structure of DPs shows that the participant’s utterances respect the basic word order of heads and modifiers in Egyptian Arabic where the adjective follows the head noun. However, overlapping feminine gender agreement with the masculine one is evident as shown in the above table. As shown, the participant’s utterances lack both plural and dual number indicators. The data also shows overlapped use of feminine grammatical gender. However, the utterances respect adjunction word order.

5.2. The Analysis of IPs

Table (3)

<table>
<thead>
<tr>
<th>Type of Deviation: past tense and progressive markers</th>
<th>Adult model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utterance</td>
<td></td>
</tr>
<tr>
<td>1. *ilwalā ilšā bitūrah w tasā ilbī The-boy play with-the-ball and broke the-egg-ACC. *The boy play with the ball and broke the egg.</td>
<td>(ilwalā kān bi-ji-ḥab bi-kūrah w kasar ilbīḍ.) the-boy was PROG-play-3SG with-the-ball and broke the-eggs-ACC. The boy was playing with the ball and broke the eggs.</td>
</tr>
<tr>
<td>2. *dih tiʕajjā samat (retelling a story of a boy who was crying over the fish he caught) *this-FEM cry fish-ACC. *this cry fish</td>
<td>(hinā ilwalad kān bi-ji-ʕajjat ʕalā isamakah) Here the-boy was 3PROG-MASC-cry over the-fish-ACC. Here the boy was crying over the fish.</td>
</tr>
<tr>
<td>3. *sūf jisūf (retelling a story of a girl who was watching the eggs) *see 3PROG-MASC-see *see is seeing</td>
<td>(il-bint kānit bitʃūf il-bīḍ) The-girl was 3PROG-FEM-see the-eggs. The girl was seeing the eggs.</td>
</tr>
<tr>
<td>4. *jisūf il-bitāʕah asrha (describing the picture of a girl watching the eggs and a boy breaking them)</td>
<td>(il-bint kānit bi-tʃūf il-bitāʕah wi il-walad kasarha.)</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
| *3PROG-MASC-see the-thing broke-it  
*see the thing broke it | The-girl was 3PROG-FEM-see the-thing and the-boy broke-it.  
The girl was seeing the thing and the boy broke it. |
(Answering the question where was the ball hidden?)  
*ball went-3SG-MASC. up and pro-drop went-3SG-MASC.  
*Ball went down. Up went down | (Ilkūrah nizlīt taḥt. kānit fūʔ wi nizlīt taḥt.)  
The-ball went-3SG-FEM. pro-drop was up and pro-drop went-3SG-FEM.  
The ball went down. It was up and went down. |
| 6. *sahabah (referring to the feminine word “ilūṭah” (the cat)  
*hid-MASC  
He hid | (istaxabbīt)  
Hid-FEM  
She hid |
| 7. *alaṣ-uh (referring to a girl who finished eating a banana)  
*Finished-MASC-it-MASC  
He finished it. | (xallaṣīt-ha)  
Finish-FEM-it-FEM  
She finished it. |
| 8. *taliah (referring to a girl who ate a banana)  
*Ate-MASC-it  
He ate it | (kalīt-ha)  
Ate-FEM-it-FEM  
She ate it |

Utterances that express the past tense are intact, yet gender may be overlapped as follows: Despite having some phonetic deformations, all the utterances in the above table display overt past tense forms as in the verbs: kasar (the past tense of ji-ksar), nizil (the past tense of ji-nzel), xallaṣ (the past tense of ji-xallaṣ), istaxaba (the past tense of ji-staxabba), and kal (the past tense of jā-kul). The only exceptions are the verbs that are supposed to be preceded by the past auxiliary verb kān-MASC and kānit-FEM which are persistently omitted in all the above utterances. These main verbs seemingly show a shift in either the tense or mood. However, a closer investigation of these utterances proves otherwise. The following analyses illustrate the US these utterances.
1. On the SS, the utterance “ʾilšā” (2IMP-play) seemingly corresponds to the imperative mood as if the participant overlapped the third person with the second person yet this is not true. The US of this utterance is “kān bi-ji-ʾlšab”. It underwent an elision process licensed by the Null Auxiliary Hypothesis that rendered the AUX verb “kān” null. Further elision was applied due to a length constraint that rendered the progressive morphemes” bi-ji” elided as well.

