Narrative microstructure and macrostructure skills in Arabic diglossia: The case of Arab immigrant children in Canada

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Abstract

The current study investigated the composition of the lexicon deployed by Arabic-speaking Canadian immigrant children in narrative production with specific focus on diglossia (N=75; Age-range 7-12 years). The study also tested narrative microstructure skills and the relationship between microstructure and macrostructure. Participants were asked to tell a story using an Arabic version of the Test of Narrative Language (Gillam & Pearson, 2004). Instructions were given in Standard Arabic. General measures of microstructure were coded (number of tokens, type\token ratio, Mean Length of Utterance). In addition, we coded the average frequency of the following diglossia-specific lexical features: a) identical words, which keep the same phonological form in Standard Arabic (StA) and Spoken Arabic (SpA); b) cognate words (which keep different yet related forms in StA and SpA) in their SpA form (SpA cognates); c) cognate words in their StA forms (StA cognates), d) unique SpA words, and e) unique StA words. Results showed that the bulk of the lexicon of the narratives produced by immigrant children consisted of SpA words; StA words were used less frequently and English code-switched words made up a very small proportion of the words. Results also showed that narrative length and type/token ratio significantly predicted macrostructure beyond the children's age and Arabic language proficiency. However, when diglossia-specific lexical features were used as predictors of macrostructure only use of StA words predicted unique variance beyond age, Arabic language proficiency and narrative length. Findings are discussed within the context of Arabic diglossia and lexical competition in narrative production in this context.

Keywords: Arabic, diglossia, immigrants, lexical distance, macrostructure, microstructure, narrative

Introduction

Narrative production is a fundamental aspect of spoken language ability and an effective tool for testing the ability to construct and communicate ideas using complex linguistic, cognitive and social skills (Duinmeijer, de Jong, & Scheper, 2012; Sartwell, 2006; Tsimpli, Peristeri & Andreou, 2016). Narrative production is a discourse genre organized around a setting, characters, actions, and outcomes (Rumpf, Kamp-Becker, Becker & Kauschke, 2012) through which the narrator conveys character perspective to explain motivations and actions (Stein & Glenn, 1979; Heilmann, Miller, Nockerts & Dunaway, 2010). The literature distinguishes two levels of discourse in narratives: microstructure and macrostructure (e.g., Petersen, Gillam, & Gillam, 2008). Macrostructure refers to the overall story structure whereas microstructure refers to the language deployed in storytelling.

Children's acquisition of narrative discourse has been investigated in diverse populations and languages (Hipfner-Boucher, Milburn, Weitzman, Greenberg, Pelletier & Girolametto, 2015; Fichman, Altman, Voloskovich, Armon-Lotem & Walters, 2017; Sah & Torng & 2019) and this research has outlined general patterns in the acquisition of narrative skills across languages (Lucero, 2015). However, few studies have focused on narrative skill acquisition in Arabic diglossia (Ferguson, 1959), a language context that is characterized by linguistic distance between the language of speech, in which narrative skill first develops, and the language of reading and writing, which is acquired later and in which written narratives are delivered (Leikin, Ibrahim & Eghbaria, 2014; Ravid, Naoum & Nasser, 2014). Additionally, few studies have addressed the acquisition of narrative skill among immigrant populations in general (e.g. Gamez, Lesaux & Rizzo, 2016) or among Arabic-speaking immigrants. The current research examines narrative skill in Arabic

among immigrant school-age children in Canada. Specifically, we investigate the composition of the lexicon used in the construction of narratives in light of Arabic diglossia. We also examine narrative microstructure and macrostructure and the relationship between the two skills. Furthermore, we focus on the lexical distance between the spoken and the standard varieties in Arabic diglossia as it is reflected in storytelling and ask whether this lexical distance factors into the relationship between macrostructure and microstructure.

Narrative skills: Macrostructure and Microstructure

Narrative macrostructure is often captured by what is referred to as Story Grammar (SG) (Stein & Glenn, 1979). Story Grammar offers a universal organizational model for analysing the macrostructure of narratives in terms of setting, characters and episodic structure. An episode is defined as a part, scene, or event of a story that is complete in and of itself (Stein & Glenn, 1979, Soodla & Kikas, 2010, Westby, 2005, Trabasso, van der Broek, & Suh, 1989). Within the SG model, narratives begin with a setting that provides background information about characters and sets place and time. The setting is followed by one or more episodes that are connected temporally or causally, referred to as a goal–attempt–outcome (GAO) schema (Westby, 2005). The goal (G) reflects the character's motivation to solve a problem triggered by an initiating event (IE), whereas the attempt refers to the effort to satisfy the goal, and the outcome (O) the degree of success in achieving the goal. The IE evokes an internal response (IR) in the protagonist (emotion, desire, belief) that prompts the protagonist to attempt to achieve a goal. The story ending relates to a final remark such as 'The end', whereas the meta-ending refers to the narrator's reflections on the story.

SG analysis has been used to assess children's communicative competence (Botting, 2002, Paradis, Genesee & Crago, 2011). In typically developing children, the number of story grammar elements included in oral narratives was found to grow with age (Applebee, 1978). For example, children aged 4 to 4.6 years included a central theme and three SG components (initiating event, attempt, and outcome) whereas children between age 5 to 7 years included at least five story grammar elements, adding a setting and an ending (Applebee, 1978). By about the age of ten, children were found to be able to make explicit reference to characters' internal responses (Bishop & Donlan, 2005).

Unlike macrostructure which captures the global structure of a story, narrative microstructure captures the language deployed in the telling of the story. It reflects the narrator's mastery of basic language structures and a range of lexical, morphological, syntactic, and semantic features. Microstructural indices include measures of general productivity (e.g., number of utterances, number of words), syntactic complexity (e.g., mean length of utterance), morphology and morpho-syntax (e.g., verbal tense/aspect, inflectional morphology), lexical knowledge (e.g., lexical aspect and manner of motion/cause verbs), lexico-grammatical features (e.g., locative particles, prepositional phrases, connectives), and linguistic content (e.g., lexical diversity using type-token ratios, ratio of different content to function words) (Rezzonico, Smits, Born, Blom, Frey, Goesmann & Montesinos , 2016, Heilmann, Rojas, Iglesias & Miller, 2016).

