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Effects of Age of Arrival on Acquisition of Formulaic Expressions in the Second Language

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Abstract

Little is known about age effects on formulaic language acquisition in second language (L2) learners. This research compared use and comprehension of formulaic expressions (FEs) in English and Russian by two groups of Russian bilingual speakers differing in age of arrival (AoA) to the USA. A critical period perspective predicts better performance in the early than the later group in the second language. Contrary to this expectation, the early arriving group did not perform significantly better than the later arriving group on the English formulaic tasks. They did perform better on the English than the Russian formulaic tasks. The later arriving group scored significantly higher than the early group on all formulaic tasks in Russian, and performed significantly better in Russian than English. Both bilingual groups scored higher on comprehension than production for English. The surprising result, that earlier arrival in the second language country did not significantly benefit formulaic language use, remains to be explained. Linguistic input and brain maturation likely both play important roles in formulaic language acquisition.

Keywords

Second-language learning, formulaic language, age of language acquisition, critical period

1. Introduction

There is a growing interest in formulaic language and its role in language development and communication in first and second language acquisition (Puimege & Peters, 2019; Siyanova-Chanturia & Pellicer-Sánchez, 2018). Formulaic language figures importantly in verbal communication (Pawley & Syder, 1983; Van Lancker Sidtis, 2012, 2015, 2019; Wray, 2017; Kuiper, 2004, 2009). Some time ago, Fillmore (1979) noted that achievement of native-like performance depends greatly on understanding and appropriate use of formulaic language. While percentage of use varies with register, topic, interlocutors, setting, and so on (Foster, 2001; Biber, Conrad, & Cortes, 2004), an overall average across conversations of native speakers of English places the proportion of formulaic expressions (FEs) in conversational discourse at about 25% (Van Lancker & Rallon, 2004).

For second language (L2) speakers, less is known about quantity, efficiency, appropriateness, authenticity, and functionality in use and understanding of FEs. Although it has been amply observed in professional as well as anecdotal reports that use and understanding of FEs is challenging for adult L2 learners (Raupach, 1984; Widdowson, 1989; Moon, 1992; Towell & Hawkins, 1994; Weinert, 1995; Maisa & Karunakaran, 2013; Yeldham, 2018; Meunier, 2012), understanding of many topics touching upon acquisition and use of this mode of language remains limited (Gablasova, Brezina, & McEnery, 2017). There is little information offering a clear picture of the extent and nature of the FE repertory in L2 speakers at different stages of their learning, nor has the most favorable age for successful learning of L2 FEs been considered (Bardovi-Harlig, 2018; Bestgen, 2017). It is the goal of this study to investigate details of FE use, knowledge of FE forms, and understanding of FE meanings of L2 FEs by native Russian speakers who learn English at different ages.

1.1 Background

The literature consists of many terms that have been used to describe aspects of formulaicity in a native language (Myles & Cordier, 2017; Jeong & Jiang, 2019). Formulaic language has been described as unitary or preassembled speech, prefabricated routines and patterns, ready-made or fixed expressions, schemata, stereotyped phrases, multiword expressions, and chunks of speech. Wray (2000) used the term *formulaic sequence* to describe a wide range of these phenomena. However, single words also function as formulaic expressions (e.g., Hello, Right!). Formulaic expressions (FEs) include idioms, proverbs, slang, clichés, social speech formulas, indirect requests, expletives, sentence stems (*I guess, I think*), slogans, memorized expressions, collocations, and pause fillers, such as *uh, um*. Van Lancker Sidtis (2004, p. 5) identified five properties that characterize formulaic language, including stereotyped form, conventionalized meaning, association with social context, inclusion of attitudinal and affective valence, and familiarity-recognition by native speakers. It follows that speakers in a language community can demonstrate competency in the use (i.e., production) of FEs, knowledge (i.e., recognition) of the correct FE form, and understanding (i.e., comprehension) of the FE meaning. Formulaic expressions serve important communicative functions, including humor, interpersonal bonding, identification with social groups, and as vehicles for indirectly expressing attitude and

emotion (Van Lancker Sidtis & Sidtis, 2018). Wray and Perkins (2000) identified two major functions of formulaic language, one serving as the tool for social interaction, and the other as a way to avoid processing overload.