2. On the SS, the utterance “tišājjā” corresponds to either the second person singular present tense (2PRES-SG-cry) or an overlap of gender from masculine “3PRES-MASC-ji-šajjat” to feminine “3PRES-FEM-šajjāt. By consulting the US of the utterance, “kān bi-ji-šajjat”, it shows that neither of these assumptions is correct. Like the previous example, both the AUX verb and the progressive morphemes were omitted. The stem “šajjat” underwent metathesis, a phonological process that shifted the /t/ to the beginning of the utterance.

3. Utterances 3 and 4 strongly corroborate the previous analyses as follows: “sūf jisūf” disconfirms the second person imperative assumption as it can be noted that the participant’s initial attempt to pronounce “kānit bitʃūf” was “2IMP-SG-sūf” which was corrected to “jisūf” which clarifies that the intended structure is the progressive past not the imperative. This also verifies that the structures of these utterances are operating under the assumption of a phonetically null auxiliary realized as: \([\text{IP} [i \emptyset]]_{\text{VP}} [\text{jisūf}]\).

### Table (4)

| Type of Deviation: Present tense and progressive markers | 
| --- | --- |
| **Utterance** | **Adult model** |
| 1. *jikli (describing a picture of a boy and a girl running)*  
*PRES-MASC-run-SG He runs. | (humma bijigr-ū)  
They are-PRES-run-Pl.  
They are running. |
| 2. *dih jākul dih laʔ (referring to a picture of a group of boys eating and another of others not eating)*  
*this-SG eat-SG this-SG no | (dūl bi-jāklū dūl laʔ)  
Those PROG-PRES-eat-Pl. those no  
Those are eating those are not. |
Investigation of the present tense shows a phonetically null present tense AUX “bi- “ and frequent omission of the progressive aspect “j-“ with substitutions of plural number agreement with the singular one. Although phonological deformations characterize the above utterances, they express the present tense. The present tense auxiliary “bi-“ is phonetically absent, but it is syntactically operant. This assumption can be verified by the US of “jikli” and “jākul” and “taša” which attest that their structures operate under a null present tense auxiliary “bi- “ and the substitution of the plural agreement indicator -ū with the masculine singular one.

This structure can be expressed as follows:

\[
[\text{TP} \ [\text{TP} \ [\text{VP} \ jikl-i]]] \rightarrow \text{Adult model: } [\text{TP} \ [\text{TP} \ [\text{VP} \ jigr-ū]].
\]

\[
[\text{TP} \ [\text{TP} \ [\text{VP} \ jākul]]] \rightarrow \text{Adult model: } [\text{TP} \ [\text{TP} \ [\text{VP} \ jākl-ū]].
\]
The US of the verb “taṣa” confirms the same assumption as only the AUX -bi was omitted yet the structure shows awareness of its existence.

\[ [\text{TP} \ [\text{T} \emptyset] \ [\text{VP} \ taṣa]] \rightarrow \text{Adult model: } [\text{TP} \ [\text{T} \ bi-] \ [\text{VP} \ tʔaʃar]]. \]

Given this evidence, it follows that the US of (iʃrāb- infuxha) is not imperative mood. Similarly, (ʔākū- wāku- ?ana) do not have a shift from the third person singular to the first-person singular subject despite their surface structures that seem to show otherwise.

1. The US of “iʃrāb” is “bijiʃrāb-ū”. The omission of the present tense AUX “bi- “, the deletion of the progressive aspect, and the substitution of the plural marker with the singular one render the structure as follows:

\[ [\text{TP} \ [\text{T} \emptyset] \ [\text{VP} \ iʃrāb]] \rightarrow \text{Adult model: } [\text{TP} \ [\text{T} \ bi-] \ [\text{VP} \ jiʃrāb]]. \]

2. “infuxha” is licensed by a null AUX and omission of the progressive aspect.

\[ [\text{TP} \ [\text{T} \emptyset] \ [\text{VP} \ infuxha]] \rightarrow \text{Adult model: } [\text{TP} \ [\text{T} \ bi-] \ [\text{VP} \ ji-nfux-ha]]. \]

3. The SS of “ʔākū/ “wāku” seems to indicate a shift from the third-person singular subject “t-ākul” to the first-person singular subject “ʔākul” yet the US shows that the structure is licensed by a null AUX and elision of the feminine progressive marker (-t)

\[ [\text{TP} \ [\text{T} \emptyset] \ [\text{VP} \ wākū]] \rightarrow \text{Adult model: } [\text{TP} \ [\text{T} \ bi-] \ [\text{VP} \ t-ākul]]. \]

5.3. The Analysis of CPs

Table (5)