Whereas SG elements may be rather universal (Stein & Glenn, 1979), many features of microstructure may be language specific, even though marked developmental patterns in microstructural quality are evident across languages (Berman, 2009). The language of storytelling starts to develop at a young age, and

development is prolonged continuing well past the age of ten (Blankenstijn & Scheper, 2003). Lexical diversity is evident at age four (Elbers & Van Loon-Vervoorn, 2000), as is the use of complex propositions (Justice, Bowles, Kaderavek, Ukrainetz, Eisenberg & Gillam, 2006; Kaderavek & Sulzby, 2000; Reilly, Losh, Bellugi & Wulfeck, 2004). Nonetheless, children gradually produce longer narratives using more varied content words (Justice et al., 2006) and more complex syntactic structures with age (Berman & Nir-Sagiv, 2007). Hence, microstructure has served as a tool for assessing linguistic skills in children.

According to one views, macrostructure and microstructure capture different aspects of productive narrative skill and are independent of each other. This view is based on evidence from bilingual children showing interrelatedness of macrostructure skills across the two languages of bilingual children, whereas microstructure was different in the two languages (Gagarina, Klop, Tsimpli & Walters, 2016). In contrast with this position, other researchers argue that, microstructure and macrostructure are inter-related. For instance, cognitive-driven schema theory (Berman, 1988, 2008; Karmiloff-Smith, 1979) and form-function approaches to language and narrative acquisition (Berman and Slobin, 1994) argue that the development of narrative production relies on the integration of both micro and macro processes. As such, narrative production involves the integration of top-down *cognitive* processes to organize and connect story events (i.e., macrostructure) with bottom-up *linguistic* processes to select appropriate lexical and morpho-syntactic forms in the course of storytelling (i.e., microstructure). Hence, top-down representations are activated in the process of selecting linguistic forms to connect ideas together (Hickmann, 2002, 2004).

Form-function approaches to narrative acquisition (Karmiloff-Smith, 1979; Hickmann, 2002; Berman and Slobin, 1994) focus on the interaction of cognition and language, explicating the role of cognitive maturity and linguistic skills in the development of narrative forms (the selection of appropriate lexical and morpho-syntactic forms) and functions (the intent and content of the narrative, e.g., to chain events in chronological sequence, to motivate, etc.). In their research, Berman and Slobin (1994) tested how microstructural forms support narrative macrostructure and drive narrative skill development. Narrative skill development was measured in terms of increased productivity and complexity, as well as change in form-function relations. It was found that, with age, old forms assume new functions, and at the same time, new forms are recruited to meet old functions (Slobin, 1973). For example, in the narratives of 3- and 4-year-olds "and" is used as utterance initial and its function is to announce that the narrator has more to say in the same conversational turn. In the narratives of 5- and 6-year-olds its position is also clause initial, however the function is to chain events in chronological sequence. In the narratives of 9- and 10-year-olds, 'and' functions to chunk within a given discourse topic and the intention conveyed is 'the events or states are related' (Berman, 2009).

Recent studies have also focused on the relationship between various indices of microstructure and changes in macrostructure (e.g. Heilmann et al., 2010; Mäkinen, Loukusa, Nieminen, Leinonen, & Kunnari, 2014). Overall, these studies demonstrate that an increase in macrostructural competence involve changes in the way microstructural features are deployed for emerging discourse functions, and that changing relations between micro- and macrostructure are informative indices of narrative development. Understanding the relationship between microstructure and macrostructure is critical since narrative production is a well-known predictor of

children's language, literacy and academic achievement, both in L1 (Pinto, Tarchi, & Bigozzi, 2016; Suggate, Schaughency, McAnally, & Reese, 2018) and in L2 learners (Hipfner-Boucher, Lam, & Chen, 2014; Uchikoshi, Yang, Lohr & Leung, 2016).

A small number of studies have examined relations between narrative macrostructure and microstructure (Terry, Mills, Bingham, Mansour & Marencin, 2013). Heilmann, Miller, Nockerts & Dunaway (2010) tested the relationship between microstructure and macrostructure using hierarchical regression analysis. They investigated the relations between lexical indicators of microstrcture (number of tokens and number of types) and grammatical features (mean length of C-units and SI (subordination index), a measure of clausal density), on the one hand, and overall story structure, on the other, among English-speaking children aged 5 to 7 years old. This study showed that lexical and grammatical features significantly predicted narrative macrostructure, with the lexical features proving stronger than grammatical features in predicting macrostructure.

Given the central role of language in narrative skills, research has addressed the effect of differences in language exposure on the narrative skills development. This question was tested in bilinguals. Bitetti and Scheffner Hammer (2016) investigated the impact of home language experiences and exposure (based on maternal report of frequency of literacy activities, activities with caregivers, and number of children's books in the home) on the English narrative microstructure and macrostructure of Spanish–English bilingual children from preschool through first grade. Findings indicated that home language experiences and exposure were positively related to narrative quality (Gagarina et al., 2012). For example, Albirini (2014 b) examined the language proficiencies of Egyptian and Palestinian heritage speakers and the contribution of linguistic, social and demographic factors to

proficiency in heritage Arabic language. The study used an oral narrative task for assessing language proficiencies: fluency, grammatical accuracy, and syntactic complexity. The findings revealed language use, language input, family role, community support, and parents' language correlated positively with language proficiency, while language use was the only significant predictor of the variability in heritage language proficiency.

Given the diglossic nature of Arabic (Ferguson, 1959), language proficiency, at least for children raised in native Arabic contexts (Albirini & Benmamoun, forthcoming), involves proficiency in using two varieties simultaneously: Spoken Arabic for everyday speech and Standard Arabic for formal speech and for reading and writing (Albirini,2016; Saiegh-Haddad & Henkin-Roitfarb, 2014). Degree of exposure to the two language varieties is different since StA is mainly limited to literary functions, and children do not appear to develop equal competence in the two varieties even after years of schooling (Saiegh-Haddad & Schiff, 2016; Schiff & Saiegh-Haddad, 2018). The spoken and the standard varieties are remarkably distant linguistically, and this has been shown to challenge the development of linguistic and metalinguistic skills in the standard variety (e.g., for a review and a model see Saiegh-Haddad, 2018). However, this linguistic cost appears to co-occur with a metalinguistic cognitive advantage akin to that observed in bilinguals (Eviatar & Ibrahim, 2001, Asli-Badarneh & Leikin, 2018). In earlier research with Arabic speaking children, it was found that Arab homes were poor in high quality literacy experiences and exposure to Standard Arabic, and this was correlated with measures of emergent literacy in children (Aram, Korat, Saiegh-Haddad, Arafat, Khoury & Elhija, 2013; Korat, Aram, Hassunha-Arafat, Saiegh-Haddad & Iraki, 2014). Thus, it is informative to study narrative production in diglossia, and the relationship between microstructure

and macrostructure to shed light on the relationship between linguistic skills and higher order discourse organisational skills in a context where lexical skills are distributed between StA and StA. Moreover, it is informative to investigate the composition of the lexicon deployed in the narratives and the extent of reliance on lexical features from the spoken versus standard variety in the production of narratives in Arabic. Specifically, it is informative to probe whether and which specific diglossia-related lexical features predict quality of the narratives at the macrostructure level. This question is particularly important if it can be argued that the integrated lexicon of SpA and StA might enhance lexical competition and interfere with the children's ability to attend to macrostructure.