A dual-process model of language processing proposes that generation and use of formulaic and novel (i.e., grammatical, newly created) language represents two very different processes, both of which are necessarily incorporated during communication (Sinclair, 1987; Erman & Warren, 2000; Wray & Perkins, 2000; Van Lancker Sidtis, 2012; Heine, Kuteva, & Kaltenböck, 2014; Lounsbury, 1963; McGilchrist, 2009). Ellis (1983, p. 53) referred to formulaic and novel modes as "alternative ways of expressing meaning". These contingencies place requirements on speech production and comprehension of formulaic expressions that differ from those for novel, grammatical processes. During speech production of novel language, lexical retrieval and adherence to grammatical rules is activated, whereas production of formulaic language involves activation and retrieval of pre-fabricated units (Rammell, Pisoni, & Van Lancker Sidtis, 2018). Comprehension of novel language requires lexical and grammatical analysis, whereas formulaic language comprehension requires recognition of the phrase as a whole and mapping onto its meaning, which is often nonliteral or otherwise unconventional. Both modes, analytical and holistic, are interleaved in language processing.

A contrast in mental processing, corresponding to formulaic versus novel phrases, has been demonstrated in studies too numerous to thoroughly review here, starting in the 1970s with reports that individual words present in novel expressions are more successfully recalled and recognized than the same words in matched formulaic expressions (Horowitz & Manelis, 1973; Osgood & Housain, 1974; Pickens & Pollio, 1979). These results suggest that FEs are processed holistically while novel expressions are processed compositionally. In a classic study addressing these questions, reaction times were shorter to idiomatic than novel expressions in a natural English phrase classification task (Swinney & Cutler, 1979). Since then, experimental designs of a wide variety have yielded results that provide support to the notion of holistic processing of formulaic language (Raupach, 1984; Altenberg, 1998; Schmitt & Carter, 2004; Spöttl & McCarthy, 2004) for native speakers of English (Van Lancker & Canter, 1981; Dechert, 1983; Schmitt & Carter 2004; Underwood, Schmitt, & Galpin, 2004; Jiang & Nekrasova, 2007; Conklin & Schmitt, 2008; Libben & Titone 2008; Siyanova-Chanturia, Conklin, & Schmitt, 2011).

Little is known about the learning processes involved in formulaic language acquisition by second language speakers. However, it has been documented and well-known that L2 learners experience difficulties in acquiring formulaic language (Paquot & Granger, 2012; Guz, 2014). Acquisition and mastery of formulaic language is challenging for L2 learners due to the inherent properties of formulaic language, mentioned earlier in the paper, including stereotyped form, conventionalized meaning, subtle association with social context, and inclusion of attitudinal and affective valence (Van Lancker Sidtis, 2004). Irujo (1986) proposed that limited exposure to formulaic sequences during the learning period as well as poor approaches to teaching formulaic sequences may explain the difficulty learning formulaic

language in L2 speakers. Kuiper and Tan Gek Lin (1989) have suggested that native-like knowledge of formulaic language is intertwined with the native culture. Furthermore, it was proposed that in order to become truly bicultural and acquire the native-like knowledge of formulaic language, the L2 learner must be exposed to L2 in early childhood.