<table>
<thead>
<tr>
<th>Type of Deviation: Deletion of coordinating conjunctions</th>
<th>Utterance</th>
<th>Adult model</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>*dih wāku dih infuxha (describing a picture of a girl eating and a boy blowing a balloon)</td>
<td>(dih bi-ʔākul wi dah bi-ji-nfux-ha) This PROG-FEM-eat and this PROG-MASC-blow-it This is eating and this is blowing it.</td>
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<td></td>
<td>*this eat this blow-it</td>
<td>(ʔawī, baḥib kuluh bašab b-ilšagalah wi bašab ḥadīd wi bagri)</td>
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<tr>
<td>2.</td>
<td>*tawī źib tuluḫ źab źagalah bašab źadīd īkri (answering the question “why do you like your school?”)</td>
<td></td>
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<tr>
<td></td>
<td>*a lot love all play bike play iron run</td>
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<tr>
<td>3.</td>
<td>*ḥuṭ tifūn īgri (asking the examiner to put down the mobile phone and run with him) *put mobile run</td>
<td>(ḥuṭ t-tilifūn wi īgri) 2IMP-put-FEM the-mobile and run Put the mobile and run.</td>
</tr>
<tr>
<td>4.</td>
<td>*jisūf il-bitāʕah asrha (describing the picture of a girl watching the eggs and a boy breaking them) *see the-thing broke-it</td>
<td>(il-bint kānit bi-t-ʃūf il-bitāʕah wi il-walad kasrha) The-girl was PROG-see the-thing and the-boy broke-it The girl was watching the thing and the boy broke it.</td>
</tr>
<tr>
<td>5.</td>
<td>*dih ʔākū mūs dih ʔana (describing a picture of a girl eating a banana and a boy sleeping) *this-FEM eat bananas this sleep</td>
<td>(dih bi-t-ākul mūz wi dah bi-j-nām) This-FEM is-PROG-FEM-eat banana and this-MASC is-PROG-MASC-sleep This girl is eating a banana and this boy is sleeping.</td>
</tr>
<tr>
<td>6.</td>
<td>*hatl l-umuh l-abūk (describing a picture of a story where a girl threatens to tell her father and mother about her brother’s naughty behaviour) *will-say to-mother-his to-father-your</td>
<td>(Hatʔūl l-umuh wi l-abūh) Will-tell to-mother-his and to-father-his She will tell his mother and his father.</td>
</tr>
<tr>
<td>7.</td>
<td>*smā dih smā dih smī (answering the question “where do we wear a watch?” and trying to say “this is right, and this is left”) *left this left this right</td>
<td>(dih jīmāl wi dih jīmīn) This left and this right This is left and this right.</td>
</tr>
</tbody>
</table>
The Syntax of DP, IP, and CP in the Language of an Egyptian Down Syndrome Individual: A Generative Approach

Conjunctions, by definition, are words that join phrases together on an equal bar-level. Recurring deletion of conjunctions was observed in the subject’s linguistic production. The previous examples include deletion of the conjunction “wī (and) and lāken (but). Despite conjunctions being phonetically null in the utterances shown in the previous table, the participant is aware of their existence. This can be evidenced in the adherence to conjoining elements of the same category. XP → XP conj. XP

1. CP → CP conj. CP as in:
   [CP [CP dih wāku] [conj. ∅] [CP dih infuxha]] → Adult model: [CP [CP dih wāku] [conj. wi] [CP dih infuxha]]

2. DP → DP conj. DP as in:
   [DP [DP ʕarūsah] [conj. ∅] [DP ʕarīs]] → [DP [DP ʕarūsah] [conj. wi] [DP ʕarīs]]

Table (6)