Arabic: Diglossia and Lexicon

Arabic is a root-based Semitic language in which lexical items are formed by simultaneously interdigitating two bound morphemes: a root and a word-pattern. Roots provide the core semantic meaning of all the words within the same root-related family; whereas patterns consist of vocalic skeletons (together with a closed set of fixed consonants) with designated slots for the root consonants (Saiegh-Haddad and Henkin-Roitfarb, 2014). All verbs and many nouns and adjectives are composed of roots and patterns and the meaning, syntactic and phonological properties of words change for each root-pattern combination. For example, the root KTB, (ك ت ب) is associated with the concept "to write. An example of derivations based on this root are the words /*ka: tib*/ (كاتب) "writer"; /*maktu:b*/ (مكتوب) "written". Psycholinguistically, the mental lexicon of Arabic speakers is also organized along the morphological units of roots and word-patterns, both in adults (Boudelaa &

Marslen-Wilson, 2013; Boudelaa, 2014) and in children (Asli-Badarneh & Leikin, 2019; Shalhoub-Awwad & Leikin, 2016) and this has been shown to be compatible with early morphological processing in reading and spelling acquisition (Saiegh-Haddad, 2013; Saiegh-Haddad & Taha, 2017; Taha & Saiegh-Haddad, 2016, 2017).In fact, according to MAWRID (Model of Arabic Word Reading In Development (Saiegh-Haddad, 2018) morphological processing is a core building block of literacy acquisition in Arabic.

One of the most prominent sociolinguistic features of Arabic is diglossia (Ferguson, 1959) and a long-lasting and rather stable co-existence of two varieties of the language within the same speech community for different social functions (Albirini, 2016). According to Ferguson (1959) diglossia consists of a stable coexistence of two related forms of a language, a High and Low variety, that are used in different social contexts. Standard Arabic (StA), is to a great extent uniform across the Arabic speaking world and is used mainly for conventional reading and writing in Arabic as well as for formal speech (Holes, 2004; Van Mol, 2003). It is considered the "prestigious" High form of the language and is therefore used for praying and in public discourse (e.g., theatre, parliamentary debates, education, and most television programs). In contrast, different local dialects of Spoken Arabic (SA, SpA) are used for everyday verbal communication and informal transactions (e.g., Versteegh, 2001, Holes; 2004, Saiegh Haddad, 2003, 2012; For a more nuanced discussion of diglossia in Arabic today, see Albirni, 2016).

Dialects of SpA are all structurally related to StA (Maamouri, 1998). At the same time, when compared linguistically to StA, they all differ from it in their

phonological, morphological, morphosyntactic, and lexical–semantic properties (Saiegh-Haddad & Henkin-Roitfarb, 2014). This linguistic distance is most prominent in the phonological and lexical domains. Lexical knowledge in Arabic diglossia is distributed between the two varieties of the language (Saiegh-Haddad, 2004). Saiegh Haddad and Spolsky (2014) analyzed a corpus of 4,500 word types derived from a corpus of 17,500 word tokens of five-year-old Arabic Palestinian children living in Israel. They classified words on the basis of the lexical and lexico-phonological distance between StA-SpA distance. This analysis yielded three types of words in the spoken lexicons of preschool children: identical, cognate, and unique words. Identical words (which made up 21.2% of the word types in the corpus tested) were lexically and phonologically identical in the two varieties (e.g. /*žamal*/ 'a camel', or /*daftar*/ 'notebook'). Cognate words or (40.6%) have different yet related phonological forms in the two varieties, namely they share some phonological characteristics but differ, many times systematically, in other phonological characteristics. Cognates differ in terms of the degree of phonological distance in SpA and StA forms, that is in terms of the number of phonological alterations between the two forms. Phonological distance between the two forms was then measured in terms of the number of phonological parameters that distinguish cognate pairs. An example of an StA-SpA cognate pair distinguished by one vocalic alteration is StA /*ʃams*/- SpA /*ʃamis*/ 'sun'. The cognate pair StA /*miqlama*/- SpA /*miʔlami*/ 'pencil case' is distinguished by two phonological parameters: a consonant and a vowel, whereas the cognate pair StA /*ṭaːʔira*/ - SpA /*ṭayyaːra*/ 'airplane' is distinguished by more than three vocalic alterations (Saiegh-Haddad, forthcoming ; Saiegh Haddad & Haj, 2018). The third lexical category is unique SpA words (38.2%) which have a lexical (and phonological) form in SpA that is completely different from their form in StA (e.g. StA */juzdaːn/*- SpA /*ħaqiːba/*

'bag'). Unique SpA often have have parallel yet completely distinct forms in StA, called unique StA words. The corpus that Saiegh-Haddad & Spolsky (2014) analyzed did not report any unique StA words actively produced by children during natural free play in kindergarten. Yet, some were recorded during parroting StA songs by children.

The linguistic distance between StA and SpA was found to influence children's acquisition of basic linguistic and metalinguistic skills in the standard variety (Saiegh-Haddad, 2003, 2004, 2007; Saiegh-Haddad, Levin, Hende, & Ziv, 2011). At the lexical level, Saiegh-Haddad & Haj (2018) showed that the lexical and lexico-phonological distance between SpA and StA had a significant impact on lexical-phonological representational quality in children. As such, children had difficulty judging if the pronunciation of a target StA word was accurate when the word had a form in StA that was different from its form in SpA. This was the case even when the distance consisted in just a single consonantal phoneme and even though the StA word was within the child's receptive vocabulary. Across all ages, identical words were easier to judge than cognate words, and both were easier than unique words. The authors also found that the quality of phonological representation of cognate words was commensurate with the degree of phonological distance between the StA and the SpA form of the cognate.