2. Effects of Age on Formulaic Language Acquisition in L2 Speakers

It is generally held that younger L2 learners are more proficient in L2 acquisition than older ones. Numerous studies have demonstrated the effects of age on grammatical aspects of language acquisition, including phonology, morphosyntax, and lexical development in L2 learners. In contrast, formulaic language acquisition in L2 learning has received very little attention. A number of studies that investigated age effects on grammatical aspects of L2 learning lent support to Lenneberg's (1967) Critical Period (CP) Hypothesis for language acquisition, a maturational account. Lenneberg and others argued that cerebral plasticity and neural capacity, sufficient to acquire a language, remained viable only up to the time of puberty (Johnson & Newport, 1989; Long, 1990). In phonetics and phonology, it was shown that exposure to L2 after puberty results in accented speech production in L2 (Scovel, 1988; Asher & Garcia, 1969; Flege et al., 1997). Findings by Buchwald, Guthrie, Schwafel and Van Lancker (1994) revealed that L2 acquisition by older native Japanese speakers resulted in an inability to perceive /r/ and /l/ contrasts at the cortical level of the brain. For morphosyntax, Patkowski (1980) reported significantly higher ratings on syntactic proficiency and grammaticality judgments in non-native speakers of English who were exposed to English before age 15, with similar results for Chinese and Korean (Johnson & Newport, 1989; DeKeyser, 2000). Interestingly, semantic competence appears to be less affected by later exposure (Weber-Fox & Neville, 1996).

The maturational account was challenged by evidence from numerous findings that demonstrated a gradual decline with age in L2 learning post-puberty, rather than an abrupt cut off age point, as was proposed by the critical period hypothesis (Bialystok, 1997; Marinova-Todd, Marshall, & Snow, 2000, 2001). Other factors, such as presence in the country of the second language, degree of L1 contact, type of teaching, motivation, cognitive abilities, and individual talent also have been shown to impact L2 acquisition post puberty (Birdsong, 1992; Hyltenstam & Abrahamsson, 2003; Ioup, Boustagui, El Tigi, & Moselle, 1994). These considerations bear important implications for teaching FEs in the second language. Is naturalistic exposure at an early age sufficient to establish a functional repertory of formulaic expressions in the L2 speaker? If so, what age? At what point in the maturational process is it advisable to emphasize this mode of language?

Despite the lack of consensus on the optimal age for L2 learning, it is clear that age remains an important variable in the ease with which L2 is acquired. The L2 literature is abundant with research studies that document age effects on L2 acquisition of phonology and syntax. In contrast, there is little consideration or empirical evidence in regard to how age affects formulaic language acquisition in L2 learning. The aim of this study was to investigate and establish age effects in the acquisition of

394

formulaic language in L2 learners. Furthermore, this study set out to examine the extent to which competence in production (use) tracks abilities in knowing (i.e., identifying) the forms of FEs and comprehending their meaning, as this has not been considered and has received very little attention in the existing literature. The goals of this research are to directly address questions related to the age of acquisition of formulaic expressions in L2 learning and to quantify and compare abilities in production, identification, and comprehension.

3. Research Objective

This research study examined the use (production), recognition (i.e., identification or knowledge of form), and comprehension (of meaning) of English and Russian formulaic expressions (FEs) by Russian immigrants, who arrived in the United States at different ages. The investigation focused on the relationship between age of arrival (AoA) and use of FEs in both English and Russian. Additional variables such as the age at which the participants began to learn English, exposure time to L2, and use of L2 in social settings were controlled for by setting specific inclusion criteria. This study was designed to examine two distinct AoA bilingual groups, i.e., early-arriving and later-arriving groups, in order to investigate age effects on formulaic language acquisition in second language learning.

The early-arriving bilingual group immigrated to the US around the age of puberty, whereas the later-arriving bilingual group immigrated in young adulthood. A control group of native speakers of English, matched on age and education, participated in the study as well. Within and between group comparisons for the bilingual participants were made to determine the level of accuracy and proficiency in formulaic language in both English and Russian, compared to a control monolingual English speaking group.

Hypotheses:

1.   It was hypothesized that early- and later-arriving bilingual groups will demonstrate lower performance scores than the native speakers of English on the proportion of English FEs used in conversation, as well as on English structured tasks of formulaic language production. Comprehension and recognition tests were expected to result in comparable performance in English FEs in both early and later arriving groups.

