

CHAPTER 4

Agreement morphology in Arabic as a second language

Typological features and their processing implications*

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This study attempts to establish the developmental stages for agreement morphology in the acquisition of Arabic as a second language (henceforth Arabic SLA) from a Processability Theory (PT) perspective (Pienemann 1998). More specifically, the paper will provide a systematic account of the developmental features of structures within Stage 3 (phrasal agreement morphology) and Stage 4 (inter-phrasal agreement morphology) on the PT predicted developmental sequence. The empirical testing of these stages is based on data produced by English-speaking learners of Arabic in a classroom context (Mansouri 2000). The paper builds on Mansouri's previous findings (1999, 2000) by further refining the linguistic description of agreement structures in Arabic SLA taking into account key typological features such as form function relationships, class type of the head NP, word order variation and directionality of encoding. These typological features discussed at length in Arabic grammar theories (Kremers 2000; Fassi Fehri 1983, 1988, 1993; Moutaouakil 1985; Bahloul 1993; Benmamoun & Aoun 1999) will be analysed in terms of key patterns of grammatical information exchange (Bresnan 2001) in order to define their processing requirements and, consequently, their predicted developmental order. The paper will conclude by discussing the issue of intra-stage sequencing and the potential for this to be examined on the basis of a combination of language-specific typological features and differing processing requirements.

1. Introduction

The chapter has two inter-related objectives, the first to provide a typological account for phrasal and inter-phrasal agreement morphology in Arabic, and the second to establish their developmental sequence on the basis of the Processability Theory's predictions (Pienemann 1998). The former is essential for an accurate formulation of the latter. The choice of Arabic for cross-linguistic validation is theoretically important because it provides a unique typological testing context for theoretical claims that have been initially developed on the basis of research carried out on Indo-European languages such as German and English.

One of the difficulties in cross-linguistic testing of theoretical claims in SLA is the specific typological peculiarities of the target language (TL) and its methodological implications for establishing comparable structures at different developmental stages. The contribution of PT in this context is that its processing procedures hierarchy reflects the universal concept of feature unification in different patterns of grammatical information exchange and, therefore, this hierarchy is testable in any language. However, applying the notion of grammatical information exchange in different languages requires a careful selection of optimal structures for SLA testing. In considering why some structures may or may not be optimal candidates for SLA testing, this study will rely on the concept of grammatical information exchange as outlined in Lexical Functional Grammar (LFG) and adopted in PT (Pienemann 1998). This concept is crucial in generating predictions across typologically different languages: the higher the syntactic level of this information exchange (phrasal > inter-phrasal > inter-clausal), the later its development/emergence in the learner language is predicted.

Another important point that will be discussed in this paper is the multiplicity of structures within individual acquisition stages and their role in analysing the learner language. This is especially the case in Arabic phrasal (Stage 3 in PT) and inter-phrasal agreement morphology (Stage 4 in PT) where their multiple structures exist. The importance of the intra-stage range of structures is that it will have implications for interpreting certain developmental 'gaps' that are otherwise categorised as 'inconsistent' with the predicted developmental order. This paper will examine the various typological phenomena within a particular stage, establish whether structures belonging to the same stage are all processable in the same manner, and (if so) whether such an analysis can form the basis for an intra-stage learning sequence.

2. Studies on Arabic SLA

As far as research on the acquisition of Arabic as a second language is concerned, the few studies carried out in the past two decades are either too narrow in focus (e.g., Nielsen 1997) and, therefore, cannot claim to establish acquisition stages for Arabic grammar, or are essentially descriptive studies (e.g., Bakalla 1980; Kuntz 1996) that focus mainly on the major difficulties facing learners of Arabic as a second language. The latter studies, in particular, are typically undertaken from a traditional error analysis approach where certain types of the learner's errors are analysed, accounted for and classified into various lexical, phonological and grammatical categories. Much of this research ignores the key developmental issues in Arabic second language acquisition and as such will not be discussed any further in this paper.

The main concern of Mansouri's (1995) study was to investigate: (i) the effect of grammatical encoding on the acquisition of subject-verb agreement marking in terms of the amount and direction of encoding between the subject (source of information) and the verb (target of information); and (ii) the effect of discourse information on the acquisition of grammatical agreement. The learners were 15 Australian tertiary students enrolled in three different levels of Arabic courses offered at an Australian tertiary institution. The main hypothesis of the study was that directionality of encoding (the degree to which the source's grammatical information is morphologically marked onto the target) would correlate with learning difficulty in a systematic manner. It was predicted that:

- i. when the source's features (i.e. person, number and gender) are fully mapped onto the target [Source = Target] learning is expected to be easy;
- ii. when there is an under-specification of source's features onto the target as with non-humans [Source > Target], learning is expected to be less easy; and
- iii. when there is an over-specification, i.e. the target is marked for features that the source does not explicitly exhibit as in the case of collectives [Source < Target], then learning is expected to be the least easy.

A linguistic analysis of data revealed that the main source of difficulty for learners was the correct identification of the pragmatic roles of 'subject' head nouns. This is especially the case when the 'subject' NP exhibits the feature [-Human] resulting in reduced agreement marking. The study has shown that the developmental order of subject-verb agreement goes along the following path:

$$\begin{array}{ccc} [\text{Source}<\text{Target}] > & [\text{Source}>\text{Target}] > & [\text{Source}=\text{Target}] \\ (\text{Time } 3) & (\text{Time } 2) & (\text{Time } 1) \end{array}$$

This study, however, was interested in linguistic complexity as the basis for learning predictions. This is different from Mansouri's (2000) study, which attempts to establish the full developmental hierarchy for Arabic SLA syntax and morphology from a general PT perspective. The study explored the connection between linguistic (e.g. word order and semantic class), cognitive (e.g. learner's processing procedures) and educational (e.g. formal objectives of instruction) factors. The findings of the study for syntax resulted in the formulation of the following simplified implicational developmental sequence with SVO being the first to emerge:

$$\begin{array}{ccccc} [\textit{Anaphora}] > & [\textit{Subordination}] > & [\textit{VSO}] > & [\textit{SVO}] \\ (\text{Time } 4) & (\text{Time } 3) & (\text{Time } 2) & (\text{Time } 1) \end{array}$$

The detailed analysis shows that this sequence is invariably similar across all learners and that all the structures are acquired in a cumulative and implicational manner. The findings in relation to the acquisition of morphology are less coherent, with a greater degree of inter-learner variability, in particular with regard to clitics, grammatical gender, case marking and irregular plurals. These four structures, not surprisingly, are among the latest structures to be acquired by all learners.

Nielsen (1997) attempted to test the Processability Theory's prediction in the context of Arabic as a second language. The focus of Nielsen's study is the acquisition of agreement procedures within (phrasal) and across (inter-phrasal) constituents. The structures selected to test Processability Theory in the context of Arabic SLA are noun phrases (phrasal agreement) where the head nouns and their modifiers are marked for definiteness, gender and optionally preceded by a demonstrative article, and subject-verb agreement (inter-phrasal agreement) with number and gender being the variant features.

This study suggests that phrasal agreement in Arabic SLA (in particular, the definite article /al/ in mid point and the *idafa* structure /N1 al-N2/) occurs later than inter-phrasal morphology (subject-verb agreement). There are a few methodological issues that need to be clarified before a clear interpretation of these findings is achieved. The first issue is the lack of a clear formal account of the selected target language structures which is necessary for the empirical testing of the predictions outlined in Processability Theory. This is essential in the context of processability research in order to outline why certain structures would be processed differently or at different times from other structures.

This is a key aspect of linguistic and psychological plausibility articulated in PT which accounts for the processing operations required for different structures (with different patterns of information exchange).

The second methodological issue relates to the misunderstanding and, therefore, (mis)application of the emergence criterion which adds an element of methodological confusion to the conceptual basis of the study in question. Processability Theory states clearly that the emergence criterion can only be applied to “morphological development through more refined analyses which ‘neutralise’ the effect of un-analysed entries into the learner’s lexicon” (Pienemann 1998: 144). Furthermore, Pienemann suggests that the emergence criterion can be applied effectively only once a distributional analysis, i.e. a detailed linguistic description of the context in which the morpheme is produced, is undertaken. It is, therefore, clear that it would be difficult to interpret any research findings correctly if there is a lack of a formalised account of the target language structures selected for testing the theory and the misunderstanding of the emergence criterion as applied within PT.