These results have implications for lexical processes in narrative production in Arabic. To produce a narrative in Arabic, words have to be retrieved from a complex integrated lexicon that stores both SpA and StA words (Nevat, Khateb & Prior, 2014) some of which are partially related cognates and others have unique lexical forms in

SpA and StA. Given this complex lexicon, selection and retrieval of lexical items likely involves competition between the less familiar, inaccurate and unstable StA representations of words with their more dominant and more accurately represented SpA forms. Such diglossia-related features of microstructure might affect top-down processing for generation of macrostructure as predicted by form-function approaches (Berman & Slobin, 1994) according to which attention allocated to language processing at the local level detracts from the overall structural quality of the narrative given limited cognitive resources (Berman, 1988, 2008; Berman & Slobin, 1994; Karmiloff-Smith, 1979).

Our investigation of the published research revealed only two studies that examined narrative production in Arabic diglossia. Ravid, Naoum and Nasser (2014) tested narrative development among 97 monolingual Arabic Palestinian children in the north of Israel across 7 age groups (nursery school through adulthood). Using a retelling task, the study showed the predicted increase in story length with age. More interestingly, the study revealed that while the stories were supposed to be retold in StA, even though no explicit instructions were given in this regard, children used both StA and SpA structures. Moreover, use of StA structures was evident even in young pre-schoolers (despite lack of direct instruction in StA at this grade level) and it was found to increase with grade level especially in lexical and morphosyntactic structures.

Leikin et al. (2014) examined the influence of diglossia on story comprehension and production among 30 Arab preschool children by asking them to retell two different stories: one in StA (after it had been told in StA) and one in SpA

(after it had been told in SpA). Comprehension questions in StA and in SpA followed each of the StA and SpA narrations, respectively). The results showed that narrative comprehension of the StA stories was lower than comprehension of the SpA stories. This study suggested that the linguistic gap between SpA and StA impacted comprehension in Arabic diglossia (Abu-Rabia, 2000; Feitelson, Goldstein, & Share, 1993). With respect to narrative production, the study showed that children produced shorter texts, and they produced shorter clauses and made many more morphosyntactic errors in StA than in SpA.

The studies reviewed above show that narrative skills in Arabic might be directly impacted by the diglossic reality. Narrative comprehension skills are better in SpA than in StA and productivity indices in StA are lower in StA than in SpA, even though they increase gradually with age. Language exposure and input are crucial factors in language development especially in bilingual contexts (De Houwver, 2018, Carroll, 2017) and in diglossia (Saiegh-Haddad, forthcoming; Saiegh-Haddad & Armon-Lotem, forthcoming). Language exposure is also critical to language acquisition and to narrative skill in immigrant and in similar contexts like heritage language children (Albirini, 2014b, Meir & Polinsky, 2019, Armon-Lotem, Walters & Gagarina, 2011). The study tests narrative skills in Arabic-speaking immigrants in Canada with specific focus on the lexicon deployed by children in the narratives they produce in light of diglossia. It also tests the relationship between microstructure and macrostructure skills, as well as the role of lexical distance in this relationship given the possible effect of lexical distance on lexical retrieval and on the amount of cognitive efforts left for macro level organizational skills.

Arabic-speaking immigrants in Canada

Children growing up in Arab immigrant families in Canada often speak their native language at home and, like other immigrants in Canada, they receive schooling in the language of the majority. Immigrant children may also receive some instruction in speaking, writing, and reading in Arabic through school Arabic language programs. Participation in these programs is voluntary.

Immigrant speakers often present with variable and heterogeneous linguistic outcomes (Montrul, 2018, Armon-Lotem, Rose and Altman, 2020) influenced by chronological age (Montrul, 2012), onset of exposure to the second language, and individual variation in linguistic experience (Ahn et al., 2017). Research has shown that one of the most important factors predicting immigrant language acquisition of the heritage language is amount of exposure (Meir & Polinsky, 2019, Armon-Lotem et al., 2011). Most immigrant speakers develop unbalanced skills because their input is typically divided between two languages and they often have rudimentary linguistic and literacy skills in their heritage language compared to the dominant majority language in which they are schooled (Meir & Polinsky, 2019).

Like other immigrants, Arabic-speaking immigrants are naturally less exposed to Arabic than their majority language counterparts. Therefore, they show gaps in lexical knowledge and other linguistic gaps when compared with monolinguals as reflected in word naming (Albirini, 2015b), word selection, use of numbers, prepositions and possessives (Albirini and Benmamoun, 2014), morphological skills (Benmamoun, Albirini, Montrul & Saadah, 2014), and some aspects of syntax, such as verb-subject-object (VSO) (Bos,1997). In contrast, their phonological skills, namely vowel production, appear to converge with Arab monolinguals (Saddah,

2011). These gaps in linguistic knowledge are attributed to lack of use and exposure to Arabic, social factors (e.g., extent of relationships with the Arab community, religious affiliation), attitudes regarding the importance of Arabic, and language loss (Rouchdy, 2013). Given their limited linguistic proficiency and the dominance f the societal language, it is informative to study the nature of the lexicons of immigrant children as reflected in narrative production, as well as their microstructure and macrostructure narrative skills. A question of particular interest is the role of lexical distance in Arabic diglossia in narrative production and the extent to which diglossia-related features of microstructure might predict macrostructure narrative skills.

Against this backdrop, the study addresses the following questions: 1) what is the composition of the lexicon deployed by Arabic-speaking immigrants in narrative production; specifically, what is the extent of use of diglossia-specific lexical distance features in the oral narratives produced by children? 2) What is the relationship between narrative microstructure (number of tokens, type\token ratio, MLU) and narrative macrostructure, beyond differences between immigrant speakers in chronological age, age of arrival to Canada, receptive vocabulary and oral exposure to Arabic at home? 3) Do diglossic lexical distance features factor into the relationship between narrative microstructure and macrostructure skills in this population?

Method

Participants

Participants in the current study were 75 Arabic-English bilingual children (39 males) aged 7-12 years old (Mean age = 9;8, SD=19.58) recruited from a large urban centre in Canada. Fifty-three families were recruited for the study. All parents were native speakers of Arabic. With regard to age of arrival to Canada, 15 children from

our sample arrived between ages 1-4 years, 31 arrived between ages 4-8 years and 11 arrived between ages 8-13 years. 18 children were born in Canada. Arabic was reported by the parents of the participants as the primary language spoken in the home for all children; only 45.3% (n= 34) reported using English at home with their siblings.