<table>
<thead>
<tr>
<th>Type of Deviation: Deletion of the complementizer</th>
<th>Utterance</th>
<th>Adult model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. *waḥ ḍabak (threatening to hit his friend when they leave school)</td>
<td>*(lamma ni-rawwah, ha-ḍrabak) When we-leave, will-1PRES-PROG-hit-you. When we leave, I will hit you.</td>
<td></td>
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<tr>
<td>*leave hit-you</td>
<td></td>
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<tr>
<td>2. *il-ʕaṣ jid, tuxrug tafnah (speaking of his mother who will go out to attend his uncle’s funeral when ʕaṣr call to prayer is due)</td>
<td>*(lamma il-ʕaṣr jiddan, ha-tuxrug turūḥ i-dafnah) When the-Asr PROG-call, will-3PRES-FEM-exit go the funeral</td>
<td></td>
</tr>
<tr>
<td>*the-Asr PROG-call, she-exit funeral</td>
<td>When Asr prayer calls, she will go out to go to the funeral.</td>
<td></td>
</tr>
<tr>
<td>3. *nū tadʕah, ha-twalaʕ (trying to say when the lights go off, we light the candle)</td>
<td>(lamma i-nnūr jiʔtaʕ, ha-n-walaʕ i-ʃʃamʕah) When the-light PROG-cut, will-1PRES-Plu.-light the-candle When the light go out, we will light the candle.</td>
<td></td>
</tr>
<tr>
<td>4. *saħmah (answering the question why he didn’t come to school yesterday) Crowdedness</td>
<td>(ʕafān kān fi zahmah) Because was there crowdedness Because it was busy.</td>
<td></td>
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<tr>
<td>5. *taṣa ʔākū (describing a picture of a girl peeling a banana to eat it) 3PRES-peel PRES-SG-eat</td>
<td>(bi-tʔar il-mūzah ʕafān t-ʔakūl) Is-PROG-FEM-peel the-banana because FEM-eat-it She is peeling the banana to eat it.</td>
<td></td>
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<tr>
<td>6. *ji taʕ jū (answering the question what is he doing?) *Remove thing see</td>
<td>(bi-jiʃil il-biʃʕ ʕafān jiʃlaf) PRES-PROG-remove the-thing to see He is removing the thing to see.</td>
<td></td>
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<tr>
<td>7. *ātlā kidah silah (describing a picture of a girl attaching beads in a string while imitating the action with his hands) *do this necklace</td>
<td>(bi-tiʃmil kidah ʕafān tiʃmil silsila) PROG-FEM-do this because FEM-do necklace She is doing this to make a necklace.</td>
<td></td>
</tr>
<tr>
<td>8. *iʃ fāf bā ʕilwah (answering the question why do you comb your hair) *not know be beautiful</td>
<td>(Miʃ fārif, ʕafān ʔābʔa ḥilw) Not know because be beautiful I don’t know to be beautiful.</td>
<td></td>
</tr>
<tr>
<td>9. *madasah (answering the question why he didn’t go to his uncle’s funeral yesterday)</td>
<td>(ʕafān kunt fi il-madrasah) Because I was in the-school Because I was in the school.</td>
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</table>
The Syntax of DP, IP, and CP in the Language of an Egyptian Down Syndrome Individual: A Generative Approach

| *school | *
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<tbody>
<tr>
<td>10. *faxha faʔa (describing a picture of a boy blowing the balloon until it exploded) Blew-it exploded</td>
<td>(il-walad nafax il-bālūnah liḥad mā farʔaṣit) The-boy blew the-balloon until exploded-it The boy blew the balloon until it exploded.</td>
</tr>
<tr>
<td>11. *mit ha-rawwaḥ waʔti bidat (threatening to leave the school, if the examiner keeps insisting that he takes a breakfast break) *stand will-leave now really</td>
<td>(law umt, ha-rawwaḥ dilwaʔti bigad) If I-stand, I-will-leave now seriously. If I get up, I will leave now seriously.</td>
</tr>
</tbody>
</table>

Complementizers are functional categories that are used to embed one clause inside another. An evident deficiency in the use of complementizers can be noted in the subject’s overall linguistic production as deletion of the complementizers “ʕaʃān” (because), “lamma” (when), “law” (if), and “liḥad mā” (until) significantly prevailed in contexts that required the use of these complementizers. Despite the omission of subordinating conjunctions in the participant’s utterances, awareness of their existence can be noted in the structure of the complex sentences in the previous table which reveals an underlying COMP despite being phonetically null.

Example: CP → C TP as in [CP [COMP. ∅] [TP ḍabak [CP [COMP. ∅] [TP waḥ]]] ]

Adult model: CP → C TP as in [CP [COMP. ∅] [TP ha-ḍrabak [CP [COMP. lamma] [TP ni-rawwaḥ]]]]

6. Findings and Results

The analysis of the structure of DPs, IPs, and CPs in the language of an 18-year-old DS male shows that the basic FCs and morphemes are often prone to omission. This is consistent with the syntactic and morphosyntactic language defect characteristic of DS manifested in the elision of FCs, impaired acquisition of grammatical morphemes, and the scarce use of grammatical verbs. (Hesketh and Chapman, 1998)
The deviations in the structure of DPs included omission of the determiner and overlapping number and gender marking yet the analysis shows that the structure of DPs respects adjunction word order. The omission of determiners is licensed by the parameters of UG that allow for null determiners. Moreover, the structure of DPs shows substitution of the feminine gender agreement with the masculine one and a deficiency in the use of plural and dual marking and agreement within the DPs. Grammatical gender and number marking are areas of LA which require inductive learning. Hence, they show developmental delay.