2.   It was hypothesized that the early-arriving bilingual group will demonstrate higher proportions of English FEs in conversation and higher scores on English structured FE production tasks than the later-arriving group. Additionally, it was predicted that the differences between early and late arriving Russian speaking groups for comprehension and recognition tests would not be significant, in contrast to production tests.

3.   It was hypothesized that the later-arriving group would demonstrate higher proportion of Russian FEs in conversation, and more accurate understanding and use of Russian FEs on all Russian structured tasks than the early-arriving bilingual group.

4. Method

4.1 Participants

The participants for this study were Russian bilingual speakers of English who immigrated to the United States (US) from the former Soviet Union (USSR). The native Russian speakers of English were divided into two groups, early-arriving and later-arriving, based on the AoA to the United States. Each bilingual group consisted of 10 participants (total n=20). The later arriving bilingual group's mean AoA to the US was 19.4 years, and the mean chronological age at the time of the study was 40.3 years. The early-arriving bilingual group's mean AoA to the US was 11.1 years, and the mean chronological age at the time of the study was 33.3 years. The length of residence in the US for L2 participants ranged between 18-25 years. A monolingual English control group of 10 subjects (n=10) participated in the study. The control group's mean chronological age at the time of the study was 37.1 years. Chronological age of the control group was matched to the chronological age of the bilingual groups. A total of 30 subjects (n=30) participated in this study (Table 1).

Table 1. Demographic Information: Group Means and Range for Chronological Age (Age), Age of Arrival (AoA), Length of Residence in US, Education Years in US (US Edu), Education Year in Former Soviet Union (USSR Edu), Formal English Instruction in Former USSR (English Learned in USSR), and Formal Russian Instruction in US (Russian Learned in USSR)

Subject Group	N	Age	AoA (yrs)	Residence US (yrs)	US Edu (yrs)	USSR Edu (yrs)	English learned in USSR (yrs)	Russian learned in USSR (yrs)
Later-arriving	10	40.3 (36-43)	19.4 (18-22)	21 (18-23)	5.8 (4-7)	12.4 (10-14)	4.9 (0-8)	N/A
Early-arriving	10	33.3 (28-37)	11.1 (9-13)	22.3 (19-25)	13 (8-19)	4.1 (1.5-6)	0.2 (0-1)	0.65 (0-3)
Control	10	37.1 (27-42)	N/A	N/A	17.8 (14-24)	N/A	N/A	N/A

Inclusion criteria for participant recruitment were based on their chronological age, age of arrival, place of residence, years of living in the United States, length of exposure to the Russian and English languages, and educational background (see Table 1). At the time of testing, all bilingual participants had been residing in New York City since their arrival to the United States. The Russian bilingual participants were first generation speakers of English; each participant had a formal English education in the US, with an Associate or higher degree earned in the US. All were employed in full time positions as educators, attorneys, medical doctors, managers, or accountants; and each bilingual participant had been employed in an English language environment for at least 5 years. The control

participants were from a monolingual English environment for at least one generation and were similarly engaged in professional activities. Age and educational background were matched to the early and later bilingual groups.

Age and US education data for the participant groups are summarized in Table 2. The later-arriving bilingual group presented with higher mean chronological age at the time of the study than the early bilingual group. The control group demonstrated a higher mean of English education years in the US as compared to the two bilingual groups, and early-arriving bilingual group showed higher mean of English education years than the later-arriving bilingual group. All participants, free of psychiatric and neurological diseases by self-report, were recruited from a local community center, consented and tested following IRB procedures.

Table 2. Age and US Education Comparison for the Three Groups

	Early vs. Later arriving bilingual groups	**Controls vs. Early and Later arriving bilingual groups**
Age	t = 5.419, df = 18, p<0.001, two-tailed	N/A
US Edu	t = - 5.954, df = 18, p<0.0001, two-tailed	t = - 3.290, df = 18, p<0.004, two-tailed

4.2 Procedure

Bilingual participants filled out a comprehensive survey, with questions about their educational and language background in the US and in the former USSR (Table 1), as well as their current use of the English and Russian languages in the US (Table 3).