All children participating in the study attended English-medium public schools and they also attended Arabic language programs on the weekend (maximum of 4 hours per week). Excluded from this were four children who attended private Islamic schools in which the primary language of instruction was English but who also took one Arabic language/Islamic studies class for 45 minutes per day, for 5 days per week. Almost half of the children in our sample (52%) received their pre-schooling in Canada through participation in junior and senior kindergarten publicly funded early learning programs that implement government mandated curricula targeting specific learning outcomes. The rest of the children received their early schooling in their Arab country of origin. About 40% of the children were enrolled in Arabic-medium schools in their country of origin for a period of 1 to 6 years before arriving in Canada.

According to parental reports, Arabic was stated as the primary language spoken in the homes of ALL children participating in the study. 71% of the mothers and 79% of the fathers held an undergraduate or a professional/graduate degree. None of the participating children had an identified developmental disorder or learning disability. See more about participant background information in the previous section.

Table 1 presents means and standard deviations (SD) for the background information measures across the whole sample.

[insert Table 1 about here]

Materials

Background Information Tasks

Language Questionnaire. All parents of children participating in the study completed a demographic questionnaire (*The Canadian Bilingual School-aged Children (Use and Exposure)* (MacLeod, Bérubé, Schneider, Trudeau & Sutton, forthcoming) which related to the child's language development, home language environment, and parental demographic information.

Exposure to Arabic questionnaire. A questionnaire was used to measure the frequency of the child's engagement in speaking, listening, reading or writing activities in Arabic over a week. Engagement was assessed on a Likert scale of 1-5 (1 = never or almost never, 5 = very often). Speaking and listening activities in Arabic included watching TV shows and movies, music, singing, reading poetry and storytelling. Reading and writing activities included reading books, messaging, doing homework, and reading the Quran.

Arabic receptive Vocabulary Test. Arabic receptive vocabulary was assessed using a standardized subtest of the Arabic Language Assessment Battery (ALAB, Asadi, Shany, Ibrahim, Khateb, & Ben Simone, 2015). This test consists of a total of 73 items of increasing difficulty. For each item, the examiner orally presented the target word and the child was asked to point to one of four pictures that best represented the word. The test was discontinued after the child failed in identifying eight consecutive words. Cronbach's alpha of the performance of our sample on this test was .95.

Test of Narrative Language. An Arabic translation of a shortened version of the Test of Narrative Language TNL (Gillam & Pearson, 2004) was used to assess the children's oral narrative production. The children were instructed in StA to look at a single wordless picture and to tell a story about it. The experimenter encouraged the child to remain on task and did not interfere in story production in any way that could influence the content or the structure of the story. The child's story was recorded for later transcription and scoring. Two versions of the task (Unicorn and Aliens) were used. Half of the children received the Aliens version; the other half received the Unicorn version. Children were free to generate their stories in whichever variety of Arabic they chose. Cronbach alpha fore this task was .78.

Transcription and coding

Children were audio recorded as they generated their narrative. The narratives were subsequently transcribed broadly phonemically by trained native Arabic-speaking graduate and undergraduate students. They were then scored for macro- and microstructure.

Macrostructure

Story Grammar Elements (SG). Each script was divided into episodes. The narratives were then coded in terms of the number of settings, initiating events, goals, attempts, outcomes, internal responses, endings, and meta-endings per each episode of the narrative (Stein & Glenn 1979). A score of 1 was awarded for each element if it was mentioned and a zero score if it was not. The maximum number of SG elements was 16. The Mean number of SG elements was calculated by dividing the total number of

points awarded by seven which is the maximum number of elements (settings, goals, attempts, outcomes, IRs, endings, meta endings).

Microstructure

General indices

The analysis of narrative microstructure employed two types of indices: general and diglossia-specific. First, general measures of narrative length and lexis were coded: total number of word tokens (TW) including word repetitions, total number of different words or word types, type-token ratio (TTR), mean length of utterance (MLU**)**, and finally also number of code switched English word types and tokens.

Diglossia-specific lexical indices

Following Saiegh Haddad and Spolsky (2014), five categories of words were coded based on the lexical distance between SpA and StA. These words included: a) identical words; b) SpA cognates, namely cognate words in their SpA form; c) StA cognates, namely cognate words in their StA form; d) unique SpA words; e) unique StA words. Identical words are lexically and phonologically identical in StA and SpA (e.g. /nam/'sleep', /ʔakal/'ate'). Cognate words are paired lexical items that have overlapping phonology in SpA and StA (e.g. SpA /ʔim/'mother'-StA /ʔum/) Unique words share the same semantic representation (the same concept) but are lexically (and naturally also phonologically) different with a unique form in StA (unique StA words) and in SpA (Unique SpA words). E.g. unique StA /masak/- unique SpA /3arash/ 'catch') (Saiegh-Haddad & Spolsky, 2014). Inflected forms were considered tokens of the same types (e.g. raʔat/ she saw, /raʔu/'they saw').

Procedure

Data collection occurred in the child's home during the fall of the school year. All children were administered the vocabulary task first, followed by the TNL narrative production task. All tasks were administered to children by trained graduate and undergraduate research assistants who were fluent in Arabic. A graduate student in linguistics who is a native speaker of Arabic coded the narratives for macrostructure and microstructure. Twenty percent of the transcripts were chosen randomly and coded by a second rater, a native speaker of Arabic, for inter-rater reliability. Interrater reliability was conducted using the following formula: [number of agreements/ (number of agreements + disagreements)]× 100 (Sackett, 1978). The interrater reliabilities for macrostructure and for, identical, cognate (SpA and StA), unique SpA, and unique StA words were .91, .90.5, .92, .93, respectively.

Results

The first research question addressed the composition of the lexicon deployed by children in narrative production in light of diglossia. To address this question, all the words used in the narratives were coded for diglossia-related lexical distance features: identical words, SpA cognates, StA cognates, unique SpA words, and unique StA words. This analysis also accounted for English code-switched words. These lexical categories covered all the words used in the narratives. Table 3 provides Summary Statistics of the frequency and mean use of diglossic lexical categories in types and tokens per each lexical category. We also tested the microstruture and the macrostructure elements of the narratives produced by children. Table 4 provides means and SDs of the general measures of microstructure and macrostructure that were coded (total number of tokens/narrative length; type/token ratio, MLU and SG).