Keeping in mind these methodological constraints, the objective of this paper is to provide a detailed analysis of phrasal and inter-phrasal agreement structures in Arabic and their processability requirements. This linguistic analysis is based on the concept of grammatical information exchange and will yield a PT-generated set of predictions that will be tested empirically among learners of Arabic as a second language. The following section, therefore, provides a systematic linguistic analysis of the key structures in Arabic agreement morphology making use of key notions in LFG.

3. An LFG approach to agreement marking in Arabic language

Formal analyses of agreement phenomena in Arabic language have tended to focus on syntactic structures, their typological properties and their grammatical marking (c.f. Fassi Fehri 1983, 1988; Bahloul 1993; Mahfoudhi 2001; Benmamoun & Aoun 1999; Bolotin 1995). Many of these analyses have been undertaken from a broad government and binding (GB) perspective focusing, among other things, on structural properties of agreement relations in deep structure and their realisation in the surface structure. This is in sharp contrast to the approach adopted in this study, namely, Lexical Functional Grammar (Bresnan 2001) in which feature unification is used to capture agreement relations and speech generation. A key aspect of LFG is the interaction of the three structures (c-structure, f-structure and lexical entries) governed by a set

of well-formedness conditions. This interaction constrains the process of feature unification ensuring that all properties of an f-structure are compatible with each other. Many types of ungrammatical speech in the learner's language (learner's errors) can be accounted for on the basis of compatibility between the different components of the functional structure. Constituent structures are generated by phrase structure rules with major constituents being annotated for their grammatical functions.

4. Agreement marking in Arabic

Any account of grammatical agreement marking should be able to account for the appropriate constraints on the main sub-components of the agreement system. These relate to the nature of the agreeing lexical expressions, the features involved, and the domain in which the agreeing constituents are located. As far as Arabic morphology is concerned, the features included in this definition are gender (GEND), number (NUM), person (PERS), case (CASE), definiteness (DEF), and humanness (HUM). Other features such as MOOD are also relevant, but will not be included in this paper. Fassi Fehri offers the following definition of agreement: "Two expressions are said to agree if some of their features match by virtue of a linking relationship." (Fassi Fehri 1988: 129). Unification within LFG implies feature sharing (and in some cases merging) rather than simply copying. This feature 'sharing' aspect of agreement relations will prove crucial in Arabic agreement marking where often there are no one-to-one relationships between forms and their functions. This is because functional specifications such as the NP types [\pm Hum] and word order variation (e.g. SV(O) as opposed to VS(O) order) affect the morphological marking of diacritics in certain agreement relations.

4.1 Phrasal agreement (agreement within constituent)

Phrasal agreement refers to the process of feature unification (also referred to as feature matching) across the head noun and its modifier(s). This matching process in Arabic involves key features such as number, person and gender, which are unified (in agreement) by means of feature specification within their respective lexical entries. Before dealing with the NP structures selected for this study, let us briefly describe Arabic NPs and their complex typological features. The modifiers in Arabic NPs may be either post-nominal or pre-nominal (or a

combination of both) as in the following two structures adopted from Kremers (2000: 13):

- a. (Ord)-(Card)- Def-N.Gend-(Adj)¹
- b. Def-N.Gend-(Adj)-(Card)-(Ord)

The positioning of modifiers in Arabic NPs (pre-nominal vs post-nominal) is not governed by whether the adjectival phrase is used in a predicative or attributive manner, but rather by pragmatic choice and discourse considerations. Pre-nominal positioning of modifiers occur only with cardinals, ordinals and superlatives (used in the same manner as other adjectives), whilst post-nominal positioning is not restrictive in the range of modifiers that can be included. However, the basic sequence [Def-N.Gend]² is a fixed combination that cannot be split.

Different agreement rules govern pre-nominal and post-nominal agreement in Arabic NPs. Given that the focus of this paper is not linguistic analysis *per se* but rather the learner language, the following analysis will not include the full spectrum of NP combinations and their complex agreement patterns. The focus of this paper will be on the basic sequence [Def-N.Gen] with post-nominal modifiers (i.e. NPs of the pattern b listed above) as well as the basic structure [Card-N-Adj] which is a frequent NP structure in the target language. The four basic structures to be tested in this study are: (i) NPs with head nouns and their modifiers; (ii) NPs containing possessive pronouns; (iii) NPs containing *Idafa* i.e. possessive constructions of the order Noun-Noun; and (iv) NPs preceded by cardinals. Let us consider the following illustrative examples for the relevant NP structures for this study:

- i. [N-Adj] (Singular Number marked by means of affixation)

- (1) *al-kalb-u* *al-kabi:r-u*
the-dog-.SG.NOM the-big.SG.NOM
'The big dog.'

[N-Adj] (Plural Number marked by means of affixation)

- (2) *qa:bal-tu* *al-mudarris-i:n* *al-faransiyy-i:n*
met-I the-teachers-M.PL.ACC the-French-M.PL.ACC
'I met the French teachers.'

- ii. [N-Pron-Adj] (Definiteness marked by means of an attached possessive pronoun)

(3) *bayt-i: al-qadi:m*
 house-my the-old
 'My old house.'

- iii. [N-N] (*Idafa*: Possessive Construction)

(4) *qalam-u al-'usta:ð -i*
 pen-Nom the-teacher-Gen
 'The teacher's pen.'

- iv. [Card-N-Adj] (Gender polarity with cardinals 3 to 9)

(5) *xamsa-t-u ri:za:l-in tiwa:l-in*
 five-FEM-Nom men-Gen tall.MASC.PL-Gen
 'Five tall men.'

The structures discussed in the above examples exhibit a combination of typological features relating to the architecture of the target language and their processing requirements. The combination of these two sets of factors will prove highly useful in determining the structural options and their hierarchical order of development in the learner language (Pienemann 1998).

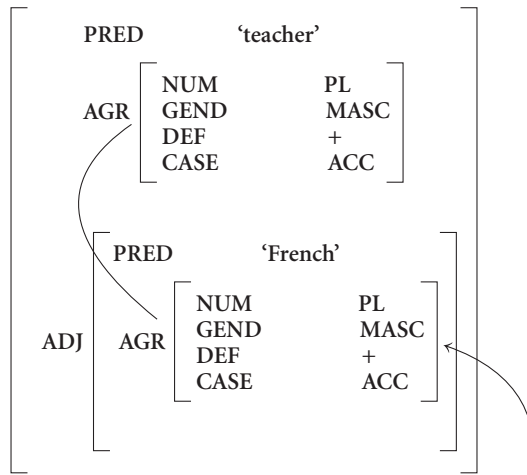
Two key structures will be analysed within LFG to demonstrate the type of information exchange involved between the head noun and its modifier/complement.

4.1.1 Full noun-adjective agreement marking: [N-Adj]

The basic type of noun-phrase agreement in Arabic has an extensive set of agreeing features that include number, gender, definiteness and case. Full noun-adjective agreement refers to instances where all the features of the head nouns have the same values as those of their modifiers, as illustrated in example (6) below:

(6) *qa:bal-tu al-mudarris-i:n al-faransiyy-i:n*
 met-I the-teachers-M.PL.ACC the-French-M.PL.ACC
 'I met the French teachers.'

The f-structure and c-structure for the 'French teachers' noun phrase are outlined in Figure 1.



The annotated c-structure for the above NP is:

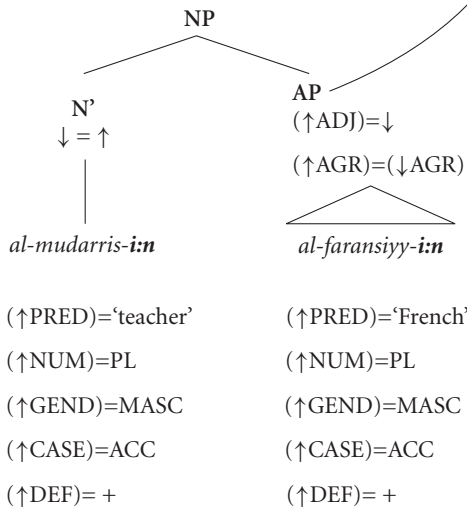


Figure 1. f-structure and c-structure for the 'French teachers' noun phrases

4.1.2 *Idafa* or possessive construction: [N-N]

- (7) *darra:3-at-u al-'usta:ð-i al-3adi:d-at-u gha:liyat-un*
 bicycle-F.Nom the-teacher-Gen the-new-F.NOM expensive-NOM
 'The teacher's new bicycle (is) expensive.'