Table 3. Group Mean Comparisons between Later- and Early-arriving Bilingual Groups for the Use of Russian and English at Work, with Family, and with Friends

Subject Group	AoA	Age	% Russian used at work	% English used at work	% Russian used with family	% English used with family	% Russian used with friends	% English used with friends
Later	19.4	40.3	17%	83%	70.4%	29.6%	69.5%	30.5%
Early	11.1	33.3	29.5%	70.5%	59%	41%	48%	52%

Production, recognition, and comprehension of FEs were assessed by the administration of conversational and structured tasks in English for all three groups, and in both English and Russian for bilingual groups (please refer to Appendix I for a detailed description of tasks).

Conversational tasks were designed to elicit and establish spontaneous use of FEs in conversation. The conversational portion of testing consisted of a structured interview and formula completion task in conversation. During conversation, a speech sample was collected, transcribed and analyzed for

proportion of formulaic words in FEs. Formulaic expressions from the speech samples were identified based on the previously established FEs categorization method (Van Lancker & Rallon, 2004) and native speaker intuition (Devitt, 2006). The following six FE categories were used to identify English and Russian FEs in conversation (See Appendix II):

- conversational speech formulas (*how are you/ очень приятно*)

- discourse elements (*well, like, you know/ я знаю, в основном*)

- conventional expressions (*as a matter of fact/ на самом деле,*)

- pause fillers (*ahm, ahh*)

- sentence stems (I think, as you know/ *ну знаешь*)

- idioms/proverbs (see Appendix II).

Structured tasks were designed to elicit and assess production, recognition, and comprehension of speech formulas, idioms, and proverbs. The structured portion of testing consisted of administration of three tests, in both English and Russian:

- The Northridge Evaluation of Formulas, Idioms and Proverbs in Social Situation Test (Hall, 1996), which was administered in two versions: Formula completion during a production task (NEFIPSS –A-) and Formula recognition during a multiple choice task (NEFIPSS-B).

- Formulaic and Novel Language Comprehension (FANL-C) Test (Kempler & Van Lancker, 1996), which probed comprehension of FE meaning.

- Classification Task, which probed knowledge, or storage in long term memory, of the expressions, in a recognition task. For the classification task, participants indicated for each stimulus whether it was a formulaic or a novel expression.

Production of FEs was assessed during conversation and a structured formulaic task, NEFIPSS-A (completion). Conversational samples elicited spontaneous use of FEs in conversation as well as an ability to produce FEs by completing formulaic sentences during conversation. Performance on NEFIPSS-A elicited a verbal ability to complete formulas as well. Recognition of FEs was tested during the formula identification (NEFIPSS-B) and classification tasks. Comprehension of FEs was assessed using the FANL-C test (Kempler & Van Lancker, 1996). The procedures for conversational and structured tasks are summarized in Appendix I. Please note that the conversation tasks identified a broad range of formulaic expressions, while the structured tasks focused on conversational speech formulas, idioms, and proverbs.

4.3 Selection of the Russian Test Items

The Russian test items, collected via websites and books on Russian formulaic expressions, were selected utilizing a survey by 15 native Russian speakers (ages 62-78), who emigrated from the former Soviet Union at the ages 40-60 years. One hundred fifty Russian formulaic expressions (50 speech formulas, 50 proverbs and 50 idioms) were presented in written form to be rated on a scale from 1 to 7 (i.e. least to most familiar) and indicate confidence in their judgment on an additional scale (1-7 rating scale). Based on the results of the survey, items rated as 7 were selected for the present study.