[insert Table 2 and 3 about here]

Table 3 also shows that overall, the lexicon that was deployed in the narratives produced by children consisted mainly of SpA cognate words making up 25.73% of the total number of word types used in the narratives. This was followed by identical words making up 21.55 %, StA cognate making up 19.97 %, unique StA words making up 18.62 % and finally unique SpA words making up 12.18%. Children used significantly many more SpA cognates than StA cognates [$t(74)=5.1$, $p<0.05$] . They also used significantly many more unique StA words than unique SpA words [$t(74)=7.2$, $p<0.01$]. English code-switched words made up 1.81% of the total number of word types used in the narratives.

Next, we tested the intercorrelations among the background variables and the various indices of microstructure and macrostructure targeted in the study. The results from this analysis are summarized in Table 4 below.

[insert Table 4 about here]

Table 4 shows that macrostructure (number of story grammar elements) was strongly associated with age ($p < .001$), with age of arrival in Canada ($0<0.01$), with general TTR ($p<.001$), MLU ($p<.001$), and with frequency of use of cognate words in their StA form ($p < .001$). Macrostructure was also moderately correlated with narrative length in total number of tokens ($p<.01$), with frequency of use of unique StA words ($p<.001$), and weakly correlated with Arabic exposure at home ($p < .05$) and with Arabic receptive vocabulary ($p < .05$).

In order to better understand the relationship between general measures of narrative microstructure and narrative macrostructure, we conducted a hierarchical linear regression analysis. Children's chronological age, Arabic exposure at home, age of arrival in Canada and receptive vocabulary were entered in Step 1, followed by total number of tokens (narrative length), TTR, MLU in step 2.

[insert Table 5 about here]

Table 5 shows the final beta weights for all variables. In step 1, chronological age and age of arrival in Canada predicted 36% unique variance in narrative macrostructure. Arabic exposure and vocabulary did not predict any additional unique variance. In the next step, the total number of tokens (narrative length in word tokens) and TTR explained additional unique explaining an additional 4% unique variance. Altogether, chronological age, age of arrival in Canada as well as number of tokens and TTR all made significant contributions to the prediction of narrative macrostructure, accounting for 36% and 40% of the variance, in steps 1 and 2, respectively.

In order to examine the contribution of the diglossia-specific lexical distance indices to the prediction of narrative macrostructure in Arabic in the overall sample, we conducted a similar hierarchical linear regression but entered the diglossia-specific lexical features of identical words, SpA cognates, StA cognates, unique SpA words, and unique StA words in step 3. We also added English code-switched words to the lexical indicators in this step. Notably, the general measure of TTR used in the previous analysis was not entered in this analysis. Instead, the mean percentage of

word types in each of the lexical categories (diglossia-specific indices of lexical distance and English code-switched words) were used as predictor variables.

[insert Table 6 about here]

Table 6 shows the final beta weights for all variables. As in the previous analysis, chronological age and age of arrival in Canada predicted 35% unique variance in narrative macrostructure in step one. Arabic exposure and vocabulary did not predict any additional unique variance. In step 2, total number of tokens accounted for 45% variance, and explained an additional 10 % unique variance. In the third step, only StA cognates and unique StA words predicted significant unique variance that amounted to a total of 65%, and 20% unique variance. While StA cognates made the largest contribution to the prediction of narrative macrostructure (B=0.49), unique StA words also made a unique contribution (B=0.32). The rest of the lexical parameters did not contribute unique variance.

Discussion

The current study had two aims. Our first aim was to explicate the nature of the lexicon that immigrant children deploy in narrative production in light of diglossia and of the lexical distance between SpA and StA. The second aim was to study the microstruture and the macrostructure of the narratives produced by children and the relationship between the two; Specifically, we aimed to probe whether diglossia-specific lexical features of the microstructure of the narrative predicted macrostructure.

Language proficiency in Arabic requires skill in using both SpA and StA. Language proficiency in Arabic also requires awareness of the complementary sets of

social functions that each language variety fulfills and skill in switching between varieties (Saiegh-Haddad, forthcoming). In the current study, children were free to tell their stories in whichever language variety they chose. However, instructions were given in StA in order to guarantee uniform dialect-neutral instructions and in order to mimic an academic activity and encourage students to take the task more seriously. As expected, even though instructions were given in StA, the children used both language varieties, as well as few English code-switched words.

With respect to the first question which pertained to the composition of the lexicons of immigrant children as reflected in narrative production, the result showed that the structure of the lexicon consisted of SpA Cognates making up 25.73% of the total number of word types used in the narratives. This was followed by identical words making up 21.55 %, StA Cognates making up 19.97 %, unique StA words making up 18.62 % and unique SpA words were used in the least frequency making up 12.18%. Interestingly, when StA and SpA forms of words were compared, there was a clear difference in the distribution of these lexical classes. In terms of cognates, children produced many more SpA cognates than StA cognates. In contrast, children produced many more unique StA words than unique SpA words. In addition, code-switched English words made up a very small portion of the total number of words used in the narratives (1.8%).

The finding that children opted more for SpA cognates than StA cognates is very interesting and it might reflect the salience, dominance and ease of retrievability of these words as opposed to their StA form given that this is the form used in most daily speech and all mediocre communicative functions. Also, because the narratives were produced orally, the time constraints on checking, revising and monitoring might have factored into this finding too favoring the SpA form of cognates. In

contrast to the SpA form of cognates, the StA form is less accurately represented, is more difficult to retrieve (Saiegh-Haddad & Ghawi-Dakwar, 2017; Saiegh-Haddad & Haj, 2018), and is probably also less accessible in the course of narrative oral production. So, it seems that in the competition between the two forms of cognates for selection in an oral narrative production task, the SpA form of the cognate wins the race among these immigrant children. The question that remains open is whether a similar pattern would emerge among other Arabic minority speakers such as heritage language speakers whose proficiency in Arabic is restricted and whose exposure to standard Arabic is very limited (Albirini & Benmamoun, forthcoming). Another question is whether the same pattern would emerge among speakers of Arabic for whom Arabic is the dominant language, such as native speakers living in Arabic-speaking regions. These questions are for future research to pursue.

With respect to unique StA words, a different finding emerged. Unique StA words were used more often than unique SpA words. Unique StA words are only used in StA and they have a conventional spelling. By definition, StA words have parallel unique forms in SpA. Yet, SpA words are only used in SpA and, therefore, they do not have a conventional spelling form in Arabic. This might explain why they were much less used in the current narrative production task which was introduced by instructions in StA and which might have therefore been taken to be an academic activity. Given that unique SpA and unique StA words are equally functional for the purpose of narrating, as they are synonymous and are similar in conceptual familiarity, the finding that unique StA words were relied on more frequently than unique SpA words reinforces the idea that the narrative task introduced with instructions in StA was considered an academic task and that children were aiming to produce their narratives in StA rather than in SpA. If this is true, this would explain

why unique StA words stood out more prominently as candidates for selection than unique SpA words in this context.