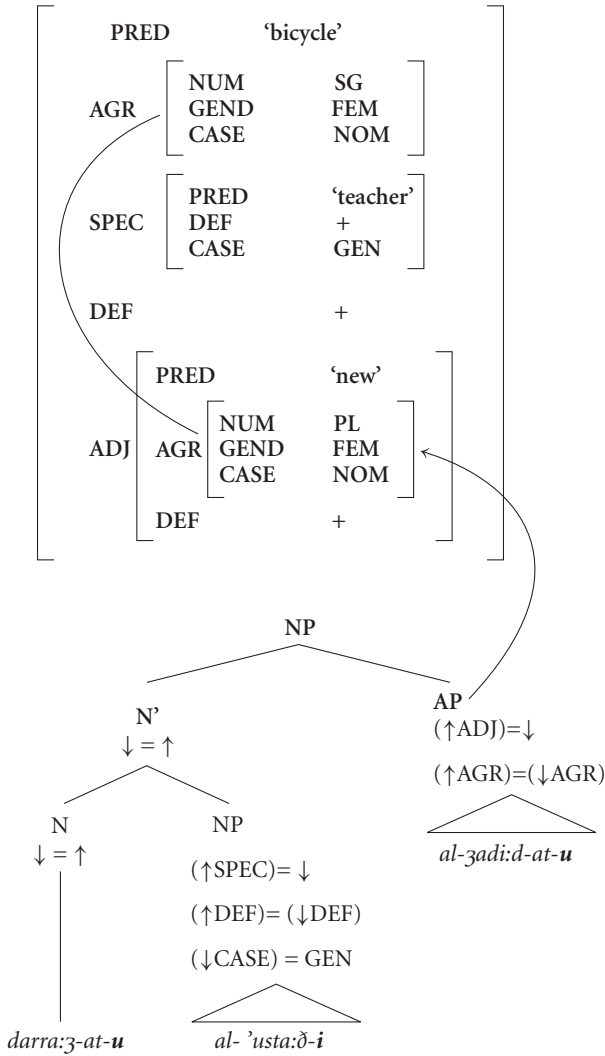


Figure 2. F-structure and c-structure for example (7)

Because nouns in Arabic must agree with their specifiers first before any other dependents (Malouf 1998:5), the following f-structure and annotated c-structure for the above example are represented in Figure 2.

The possessive (*idafa*) construction represented in the above c-structure can be explained in terms of one phrase structure rule (adopted from Thomann 2002):

$$\begin{array}{l}
 \text{NP} \rightarrow \text{N}' \quad \text{NP} \\
 \uparrow=\downarrow \quad (\uparrow\text{DEF}) = \downarrow\text{DEF} \\
 \downarrow\text{CASE} = \text{GEN}
 \end{array}$$

This complex rule for agreement within the *idafa* construction can be explained as follows: an NP can consist of an N', followed by an NP receiving CASE, NUM and GENDER from the head N ('bicycle') and DEF from the N' ('the teacher's bicycle').

To sum up, phrasal agreement in Arabic is characterised by several features as illustrated above. The feature matching between head noun and its modifier, as is the case in (1) and (2), marks definiteness across head nouns and their modifiers by different affixes. In (3) definiteness is marked on the head by means of an attached possessive pronoun, whilst it is marked on the modifier by the determiner /al-/. The marking of definiteness across the head noun and its complement Noun (in *idafa* possessive structure) is signalled by means of a Head-Complement order rule as is the case in example (4), with the complement being matched for the genitive case. And in (5), the marking of agreement between cardinals and head nouns by means of gender polarity is demonstrated.

4.2 Inter-Phrasal Agreement (agreement across constituents)

For the purposes of this paper, inter-phrasal agreement will be restricted to subject-verb agreement structures within which information exchange occurs across two syntactic constituents represented by an NP and a VP. Given that Arabic belongs to the *pro drop* type of languages, an emphasis on merging of features will be adopted as in Vigliocco, Butterworth and Garret (1996). However, before dealing with the *pro drop* phenomenon, let us examine full agreement in Arabic.

For the purpose of this study full inter-phrasal agreement in Arabic will be analysed in terms of the morphological marking of the features number, person and gender across the subject NP and the verb. The following example illustrates this information exchange within S-V-O sentences with both the NP and the verb being lexically realised.

- (8) *al-la:sib-u:n* *al-mumta:z-u:n* *na:l-u:* *za:'izat-an*
 the-players. the-excellent. received- prize-
 3MASC.PL 3MASC.PL 3MASC.PL Acc.SG
 'The excellent players received a prize.'

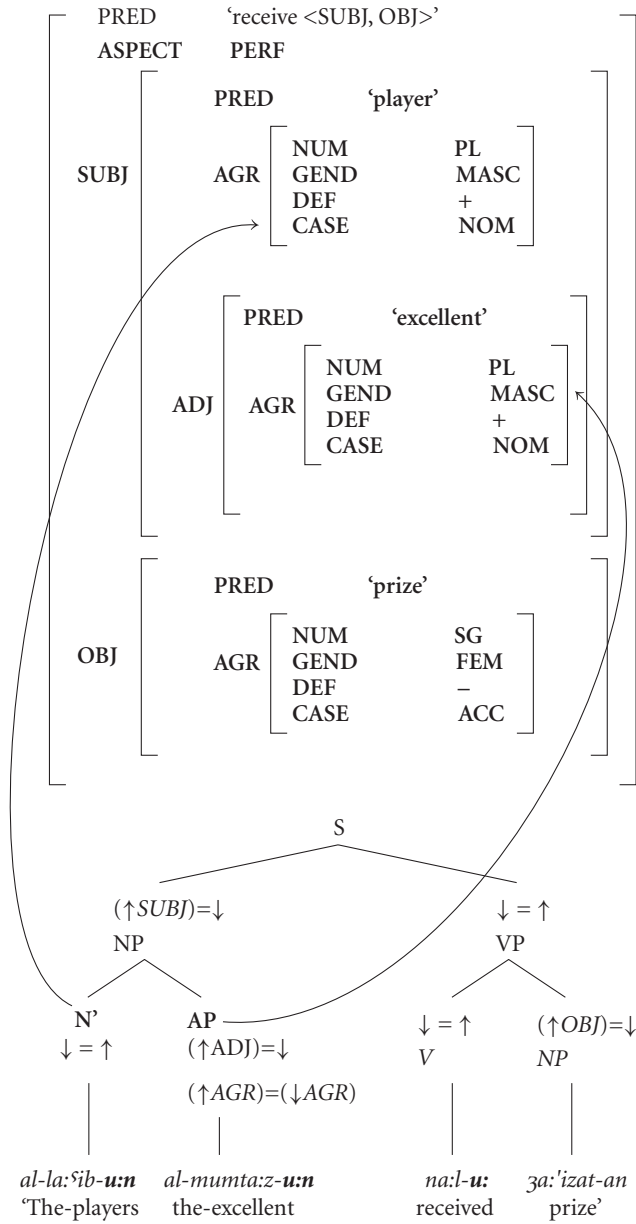


Figure 3. f-structure and c-structure for example (9)

<i>mumta:z</i>	A	(↑PRED) = 'excellent' (↑AGR) = ↓ (↓PERS) = 3 (↓GEND) = MASC (↓CASE) = NOM
<i>na:l</i>	V	(↑PRED) = 'receive' (↑ASPECT) = PERF (↑SUBJ) = ↓ (↓AGR NUM) = PL (↓AGR PERS) = 3 (↓AGR GEND) = MASC
<i>3a:'izat</i>	N	(↑PRED) = 'prize' (↑AGR) = ↓ (↓PERS) = 3 (↓GEND) = FEM (↓CASE) = ACC

The f-structure and c-structure for (9) are as above.

The above formal representations illustrate the basis for information exchange between the subject NP and the verb of the sentence. The features listed in the above lexical entries for both the subject NP and the verb are specified in the f-structure under <f1> ensuring that the appropriate information is shared across both constituents.

4.2.2 Reduced SV agreement marking

The multiple lexical entries for affixes allow an account for agreement relations where the SUBJ has the feature [-Hum; +PL] or belongs to either a collective noun or the irregular plural class of nouns (also known in Arabic grammar as Broken Plural). Let us first consider the following examples for Subject NPs with the feature [-Hum]:

- (10) *al-kila:b-u* *harab-at*
the-dogs.PL-NOM escaped-FEM.SG
'The dogs escaped.'