4.4 Data Analysis

A mixed-design analysis of variance (ANOVA) compared mean performance of the two bilingual groups on all tasks, in both Russian and English. The tasks included the use of formulaic words in conversational speech, formula completion in conversational speech, NEFIPSS-A (completion), NEFIPSS-B (multiple choice); FANL-C Formulaic and Novel, and the Classification Task. Subsequent post-hoc tests were performed to analyze the mean differences between and within the groups. Independent and Dependent Sample (repeated measures) t-tests were used for within and between group comparisons in both Russian and English languages, for all tasks. Independent Sample t-tests were also used to analyze mean age and education differences between three groups. Pearson Correlations analysis was used to examine the relationship between AoA and performance on conversational and structured tasks.
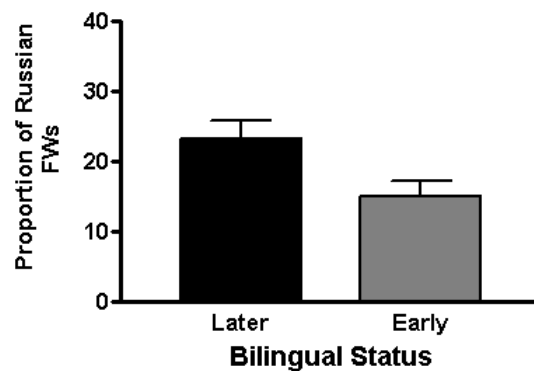
5. Results

Figure 1. Proportions of Russian Formulaic Words in Conversational Speech in the Later and Early Bilingual Groups
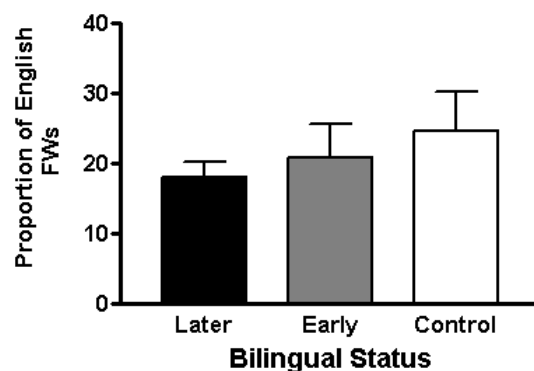

Figure 2. Proportions of English Formulaic Words in Conversational Speech in the Later Arriving, Early Arriving, and Control Groups
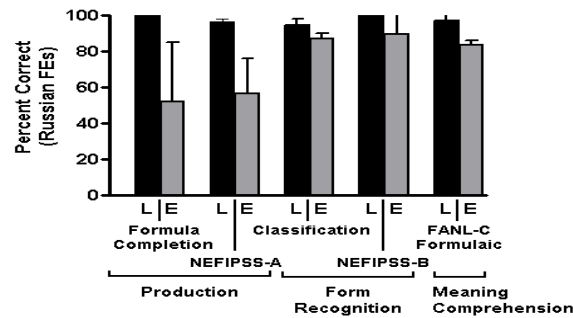
399

Figure 3. Mean Performance on Production and Comprehension of Formulaic Tasks in Russian by the Early and Later Arriving Bilingual Groups
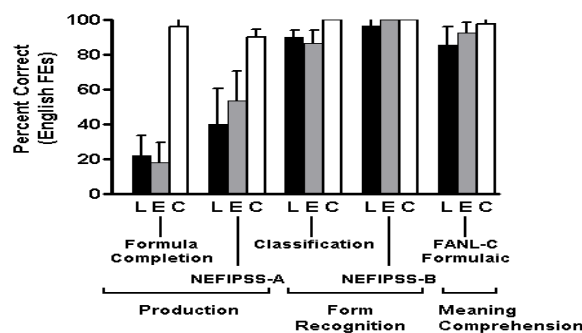

Figure 4. Mean Performance on Production and Comprehension of Formulaic Tasks in English by the Later and Early Arriving Bilingual Groups, and the Control Group

5.1 Formulaic Words in Conversational Speech

A mixed-design analysis of variance (ANOVA) was used to compare mean performance of the two bilingual groups. Dependent variables were proportion of words in formulaic expressions included in the discourse sample. Independent variables were age of arrival (early vs. later) and language (Native: Russian vs. Second language: English). Statistical comparisons of proportions of formulaic words in the linguistic samples showed a significant main effect of age of arrival [F (1;18) = 5.718; $p < 0.028$, *effect size* = .241] regardless of the language factor. Comparisons also showed a significant interaction of language (i.e., Russian and English) and age of arrival [F (1;18) = 45.599; $p < 0.0001$, *effect size* = .717].