The finding that SpA cognates were used more often than StA cognates, whereas unique StA words were used more often than unique SpA words might also be attributed to the larger phonological distance between the two forms of the latter (unique words) than the former (cognates). As such, this finding suggests that the competition between two related phonological forms of the same cognate word might be stronger than the competition between two completely different phonological forms of unique SpA and unique StA words. In turn, it is possible to argue that, if children were aiming at producing a narrative in StA, then children found it easier to select unique StA targets than StA cognates.

The second question pertained to the microstructure skills and the relationship between narrative microstructure and macrostructure among immigrant Arabic-speaking children. To address this question, we examined Story Grammar elements as indicators of macrostructure along with general measures of microstructure including total number of tokens, type\token ratio, and MLU. Regression analyses showed that the quality of narrative macrostructure was predicted by the chronological age of the children and by age of arrival. Unexpectedly, however, variations in our immigrant sample in receptive vocabulary and in exposure to Arabic at home did not explain any additional variance. This does not align with earlier research (Heilmann et al., 2010), yet might be related to the large differences between the children in our sample in chronological age (7-12) and in age of arrival in Canada (from birth-13 years) yielding large differences between them in oral proficiency in Arabic (Heilmann et al., 2010).

With respect to predictors of macrostructure, the results show that chronological age and age of arrival in Canada are the strongest background variables predicting narrative macrostructure skill predicting 35% of the variance. The results also showed that the contribution of these two variables is independent of the contribution that microstructure linguistic skills make to the prediction of the same dependent variable. Chronological age and age of arrival to Canada reflect the time that these immigrant children spent in their Arab country of origin and the number of years they spent in an Arabic native speaking environment. These factors continue to predict a large amount of variance in the children's skill in narrative macro structure in immigrant children.

With respect to the question of microstructure predictors of macrostructure, the results showed that, beyond differences between children in chronological age and age of arrival in Canada, narrative macrostructure was predicted by narrative length and by type-token ratio. In other words, the longer the narratives were and the more lexically diverse, the better the macrostructure of the narrative was as reflected in many more SG elements. Narrative length is an index of language productivity and our results align with earlier research in showing that this parameter is a predictor of macrostructure (Heilmann et al., 2010). In the same way, our results corroborate earlier finding in showing that lexical diversity and richness predicts narrative macrostructure (e.g. Heilmann et al., 2010; Terry et al., 2013). Altogether, these findings demonstrate the inter-dependence between microstcrture and macrostcrture and they support form-function views (Berman and Slobin, 1994) which argue that microstructural forms support narrative macrostructure and drive narrative skill development. As such, changes in narrative function and form, namely in the lexical complexity to which these forms are put occur concurrently with changes in narrative

macrostructure (Berman & Slobin, 1994). This interrelatedness might be related to cognitive skills; narrative production relies on the integration of top-down cognitive processes to organize and connect story events (i.e., macrostructure) with bottom-up linguistic and lexical process (Karmiloff-Smith, 1979).

It is noteworthy that the average mean length of utterance was not found to be a significant predictor of macrostructure beyond narrative length and lexical diversity indicating a stronger role of lexical skills than grammatical skills in predicting macrostructure (Heilmann, Miller, Nockerts & Dunaway, 2010; Rakhlin, Aljughaiman & Grigorenko, 2020). It is noteworthy that our current study used a measure of MLU as the average number of words per utterance. This measure might be less sensitive to differences in macrostructure skills in Arabic. Instead mean length of utterance by morpheme may be a more sensitive measure (Parker & Brorson, 2005). Tallas & Dromi (forthcoming) tested if MLU in morpheme to assess language acquisition among Palestinian Arabic-speaking children (age 2-5 years). They found that mean length of utterance in morphemes was more sensitive than MLU in words in capturing early language development in Arabic. This question is for future research to pursue.

Given the distribution of diglossic lexical distance features in the narratives produced by children, the next question that the current study tested was whether diglossic lexical distance features predicted narrative macrostructure. To address this question, we used a similar hierarchical linear regression, yet instead of a general measure of TTR in step 3, we entered the mean percentage of use of each of the diglossia-specific lexical features as well as code-switched English words. This analysis revealed that, chronological age and age of arrival to Canada were significant predictors together with total number of tokens as a measure of microstructure and

they accounted for 45% variance. Most importantly, when diglossia-specific lexical indicators were entered, narrative macrostructure was uniquely predicted by the mean percentage of use of StA cognates and unique StA words with this model accounting for a total of 65% of the variance. This finding demonstrates that, in addition to relevant background measures and general linguistic productivity indicators which predicted 45% of the variance, prediction of narrative macrostructure in Arabic benefits from an account of diglossia sensitive lexical indicators, specifically micro-level lexical skills in StA, as evidenced by frequency of use of unique StA words and StA cognates predicting an additional 20% unique variance.

We argue that use of StA for the purpose of narration places considerable cognitive demands on children. The instructions for the narrative task at hand were given in StA. Hence, StA might have been primed. As children have limited processing capacity, ease in retrieval of StA cognates and unique StA words eases the cognitive burden of lexical selection and retrieval on the part of children and allows more attention to be directed to overall story structure. It is noteworthy that, as argued earlier, the composition of the lexicon used by the children suggested that they were aiming at producing a narrative in StA rather than SpA. Hence, ease of retrieval of StA words frees attention and other cognitive resources to be directed to narrative macrostructure. Hence, variations among children in these aspects of the diglosssic language proficiency predicted differences between them in overall macrostructure. Thus, it appears that those children who can manage the competition between the SpA and StA forms of cognates and unique words and can retrieve many more target StA words, in the current StA-primed context of narration, have more cognitive effort to allocate to organizing the story elements and hence produce more macrostructure elements (Berman, 1988, 2008; Karmiloff-Smith, 1979). Altogether, these findings

imply that bottom-up linguistic processing in Arabic narration may be impeded by the linguistic distance of Arabic diglossia and might require not only sufficient linguistic skills of familiarity with StA lexical forms but also heightened cognitive flexibility in managing the competition between SpA and StA forms.