The subject in the above example has the usual AGR features but in this case – reduced SV-agreement marking – it appears with a non-agreeing form of the verb. The lexical entries for this example are listed below:

<i>al-</i>	DET	(↑DEF) = +
<i>kalb</i>	N	(↑PRED) = 'dog'
		(↑AGR) = ↓
		(↓PERS) = 3
		(↓GEND) = MASC
		(↓NUM) = PL
		(↑HUM) = –
<i>harab</i>	V	(↑PRED) = 'escape'
		(↑SUBJ AGR) = ↓
		(↓PERS) = 3
		(↓NUM) = PL
		(↓GEND) = MASC
		(↑SUBJ HUM) = –
		(↑FORM) = ↓
		(↓PERS) = 3
		(↓GEND) = FEM
		(↓NUM) = SG

This suggests that the verb has two sets of features: SUBJ AGR and FORM. Normally, for a verb, FORM = SUBJ AGR; in other words, if it is a '3rd plural masculine verb' then it agrees with a 3rd plural masculine subject. In these cases of reduced agreement, this does not happen and, therefore, it results in a verb whose f-structure and annotated c-structure are represented in Figure 4.

The above formal representations illustrate the basis for information exchange between the subject NP and the verb of the sentence. The features listed in the above lexical entries for both the subject NP and the verb are specified in the f-structure under <f1> ensuring that the appropriate information is shared across both constituents.

4.3 The pro drop phenomenon in Arabic agreement marking

As far as PT is concerned, perhaps the most important of these typological features is the *pro drop* nature of Arabic. This is because in *pro drop* languages, the verb may occur without an explicit lexical or pronominal subject constituent. Yet, the verb is still marked for such grammatical features as person, gender and number expressed by means of a combination of prefixes and suffixes. Bresnan (2001: 117) suggests that "pro drop refers to the functional specification of a pronominal argument by a head; this entails the absence of the structural expression of the pronoun as a syntactic NP of DP." Such analysis has been

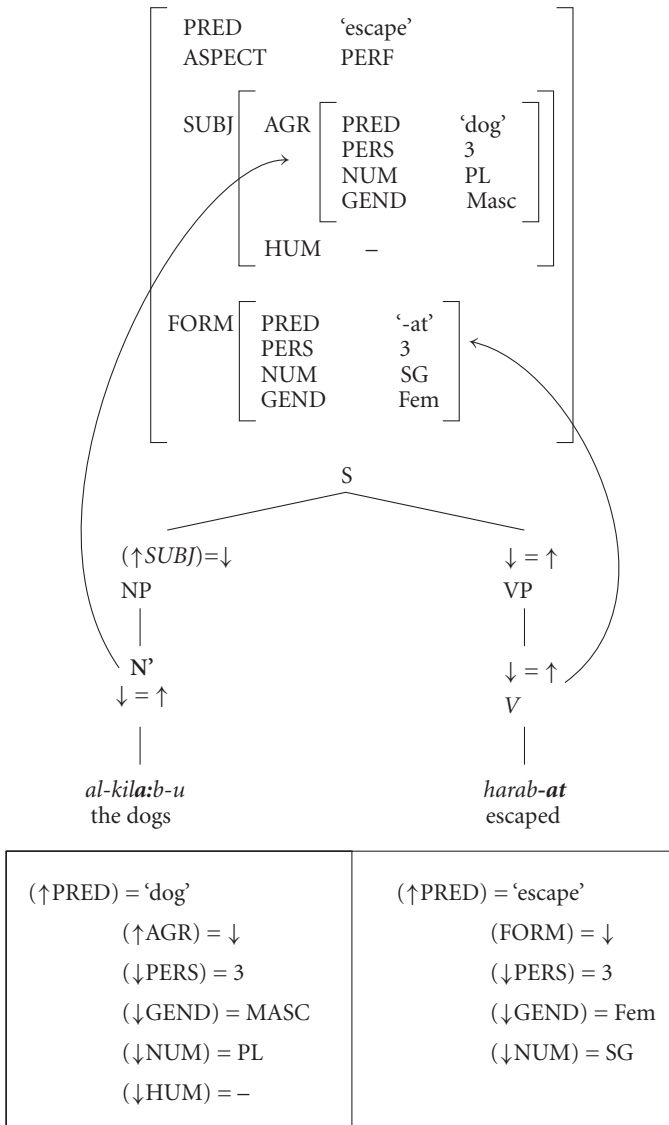


Figure 4. f-structure and c-structure for example (10)

applied to other non-configurational languages such as Italian (c.f. Di Biase & Kawaguchi 2002:276) where it is argued the “morphology of a head verb may incorporate its pronominal arguments.” The position adopted in this paper follows that of Vigliocco, Butterworth and Garret (1996) who propose a “feature

merging process” rather than a “feature copying process” in accounting for the null subject phenomenon in languages such as Spanish. This is because in LFG merging can be managed through unifying morpho-syntactic features located in the relevant lexical entries. Let us consider the following examples:

- (11) 3a:’ -u:
came-3.MASC.PL
‘They came.’
- (12) 3i?’ -tu
came-I
‘I came.’
- (13) 3a:’ -u: *bi-lqita:r*
came-3.MASC.PL by train
‘They came not by train.’

The important question in the above examples ((11), (12) and (13)) is the nature of the affixes attached to the verb and their respective features. Based on LFG, the lexical entry, the c-structure and the f-structure for the affix [-u:] in example (11) are as illustrated by Figure 5.

- (14) -u: (↑ SUBJ)=↓

$$\left[\begin{array}{l} (\downarrow \text{PRED})=\text{PRO} \\ (\downarrow \text{AGR NUM})=\text{PL} \\ (\downarrow \text{AGR GEND})=\text{MASC} \\ (\downarrow \text{AGR PERS})=3 \end{array} \right]$$

The above analysis makes use of two crucial assumptions (Fassi Fehri 1988: 109): (a) that the affix [-u:] does not have a corresponding syntactic category at constituent structure (c-structure); and (b) that it is pronominal, i.e. it has an attribute PRED whose value is ‘PRO’. Hence, we see the important role of the lexical entry specifications listed in (14) above which would serve as the basis upon which the ‘merging process’ is undertaken to fulfil the agreement requirements, for example (11).

4.4 A typological account of inter-phrasal agreement patterns

On the basis of the typological discussion of agreement in Arabic above, one can identify a set of three distinct types of agreement relations governed by the nature of agreeing features (in terms of grammatical functions) and the domain in which they occur (this is assumed to be governed by f-structure). These

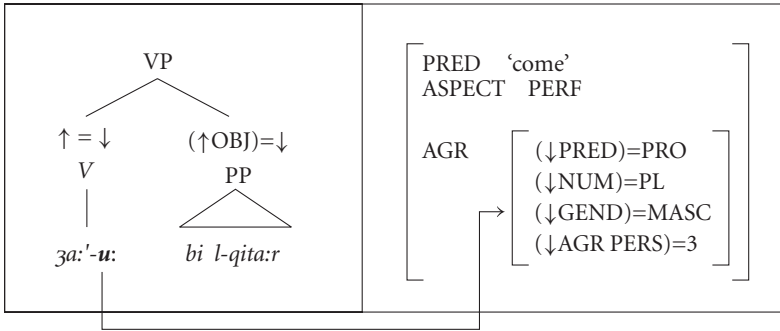


Figure 5. c-structure and f-structure for example (11)

are: (a) internal agreement; (b) anaphoric binding; and (c) external agreement, all of which are briefly described below.

4.4.1 Internal agreement

The core structures of such agreement relations in Arabic are realised when:

- i. Verbs agree with their SUBJ (as in example (15)).
- ii. Head NPs agree with their arguments (as in example (16)).

(15) *akal-at al-bintu al-zubna*
ate-3F.SG the-girl.3FEM.SG the-cheese
'The girl ate the cheese.'

(16) *al-ban-a:t-u ḍakiy-a:t-u-n*
the-girl-PL-NOM smart-PL.FEM-NOM.Indef
'The girls (are) smart.'

The agreement relation in example (16) relates to a topic NP and a predicative AP within an equative sentence marked grammatically by means of a definiteness polarity: a definite [+ DEF] topicalised NP and an indefinite [-DEF] predicative AP. The other features (number, gender and case) are unified across the two constituents.