Although phonetic distortions characterize the participant’s utterances, the investigation of the structure of IPs reveals intact overt past tense forms except in the contexts of the progressive past where the past tense AUX “kān/ kānit” and the progressive morpheme “bi-ji” were omitted. Despite this omission, the USs of these utterances strongly confirm that they operate under a null AUX hypothesis. Furthermore, the analysis excludes the assumption of a shift from the past tense form to the second person imperative mood that appears on the SS. The same findings can be confirmed from the investigation of the present tense forms which were also found to operate under a phonetically null present tense AUX “-ji-” and a null progressive morpheme “bi-“. The analysis of the US of the structure of the present tense disconfirms the apparent shift to the second person imperative revealed on the SS once more. The analysis of IPs also reveals substitution of the feminine gender agreement indicator with the masculine one. A similar substitution is evident within plural number indicators that were substituted with the singular one.

The investigation of the structure of CPs tackled both coordinated and subordinated clauses. The analysis of the two types of CPs reveals an underlying COMP despite being phonetically null. This can be evidenced through adhering to conjoining CPs on an equal bar level where the COMP is phonetically absent yet syntactically operant. Likewise, the analysis of subordinated CPs discloses an underlying null COMP that licenses the embedding of one clause within another. These intact complex sentence structures are consistent with Thordardottir et al. (2002) who reported use of complex syntactic structures in the language of DS individuals.

7. Conclusion
In conclusion, this research has mainly demonstrated the structure of the three main FCs from a Generative approach. The analysis of DPs, IPs, and CPs in the present study coincides with the FPH which posits that LA errors are licensed by UG rules. Despite the omission of the functional heads on the SS, they are syntactically operant on the US. The structures of IPs correspond to the null AUX hypothesis proposed by Boser et al. (1992). A discrepancy between comprehension and production can be noted in the structures where the participant is aware of the functional heads and their projections despite being phonetically null in production. Inductive areas of language such as specific language gender and number morphemes show developmental delay. The current paper proposed a syntactic analysis of the structure of DPs, IPs, and CPs in the language of an individual with DS. Further research ought to compare the findings within larger samples of the Egyptian DS population.

List of Abbreviations
DS           Down Syndrome
IQ           Intelligence Quotient
TD           Typically Developing
IPD          Inconsistent Phonological Disorder
SLI          Specific Language Impairment
WS           William Syndrome
MA           Mental Age
FC           Functional Categories
ECL          Early Child Language
MH           Maturational Hypothesis
FPH          Functional Projection Hypothesis
IP           Inflectional Phrase
FF           Formal Feature
US           Underlying Structure
SS           Surface Structure

List of Phonetic Transliteration Symbols:

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### The Syntax of DP, IP, and CP in the Language of an Egyptian Down Syndrome Individual: A Generative Approach

<table>
<thead>
<tr>
<th>Arabic Letter</th>
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References


The Syntax of DP, IP, and CP in the Language of an Egyptian Down Syndrome Individual: A Generative Approach

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Abstract:

Down syndrome is a neurodevelopmental disorder resulting from a genetic anomaly in chromosome 21 that affects cognitive and linguistic abilities. Numerous studies have highlighted the linguistic deviations in individuals with Down syndrome, starting from childhood to adulthood. Nonetheless, most of these studies have been conducted on English-speaking individuals. Therefore, the current study aims to investigate the syntactic structure of the nominal and verbal complexes and the full sentence in the language of an Egyptian Down syndrome individual within the generative framework. The logical basis for choosing the syntactic and prosodic structure of individuals with Down syndrome for study is that it is one of the most affected aspects of cognitive impairment resulting from the syndrome. Consequently, it is expected that the linguistic deviations of an Egyptian individual with Down syndrome will contribute to a better understanding of the linguistic characteristics of the syndrome. This study, which is part of a larger study on the phonological and syntactic deviations in a sample of Egyptian individuals with Down syndrome, aims to reveal the syntactic deviations in the language of the study participant, contrasting them with natural acquisition of the language literature. It is expected that the syntactic errors are constrained by the generative framework and that the analysis reveals the presence of prosodic heads in the deep structure, even though they are empty phonologically.

Keywords: Down syndrome,Syntax, Linguistic deviation, Natural language acquisition