It is to be remembered that our data and conclusions are limited by the nature of our immigrant sample. Our Arabic-speaking immigrant sample might be similar to heritage language Arabic speakers in some respects and have lower linguistic proficiency than monolinguals living in an Arabic speaking region; some might even develop their Arabic linguistic skills in a 'diglossia-less' context with no real exposure to StA like the heritage language context (Albirini, 2015b, Albirini & Benmamoun, forthcoming). Nonetheless, our sample of immigrants appears to be different with many of them arriving to Canada during or after puberty, with all of them living in households where the primary language is Arabic, and with all of them attending Arabic language classes on the weekend. Given this, our Arabic-speaking immigrant sample appears to develop diglossic proficiency that parallels that of native speakers, albeit much less reduced in scope and intensity. In support of this argument, the data from our background questionnaire shows that many of the children in our sample are involved in reading and oral activities in StA. Notwithstanding that, comparing measures of lexical productivity and diversity in Arabic speaking monolingual children living in Israel (Ravid et al., 2014) with the results we obtained from our immigrant sample shows huge differences between the two groups.

The results of the current study have important theoretical implications. They demonstrate the complexity of the lexicon of diglossic speakers (Saiegh-Haddad & Haj, 2018) and the role of this complexity in narrative production in children. The study also highlights the centrality of linguistic distance in understanding linguistic

processing in diglossic Arabic at all levels (Saiegh-Haddad, 2018). The results also support theories arguing for the mutual interdependence of micro and macro structure skills development in children (Berman & Slobin, 1994). The results of the study also have clear practical implications for assessment and intervention with Arabic speaking children in a diglossic context (Saiegh-Haddad & Everatt, 2017; Saiegh-Haddad & Armon-Lotem, forthcoming).

Several limitations of the study should be acknowledged. The first is the small sample size within each age groups and the large range of chronological age (9-12). The second is the use of instructions in StA which has primed use of this variety and strongly affected the patterns of results we achieved. Further research should elicit comparable narratives in SpA and in StA separately and compare indicators of microstructure and macrostructure, as well as the relationship between the two in the two elicitation conditions independently.

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Table 1. *Descriptive statistics of background measures.*

Variable	M	SD	Min.	Max.
Chronological Age (years)	9.81	(19.58)	84.00	12.57.
Age of arrival (years)	4.34	9.92	0	12.25
Home exposure to Arabic	3.5	(1.3)	1	5
Receptive vocabulary	42.16	(16.26)	2.00	71.00

Table 2. *Descriptive statistics of narrative measures.*

Variable	M	SD	Min.	Max.
Story Grammar (SG)	8.27	(3.53)	1.00	16.00
Total Word tokens	109.72	(7.09)	7.00	413
Total Word types	57.91	(9.1)	4.00	188
Mean Length of Utterance	6.39	(3.56)	2.00	20.18
Type/Token Ratio	.56	(.30)	.08	1.88

Table 3. *Summary Statistics of lexical categories targeted*

Variable	Type % M (SD)	Token% M (SD)
Identical words	21.66% 64 (.10)	17.77% 108.47 (.13)
SpA Cognates	25.73% 76 (.26)	16.61% 101.33 (.30)
StA Cognates	19.97% 59 (.50)	23.58% 143.90 (.48)
Unique SpA words	12.18% 36 (.91)	18.44% 112.5 (.88)
Unique StA words	18.62% 55	22.54% 137.5

		(.45)	(.51)
English words	code-switched	1.81% 5.34 (8.1)	1.04% 6.37 (8.4)
Totals		100% 295.34	100% 610.07

SpA: spoken Arabic, StA: standard Arabic, MLU: mean length of utterances.

Table 4. Inter-correlations among all variables

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	Chronological Age	---														
2.	Age of arrival	.12	----													
3.	Arabic Exposure	.20	**.31***	---												
4.	Vocabulary	**.43****	.12	.03	---											
5.	General TTR	**.29***	.19	.14	-.04	---										
6.	Number of tokens	.02	.10	.03	.07	-0.18	---									
7.	Number of types	**.33****	.34	.07	.21	**.47*****	**.61*****	-----								
8.	MLU	**.53*****	.51	.18	.17	.16	**.39****	**.52*****	----							
9.	TTR identical	.14	.90	-.05	-.002	-.06	.06	.03	.002	----						
10.	TTR SpA cognate	.20	**.44**	**.30****	.12	.005	0.05	.12	.29	-.07	---					
11.	TTR StA cognate	**.61*****	.67	.11	**.24***	**.34****	.15	**.46*****	**.58***	-.01	.10	---				

12. TTR unique SpA words	.21	.73	.20	.10	.07	-.06	.05	.09	.15	.22	.13	---			
13. TTR unique StA words	**.34****	.91	-.02	**.20***	.19	.003	.19	-.05	**.28***	-.16	**.23***	.13	---		
14. SG	**.63****	**.31***	**.26*****	**.27***	**.58***	**.42*****	**.64*****	**.62*****	.08	.12	**.73***	.09	**.40***	-----	
15. English code-switched words	.02	.8	-.05	.01	-.09	-.08	-.13	.06	.07	.02	-.13	-.04	-.17	-.10	---

TTR: type/token ratio, MLU: mean length of utterances, SG: story grammar elements.

Table 5. *Hierarchical linear regression predicting narrative macrostructure* (based on general TTR and classical measures)

Step and predictors	R2	B	T
1. Age	.36***	.59	5.77***
Arabic exposure		.09	1.47
Age of arrival to Canada		.25	2.99*
Receptive vocabulary		.014	.136
2. MLU	.40***	.14	1.53
Number of tokens		.31	3.5*
Number of English Code-switched words		-.05	1.1
General TTR		.35	4.61***

*p < .05. **p <. 01. *** p <.001

Table 6. *Hierarchical linear regression predicting narrative macrostructure* by diglossia-specific lexical variables)

Step and predictors	R2	B	T
1. Age	.35***	.52	5.00***
Arabic exposure		.07	1.07
Age of arrival to Canada		2.0	2.7*
Receptive vocabulary		.01	.10
2. Number of tokens	.45***	.21	2.03*
MLU		.15	1.40
3. Percentage of Identical words out of the total number of types	.65***	.09	-.34
Percentage of SpA cognates out of the total number of types		.04	-.61
Percentage of StA cognates out of the total number of types		.49	3.9***
Percentage of unique SpA types out of the total number of types		.10	.49
Percentage of unique StA types out of the total number of types		.32	2.87**
Number of English code-switched words		-.05	.09

*p < .05. **p <. 01. *** p <.001