4.4.2 Agreement with local anaphoric binding

This type of agreement takes place in a larger domain (f-nucleus) that contains not only argument functions such as SUBJ and OBJ but also non-argument ones such as adjunct (ADJ) and modifier (MODIF). Thus the adjunct is not directly lexically governed by a predicate P but rather indirectly linked to P

because it contains a pronominal controlled by an argument of the predicate P. This is what examples (17 and 18) below illustrate:

- (17) *laqi:-tu zayd-an ya-gra'u*
 found-I zayd-ACC 3.MASC.SG- read.
 'I found Zayd reading.'
- (18) *laqi:-tu zayd-an na:'im-an*
 found-I zayd-ACC sleeping.3.MASC.SG-ACC
 'I found Zayd sleeping.'

In (17) the OBJ of the matrix verb controls the pronominal subject of the adjunct clause: the PRO is anaphorically bound by the object (a case of local anaphoric binding, c.f. Fassi Fehri 1981). Similarly in (18) the pronominal subject of the participial AP can be controlled by the subject or the object of the matrix verb. Anaphoric agreement is characterised by the fact that:

- i. the two agreeing expressions are of the same category (nominal expressions);
- ii. the direction of agreement is from an argument function to a non-argument function (e.g., (17)); and
- iii. the features involved are all pronominal including NUM, PERS, HUM and GEND.

4.4.3 External agreement

The term 'external' in this instance refers to the controller of agreement being external to the f-nucleus where the agreement target is found. External agreement shares some properties with local anaphoric agreement most notably as in (c) above. For the purposes of this paper, the core characteristics of external agreement that will be investigated are the following:

- i. left dislocation: agreement between a THEME,³ in simple LFG terms a case of topicalisation, and the co-referential (resumptive) pronominal inside the clause;
- ii. relativisation: agreement between the relative marker and the head noun in gender, number and case;⁴
- iii. equative sentences: agreement between the topic NP and the predicative AP (more precisely a pronominal contained in the AP); and
- iv. questioning with pronominalisation: agreement between the question word and the co-referential (resumptive) pronominal.

Consider the following illustrative examples for (i), (ii), (iii) and (iv) respectively:

- (19) *zayd-un laqi:-tu aba:-hu*
 zayd-NOM met-I father-his
 ‘Zayd, I met his father.’

What looks like an agreement marker above is, in fact, a pronominal affix that is anaphorically related to a THEME in a left dislocation construction.

- (20) *laqi:-tu a-lwalad-ayni allaḏ-ayni darras-ta*
 met-I the-boy-DUAL.ACC who-DUAL.ACC taught-you
 ‘I met the two boys whom you taught.’
- (21) *ayy-at-u laḏn-at-in aḏdar-at*
 which-FEM-NOM committee-FEM-GEN issued-FEM
ha:ḏ aal-qara:r-a
 this the-decision-ACC
 ‘Which committee issued this decision?’

In examples (20) and (21) the information exchange in the agreement relationship is shared between a resumptive pronominal on the one hand, and a relative pronoun and a question word on the other. In example (20) the features marked are number and case, while in example (21) it is gender.

4.5 A summary of inter-phrasal agreement structures in Arabic

The following table includes a summary of the key structures discussed so far in this paper and highlights their relevant typological features. Given the *pro drop* aspect of the Arabic language, the only instances of subject-verb agreement included in this study are those where the subject is lexically realised in the agreement relationship in either an SV(O) or VS(O) word order combination. Another important typological issue taken into consideration in this table is the semantic type of the head NP (i.e. –Hum) as it results in agreement marking where the feature number on the verbal constituent is always set for the value (–PL) even if the feature number is set as (+PL) on the head NP.

Relativisation (as in example (20)), which is indicative of inter-clausal rather than inter-phrasal agreement, is listed in the above table for inter-phrasal agreement structures because of the similar typological feature (external agreement) it shares with more typical inter-phrasal structures. However, when formulating the general predictions for Arabic SLA, relativisation will be placed at the higher inter-clausal stage.

Table 1. An account of inter-phrasal agreement in Arabic

Type of Agreement Relation	Typological issue
Internal Agreement: word order variation	VS(O): Marked for Natural Gender only (i.e. reduced agreement marking) SV(O): Marked for Number and Natural Gender (i.e. full agreement marking)
Internal Agreement: with [-Hum] referents	Non Human NP type (Gram Gender) Collective NP Type (Gram Gender)
Anaphoric Agreement: left dislocation	AP controlled by matrix Vb e.g. (18) OBJ of matrix Vb controls agreement e.g. (17) Question words e.g. (21) Topicalisation: Left dislocation e.g. (19) Relativisation e.g. (20)

5. PT and Arabic agreement marking

The process of exchange of grammatical information (agreement marking), according to Pienemann (1998:76) is not possible unless: 1) the lexicon is annotated for the features in question; and 2) the syntactic procedures have specialised to hold specific grammatical information. Pienemann (1998) goes on to argue that it is feasible to predict that learners in the initial stages of acquisition will be unable to produce structures where there is exchange of grammatical information specific to the target language using syntactic procedures (or in LFG terms 'feature unification') at the early stages of acquisition.

The two levels of grammatical information exchange investigated in this study (phrasal vs inter-phrasal) require different processing resources ranging from utilisation of phrasal procedures for phrasal agreement to s-procedure for inter-phrasal agreement. These two types of information exchange correspond to phrasal agreement and subject-verb agreement marking in Arabic. If these different patterns of information exchange are acquired in a manner which reflects their processing requirements and complexities, then the argument that (a) learners can only acquire what they can process and (b) that the processing operations form an implicational hierarchy will be validated. A developmental pattern which does not reflect these processing realities is likely to raise questions about the status of processing prerequisites in SLA and the availability of an implicational processing hierarchy able to predict developmental sequences in learner language.

From a processing perspective, agreement between the noun phrase of a sentence and its verbal phrase is differentiated from agreement between noun

phrases and their modifiers on the basis of syntactic boundaries and processing procedures. In the former, the morpho-syntactic information number and gender is exchanged or transferred within the same constituent, i.e. noun phrase, and in the latter this same process takes place across two distinct syntactic constituents, namely, a noun phrase and a verbal phrase. Agreement across constituents involves the marking of the subject's syntactic features (person, number and gender) onto the verbal phrase (cf. Fassi Fehri 1988). This agreement is, in most cases, a straightforward feature – copying process whereby the subject's features are marked onto the verb. This holds for those types of agreement relations where the syntactic word order of the constituents is the basic SV(O) and the semantic class of the nominal heads (subjects) exhibits the feature [+ HUM]. However, when there are different syntactic (i.e. different word order combinations) and semantic (i.e. NPs involving [–HUM] referents) parameters, agreement marking is affected primarily in its scope, i.e. reduction in the range of features that can still be unified across constituents. The typological discussion of agreement marking in Arabic can be summarised within three central features: multiplicity and complexity of form-function mappings (Pienemann 1998); multiplicity of information sources (as in the Competition Model, MacWhinney & Bates 1987), which learners need to consider in real-time processing of the target language; and the affixation process (i.e. form, location and order, if more than one).

The various typological features and the resulting patterns of agreement relationships can have a significant impact on the processing load of key target language structures and, therefore, their processability in a specific implicational order. The objective of the previous linguistic analysis and description of the target language structures was to enable us to identify the processing requirement of different Arabic structures. In undertaking this task, the analysis incorporated general processing issues (e.g. phrasal vs inter-phrasal marking) and language-specific features such as the semantic type of the head noun and word order variation.

6. Predictions for Arabic SLA

As far as this study is concerned, the focus is on the incremental generation of phrasal procedure, S-procedure and subordinate clause procedure by learners of Arabic as a second language. The processing procedures outlined in PT provided the predictive framework for Arabic SLA structures, resulting in Table 2 below:

Table 2. Predictions for Arabic agreement structures

Level of information exchange	Linguistic context for structures	Processing procedures	Typological features
Inter-clausal	Relativisation	Subordinate clause procedure	Referential coherence (feature unification across clauses)
Inter-phrasal	Left Dislocation (object clitic)	S-procedure	Topicalisation: feature unification across constituents
	[-Hum]; / [+BP]	S-procedure	Semantic type of NP: feature mismatch across constituents
	[+Hum] in VS(O)	S-procedure	Reduced agreement: Feature unification across constituents (Gender only)
	[+Hum] in SV(O)	S-procedure	Full agreement: Feature unification across constituents
Phrasal	[Card ⁵ -N-Adj]	Phrasal procedure	Feature mismatch: gender polarity
	[N-N] (Idafa/Complement Construction)	Phrasal procedure	Cancel Det marker
	[N-Pro-Adj]	Phrasal procedure	Partial Cancel Det marker
	[N-Adj] (Number)	Phrasal procedure	Feature unification
	[N-Adj] (Natural Gender)	Phrasal procedure	Feature unification

It is important to state here that the general hierarchy of PT is flexible enough to incorporate language-specific typological features (such as gender polarity and humanness). Such language-specific typological features are important because they yield multiple structures at each developmental stage with intra-stage ordering of structures being driven by form-function relationships, which introduce additional processing tasks for the learner. For example in Table 2 above, the first two structures involving number and gender within phrasal agreement exhibit one-to-one form function mappings while the others (e.g. gender polarity with cardinals) do not.

7. Empirical evidence for the PT-generated predictions

Let us first look at the data-generated acquisition sequences for the key structures in Arabic SLA (Mansouri 2000) as defined in PT and using the emergence criterion as the key developmental indicator. This study is based on a stratified sample of individual learner data gathered from two learners studying Ara-

bic in a formal classroom environment. The two English-speaking background (ESB) learners were selected on the basis of their developmental level in Arabic, having started to learn Arabic without any prior knowledge or exposure. The main data-eliciting procedures were eight spontaneous oral interviews conducted over four semesters of classroom language learning, which consisted of a total of 52 instruction weeks. Data collection commenced with both learners after they completed their first introductory module of formal study of the Arabic language. Individual interviews were conducted four times over a two-semester period.

7.1 Acquisition criteria and data analysis

Although the data for this study was collected from learners of Arabic as a second language in a classroom environment, the fact that only oral data elicited through conversational interviews is used ensures that the key feature of time-constrained production is maintained. The learners in this study “produced the data in conversational setting, thus being subject to the same constraints on word access and the computing of syntactic structures etc: as any other speaker. Therefore, whatever they produce must be taken as evidence of their language processing skill and their underlying linguistic knowledge” (Håkansson, Pieneemann & Sayehli 2002: 255).

In line with PT’s emergence criterion and its emphasis on morphological and lexical variation for the production of structures by the learner, the position taken in this study is that at least one minimal pair of a given structure is produced before a judgment on emergence, or lack of it, can be formulated. Pieneemann (1998: 146) categorises quantitative observations of the learner language into four types, namely: “(1) no evidence, i.e. no linguistic contexts; (2) insufficient evidence, i.e. very small number of contexts; (3) evidence for non-application, i.e. non-application in the presence of contexts for rule *x*; and (4) evidence of rule application, i.e. examples of rule application in the presence of contexts.”

Following Pieneemann’s approach, this study relies primarily on type (4) observations as the basis for applying the emergence criterion. The figures reported in the following tables indicate the number of linguistic contexts for rule application and the number of suppliance. A ratio is also included in the same cell indicating the learner’s developmental progression along the time axis.

7.2 Empirical findings

The learner data will be reported individually with quantitative displays of the production of all the key TL structures at different points along the developmental time axis. The data is summarised in terms of quantitative figures and ratios to give the reader an approximate indication of the learner's dynamic interlanguage system. However, this is by no means an indication that quantitative measures are taken as a strict criterion for acquisition. On the contrary, it is the qualitative criteria and careful analyses of linguistic contexts and the obligatory minimal pair rule that allow us to include in these figures only those structures which have been produced in morphologically and lexically variable contexts. Let us first look at both learners' data summarised in Tables 3 and 4 below.

A quick first look at the data reported in this table reveals an overall pattern of developmental hierarchy predominantly, but not entirely, consistent with the predictions generated in Table 2. In fact, Louise's⁶ language reveals an inter-

Table 3. The development of agreement morphology in ASL (Louise's data)

	Structures	T1	T2	T3	T4
Phrasal	[N-Adj] (feature: Natural Gender)	6/6	7/7	9/9	8/8
		1	1	1	1
	[N-Adj] (feature: Number)	14/16	15/17	22/22	25/25
		0.87	0.88	1	1
	[N-Pron-Adj] (Def marked by possessive pronouns)	2/4	2/3	4/4	5/5
		0.5	0.66	1	1
	[N-N-(AP)] Idafa (Possessive construction)	0	1/3	2/2	2/2
			0.33	1	1
	[Card-N-Adj]	0	0	2/3	2/2
				0.66	1
Inter-Phrasal	SV(O); NP [+Hum]	0	2/3	4/5	5/5
			0.66	0.8	1
	VS(O); NP [+Hum]	2/3	1/4	1/2	2/2
		0.66	0.25	0.5	1
	SV(O); NP [-Hum] / [+BP]	0	0	1/1	1/2
				1	0.5
	Anaphoric binding: Left Dislocation (object clitic)	0	0	0	1/3
					0.33
Inter-clausal	Relativisation	0	0	2/4	1/2
				0.5	0.5

Table 4. The development of agreement morphology in ASL (George's data)

	Structures	T1	T2	T3	T4
Phrasal	[N-Adj] (feature: Natural Gender)	5/5 1	6/7 0.85	6/6 1	7/8 0.87
	[N-Adj] (feature: Number)	6/12 0.5	12/14 0.85	18/19 0.95	21/22 0.96
	[N-Pron-Adj] (Def marked by possessive pronouns)	1/3 0.33	2/4 0.5	2/3 0.66	3/3 1
	[N-N-(AP)] Idafa (Possessive construction)	0	1/2	2/2	2/2
			0.5	1	1
	[Card-N-Adj]	0	1/2	2/3 0.66	2/2 1
Inter-phrasal	SV(O); NP [+Hum]	1/4 0.25	1/3 0.33	2/3 0.66	4/5 0.8
	VS(O); NP [+Hum]	1/2 0.5	1/3 0.33	1/1 1	2/2 1
	SV(O); NP [-Hum] / [+BP]	0	0	0	1/2 0.5
	Anaphoric binding: Left Dislocation (object clitic)	0	0	0	0
Inter-clausal	Relativisation	0	0	1/3 0.33	1/3 0.33

esting, but not totally unexpected, pattern of quantitatively large samples for certain structures and rules but not others within the same stage. This is the case for phrasal morphology where structures 1 and 2 seem to be produced far more frequently than structures 3, 4 and 5. Similar observations can be made for inter-phrasal agreement with regard to structure 6 being produced more frequently than the others. This may be a useful observation both for the idea of differing processing requirements for structures within the same stage, but also for the notion of the optimal structure to be tested in SLA studies.

George's data reveals many similar patterns found in Louise's data, namely, the relatively larger quantitative samples in certain structures rather than others within the same stage. This issue will be addressed in the discussion section below where it will be shown that the concept of form-function relationships (Pienemann 1998:155) can be used successfully to account for such variation. Overall, and despite the lack of any productive use of certain structures such as object clitics in left dislocation, George's data exhibits features of an implicational hierarchy that largely reflects the predicted sequence.

It should be noted that the linguistic analysis of the learner language is not undertaken from a traditional target language approximation exercise, which can end up looking more like an error analysis than a systematic developmental analysis of inter-language. On the contrary, even grammatically erroneous utterances have been taken as evidence of emergence when containing the basic structure. Only when the structure and the rule for producing the structure are missing altogether, do we conclude that the structure is still not processable at that particular point in time. Let us now consider the following examples from both learners, which will be followed by a theoretical discussion:

i. [N-Adj]

(22) “*al-walad-u al-kabi:r-u huna:*”
 the-boy-NOM.SG the-big-NM.SG here
 ‘The older boy is here.’

(23) “*al-bint-u al-kabi:r-at-u huna:*”
 the-girl.FEM-Nom the-big-FEM.Nom here
 ‘The older girl is here.’

Examples (22) and (23) above are an indication of both learner’s ability to produce this basic NP structure productively and accurately, marking both the Determiner and the Gender accordingly. The agglutinative nature of Arabic morphology can be seen here with example (22) where the form /-u/ exhibits a classical case of one-to-many form function relationships (cf. Pienemann 1998; Håkansson 1996b). While still at the phrasal agreement stage, examples (24) and (25) below show that when this basic NP structure is compounded by additional syntactic features such as possessive pronouns in (24) and cardinals in (25), the learners are consequently unable to mark agreement.

ii. [N-Pro-Adj]

(24) *“*askunu fi: šaqqat-i: šaḡi:ra*”
 live.1SG in flat-my small
 ‘I live in my small flat.’

For example (24) this would require merging the possessive pronoun with the determiner [al-] thus producing the NP structure: /*šhaqqat-i: aš-šaḡi:ra*/ (my flat the small).

iii. [N-Card-(Adj)]

- (25) “**na-skun zami:ʕan fi al-wa:ħid da:r*”
 we-live all in the-one house
 ‘We all live in one house.’

Similarly, for the NP structure in (25) the cardinal presence results in the following structure: /*ad-da:r al-wa:ħid-at*/ (the-house the-one.Fem).

iv. [N-N-(Adj)] *Idafa* structure (Possessive Construction)

- (26) “**a-skun fi al-madi:nat Melbourne*”
 I-live in the-city Melbourne
 ‘I live in the city of Melbourne.’
- (27) “**yaʕmal abi: fi al-ja:miʕat Melbourne*”
 works my father in the-university Melbourne
 ‘My father works at Melbourne University.’
- (28) “**al-mana:x muʕtadil fi: al-faʕl fi:ta*”
 the-weather moderate in the-season winter
 ‘The weather is moderate in winter.’

An interesting pattern is observed in examples (26), (27) and (28), whereby the learner in an *idafa* construction (Noun Complement) incorrectly produces the determiner on the head noun to mark definiteness. This is a case where the determiner should be cancelled (cancel determiner) as it becomes redundant in a noun-complement NP structure. This point will be picked up in the discussion section. Let us now examine some examples relating to inter-phrasal agreement marking.

SV(O); NP [+Hum]

- (29) “**Susan wa Nicole wa Lynda taktub-u:n ʕala al-waraqa*”
 Susan and Nicole and Lynda FEM-write-3MASC.PL on the-paper
 ‘Susan, Nicole and Lynda wrote on the paper.’
- (30) “**Sally wa Lynda wa Susan ta-ʕkul-u al-bitza*”
 Sally and Lynda and Susan F-eat-3SG the-pizza
 ‘Sally, Lynda and Susan eat pizza (at lunch time).’

In (29) and (30) the learner language exhibits a feature mismatch relating to gender and number respectively. In fact, the verbal agreement suffix in both (29) and (30) should be [-*na*] indicating the features /Plural; Feminine/.

VS(O); NP [+Hum]

- (31) “**ka:n-u: al-’asa:tiḏa ḥazi:nØ*”
 was.3MASC.PL the-teacher.3MASC.PL sad.3MASC.SG
 ‘The teachers were sad (about the 3 students not finishing the course).’
- (32) “**askun-u ab-i: wa umm-i: fi ashwood*”
 live-1SG father-my and mother-my in Ashwood
 ‘My father and mother live in Ashwood.’

Similarly, in (31) the learner produces VS-agreement patterns with full merging of the feature number. This seems to be a case of over-generalisation from the SV-agreement rule where features of the subject, including number and gender, are expected to be unified with the verbal agreement suffix. In example (32) it is the feature /person/ that is marked incorrectly with the learner reproducing the verbal morphology in the first person instead of third person. This can be a case of undifferentiated ‘chunk learning’, or simply a lexically driven strategy to communicate in the target language using available forms (in this case the verb *askun* being in the first person).

SV(O); NP [–Hum]

- (33) “*al-imiṭḥa:n-a:t ta-ʃḏalu ba:l-i:*”
 the-exams-3FEM.PL 3FEM.SG-occupy mind-my
 ‘The exams occupy my mind.’

Anaphoric binding: Left Dislocation (object clitic)

- (34) “**as-suḥuf al-ʕarabiy-at al-luḡa*
 the-newspapers.PL the-Arabic-3FEM.SG the-language
fi:-haya-xtalifØ”
 in-it.3FEM.SG3MASC.SG-differ
 ‘(As for) the Arabic newspapers, the language in it differs (from colloquial Arabic).’

Example (33) provides a good illustration that a rather complex agreement rule relating to non-human subject NPs is at play. The learner here is correctly identifying the semantic type of the NP (–Hum) and holding this feature in memory before mapping the appropriate agreement marker onto the verb. In example (34) we notice a rare instance in the learner language (in this case George) where object clitics are marked correctly in a left dislocated subject-verb agreement relationship. However, since there was only one example, it would be insufficient evidence to argue that this signals the emergence of this type of complex agreement marking.

Relativisation

- (35) “*al-muʃkil-at* *alla-ti:* *ta-ʃʒalu -hu*
 the-problem-FEM.SG which-FEM.SG FEM.SG-occupy-him
la:zim yaʃmal wa yadrus”
 must work and study
 ‘The problem that is occupying him is that he must study and work (at the same time).’

Example (35) provides a rare instance of inter-clausal structure in Louise’s language with the relative pronoun /*alla-ti:*/ correctly ‘governed’ in the marking of its features by the head subject NP. However, we notice the lack of a resumptive pronoun (*hiya*) which is necessary to ensure the overall coherence of the sentence.

8. A processability perspective on the findings

From a PT perspective a number of concepts can be drawn upon to account for this seemingly inconsistent developmental sequence. Although the basic idea in PT is that processing procedures at each stage are necessary for the processing of the target language structures, there is no absolute guarantee nor a logical argument that all processable structures at a given stage must be acquired before the learner is able to process structures from the next developmental stage. ‘Developmental trailers’ can be viewed as a possible explanation for the temporal gap between the capacity to produce the linguistic context for a certain TL structure and the production of the structure itself (cf. Larsen-Freeman & Long 1991; Pienemann 1998). To put it simply, the fact that learners are producing a representative structure of the relevant stage should not be equated with his/her ability to produce all potential structures irrespective of typological and functional constraints. This is where an operationalised definition of the target language optimal structures for establishing developmental sequences is useful.

A common phenomenon that is noticeable across both learners is what appears to be a case of ‘developmental gaps’ in phrasal agreement relating to possessive structures (*Idafa* structures) and gender polarity with NP involving cardinals (numbers between 3 and 9). Neither of these structures were produced by either learner at Time 1 (T1) of data collection, though the basic form of subject-verb agreement was. On the surface, this finding would seem to contradict PT’s prediction in a manner similar to Nielsen’s (1997) findings. However, not all structures within a given stage share exactly the same typo-

logical features in terms of form-function relationships. Therefore, it is not imperative that all structures within such a developmental sequence emerge before the next stage emerges. In fact, Pienemann (1998) already indicated that multiplicity of form-function relationships can be a source of additional processing complexity and, therefore, delay the emergence of certain structures in the learner language. Such structures with multiplicity of form-function mapping should not be the prime choice for the optimal test structure in SLA research.

Let us now apply the emergence criterion to the statistical results displayed in Tables 3 and 4 above in order to establish the developmental path for both learners. The emergence criterion represented by the [+] symbol is assigned to structures (in the learner language) which meet the minimal pair requirement with lexical and morphological variation being the key indicator. In other words, only when a structure is produced at least twice with different morphological markers and with different lexical items, do we conclude that it has emerged in the learner language. In most cases, both learners have produced more than one minimal pair of the same structure. When structures were produced only once, these are represented with the Figure 1 between brackets. Tables 5 and 6 below provide a developmental summary of agreement structures in both learners' language.

The empirical results show that, overall, both learners have acquired the various ASL structures in the predicted order with phrasal structures clearly emerging before inter-phrasal ones. This is despite the fact that certain phrasal

Table 5. The development of agreement morphology in ASL (Louise's data)

	Structures	T1	T2	T3	T4
Phrasal	[N-Adj] (feature: Natural Gender)	+	+	+	+
	[N-Adj] (feature: Number)	+	+	+	+
	[N-Pron-Adj]	+	+	+	+
	(Def marked by possessive pronouns)				
	[N-N-(AP)] Idafa (Possessive construction)	-	-	+	+
	[Card-N-Adj]	-	-	+	+
Inter-Phrasal	SV(O); NP [+Hum]	-	+	+	+
	VS(O); NP [+Hum]	+/- ⁷	-	-	+
	SV(O); NP [-Hum] / [+BP]	-	-	(1)	(1)
	Anaphoric binding: Left Dislocation (object clitic)	-	-	-	(1)
Inter-clausal	Relativisation	-	-	+	(1)

Table 6. The development of agreement morphology in ASL (George's data)

Structures		T1	T2	T3	T4
Phrasal	[N-Adj] (feature: Natural Gender)	+	+	+	+
	[N-Adj] (feature: Number)	+	+	+	+
	[N-Pron-Adj]	-	-	+	+
	(Def marked by possessive pronouns)				
	[N-N-(AP)] <i>Idafa</i> (Possessive construction)	-	-	+	+
	[Card-N-Adj]	-	-	+	+
Inter-phrasal	SV(O); NP [+Hum]	-	-	+	+
	VS(O); NP [+Hum]	-	-	(1)	+
	SV(O); NP [-Hum] / [+BP]	-	-	-	-
	Anaphoric binding: Left Dislocation (object clitic)	-	-	-	-
Inter-clausal	Relativisation	-	-	-	-

Table 7. Conflated statistical summary for all structures (Louise's data)

Structures		T1	T2	T3	T4
Phrasal	All phrasal structures	22/26	25/30	38/40	42/42
		.84	.83	.95	1
Inter-Phrasal	All inter-phrasal structures	2/3 ⁸	5/7	6/8	9/12
		.66	.71	.75	.75
Inter-clausal	Relativisation as inter-clausal structure	-	-	2/4	1/2
				.5	.5

Table 8. Conflated statistical summary for all structures (George's data)

Structures		T1	T2	T3	T4
Phrasal	All phrasal structures	22/26	25/30	38/40	42/42
		.84	.83	.95	1
Inter-Phrasal	All inter-phrasal structures	2/3 ⁸	5/7	6/8	9/12
		.66	.71	.75	.75
Inter-clausal	Relativisation as inter-clausal structure	-	-	2/4	1/2
				.5	.5

structures such as *idafa* [N-N-(Adj)] and NPs preceded by cardinals [Card-N-(Adj)] were only produced by both learners at Time 3 of the data collection timeline. One of the most striking findings of this study is the emergence of VS(O) structures in Louise's data as early as Time 1. This result needs to be

treated cautiously in the light of the reduced agreement-making required in such structures. In fact, the feature number here does not unify across subject and verb with only the feature gender being marked. Given that gender, in particular semantic gender, has a conceptual basis, it is not therefore totally surprising that gender in VS(O) – type structures is easier to mark and hence emerge early in the learner language (cf. Vigliocco & Franck 1999).

Given that there are multiple structures in both phrasal and inter-phrasal stages, it would be useful to conflate the findings for both learners whereby all structures within each of the stages are represented statistically together. This will provide a more complete picture of inter-stage hierarchy and also their scalability ratio which is a good indicator of data validity.

The conflated statistical summary displayed above shows that the structures appear in both learners in the implicational order predicted in PT. Both learners have clearly acquired phrasal structures before inter-phrasal structures. To put it differently, by the time inter-phrasal structures emerged in both learners (i.e. Time 3), phrasal structures had already been produced productively and consistently as early as Time 1. The empirical data displayed above does not provide counter-evidence or significant gaps (i.e. stage gaps) for the predicted developmental hierarchy. This means that the all important scalability ratio for both sets of data is 1.0 indicating a perfect implicational relationship between lower stage structures (phrasal) and higher stage ones (inter-phrasal).

9. Conclusion

This study provides an empirical test for an acquisition hierarchy of agreement marking in Arabic SLA based on Processability Theory (Pienemann 1998). A detailed analysis of the target language structures was undertaken which resulted in a complex and multi-layered typology of agreement structures in Arabic for both phrasal and inter-phrasal agreement. When implemented into an LFG framework, this typology of agreement structures reveals a systematic pattern of agreement relations that are influenced by language-specific typological features such as the semantic class of the head noun, word order and topicalisation. The findings clearly support the predicted developmental hierarchy and, overall, provide robust evidence of its implicational nature. An important issue that emerged from this study relates to the order/sequencing of structures within a particular stage and whether this requires additional explanatory tools. In fact, a combination of tools, most notably form-function

complexity, i.e. one-to-one as opposed to one-to-many or many-to-one relationships (Bates et al. 1982; Bates & MacWhinney 1987), language-specific typological features including semantic and classificatory information (Bybee 1991), as well as morpheme types ranging from zero morpheme to bound and free morphemes, can be used to account for intra-stage developmental order. The general architecture of Processability Theory does, in fact, allow for such analysis since it clearly differentiates between “the core of processability, namely the processing of procedures needed for different kinds of affixation ... [and] the learning of morphological forms in relation to their functions” (Pienemann 1998: 154). In other words, the task of undertaking information exchange or distribution within different grammatical structures is a separate and different task when compared to the learning of the morphological form of a given affix. As such, the hierarchy of processing resources and the relevant patterns of information exchange reflects the former, whilst language-specific morphological features (including form-function relationships and classificatory information), reflects the latter. In fact, feature mismatch involving grammatical gender (i.e. where there is no conceptual basis for gender encoding) is supported by psychological experiments on gender processing and production (cf. Vigliocco & Franck 1999).

To conclude, let us return to the two core objectives of this study, namely, establishing the developmental hierarchy for agreement marking in Arabic SLA and testing this hierarchy against predictions extrapolated on the basis of Processability Theory. As far as the first objective is concerned, a hierarchy including the main structures in the target language was established with a systematic account for their typological features and their implications for processability and processing requirements. More importantly, the study generated strong empirical evidence in support of the developmental hierarchy formulated within Processability Theory with clear implicational sequences observed in both learners, despite some inconsistencies with regard to the lack of emergence evidence for *idafa* structures (possessive noun phrases) and cardinal numbers (gender polarity within NP) at the first time of data collection (T1). Both learners, however, were able to produce these structures in subsequent interviews. Overall, the findings of this study demonstrate that the developmental sequences in both learners follow that predicted in PT, despite the delayed emergence of certain structures which, nevertheless, did not amount to violation of the implicational hierarchy articulated in PT.

Key phonetic symbols

Phonetic description	Conventional/IPA transcription
voiced alveolar stop	d
voiceless alveolar stop	t
emphatic voiced alveolar stop	<u>d</u>
emphatic voiceless alveolar stop	<u>t</u>
voiceless velar stop	k
uvular stop	q
glottal stop	'
voiceless glottal fricative	h
voiceless pharyngeal fricative	ħ
voiced pharyngeal fricative	ʕ
voiceless palato-alveolar fricative	ʃ
voiced palato-alveolar fricative	ʒ
voiceless dental fricative	θ
voiced dental fricative	ð
voiceless velar fricative	x
voiced velar fricative	ɣ
voiceless alveolar fricative	s
emphatic voiceless alveolar fricative	<u>s</u>
voiceless labio-dental fricative	f
bilabial nasal	m
alveolar nasal	n
alveolar lateral	l
alveolar trill	r
short low back vowel	a
long low back vowel	a:
short high front vowel	i
long high front vowel	i:
short high back vowel	u
long high back vowel	u:
Zero morpheme	∅

Notes

* In writing this paper, I have benefited from interactions and discussions with Manfred Pienemann whose feedback helped in the overall conceptualisation of the paper. I am grateful to Peter Sells who provided excellent detailed feedback on the LFG analysis of Arabic structures. Other colleagues working within Processability Theory including Gisela Häkansson, Yanyin Zhang and Satomi Kawaguchi have been a source of insightful discussions on

many occasions. I would like to thank Bruno DiBiase in particular who provided constructive feedback on the final draft. Needless to say, any shortcomings are the author's sole responsibility.

1. The feature Gender is always marked in Arabic nouns and therefore is obligatorily shared between the head noun and its modifier.
2. Definiteness in Arabic is marked by means of an attached prefix /al-/.
3. Functions and definitions adopted from Dik (1978) and Fassi Fehri (1988):

THEME: information with respect to which the predication can be relevant,

TOPIC: old information in the relevant discourse structure,

FOCUS: most salient information in the relevant discourse structure.

4. For the purpose of the study, relative pronouns are treated as instances of inter-clausal agreement marking, and as such are predicted to emerge in the learner language at final stage 5.
5. This rule applies to cardinals 3 to 10 only.
6. The names used for both learners are pseudonyms.
7. This cell needs to be treated cautiously in light of the reduced agreement required: number does not unify across subject and verb; semantic gender does unify but this has a conceptual basis and is easy to mark (cf. Vigliocco & Franck 1999).
8. See previous note.

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