Paired dependent t-test analysis demonstrated that the proportion of formulaic words of the early-arriving bilingual group is significantly higher for English than Russian (20.9% vs. 15.1 % respectively; $t = -4.624$, $df = 9$, $p < 0.001$, two-tailed). For the later-arriving bilingual group, proportion of formulaic words is higher in Russian than English (23.2% vs. 18.1% respectively; $t = 5.020$, $df = 9$, $p < 0.001$, two-tailed), as shown in Table 4.

Independent samples t-test analysis showed that in the Russian language, the later arriving group used a significantly greater proportion of formulaic words in conversation than the early arriving group (23.2% vs. 15% ; $t = 7.74$, $df = 18$, $p < 0.0001$, two-tailed), as shown in Figure 1.

400

In the second language, English, the early-arriving group showed a greater proportion of formulaic words than the later-arriving group, but the differences were not statistically significant (20.9% vs. 18.1%), as shown in Figure 2. Proportions for the healthy control speakers (mean = 24.6) were in line with earlier studies (Van Lancker & Rallon, 2004).

Table 4. Use of Formulaic Words (FW) in Conversation by the Early- and Later-arriving Bilingual Groups in Russian (Native Language) and English (Second Language)

	AoA	Mean	Std. Deviation	N
FW RUSSIAN	Later	23.2%	2.573	10
	Early	15.1%	2.079	10
FW ENGLISH	Later	18.1%	2.079	10
	Early	20.9%	4.725	10

5.2 Formula Completion in Conversational Speech

Performance on the formula completion task in conversational speech (i.e., completing formulas introduced in conversational speech) showed a significant main effect of language [F (1, 18) = 80.640; $p < 0.0001$], and age of arrival [F (1; 18) = 23.953; $p < 0.0001$]. It also showed a significant interaction of language (i.e., native Russian and second-language English) and age of arrival [F (1, 18) = 12.45; $p < 0.002$].

Paired dependent t-tests revealed that the mean performance of the early-arriving bilingual group is poor in both native Russian and English (52% vs. 18% respectively; $t = 2.847$, $df = 9$, $p < 0.019$, two-tailed), but it is significantly worse in English. The later-arriving group performed significantly better in Russian than English (100% vs. 22% respectively; $t = 21.726$, $df = 9$, $p < 0.0001$, two-tailed), as shown in Table 5.

Independent samples t-test analysis showed that the early-arriving group performed significantly worse in Russian than the later-arriving group (52% vs. 100%; $t = 4.609$, $df = 18$, $p < 0.0001$, two-tailed), as shown in Figure 3. Both early- and later-arriving bilingual groups performed poorly on the formula completion in conversational speech in English (18% vs. 22% respectively), as shown in Figure 4, the difference between the two scores was not statistically significant.

Table 5. Performance on Formula Completion in Conversational Speech by Early- and Later-arriving Bilingual Groups in the Russian and English Language

	Subject Group	Mean	Std. Deviation	N
Formula Completion RUSSIAN	Later	100%	0	10
	Early	52%	32.93	10
Formula Completion ENGLISH	Later	22%	11.35	10
	Early	18%	11.35	10

401

5.3 NEFIPSS-A (Completion)—Structured Task-Production

Performance on the NEFIPSS-A completion (i.e., which examined use of formulaic expressions in social situations), scored for correct responses in a sentence completion format, showed a significant main effect of language [F (1, 18) = 30.131; $p < 0.0001$; *effect size = .626*], and age of arrival [F (1; 18) = 6.415; $p < 0.021$; *effect size = .263*]. It also showed a significant interaction of language (i.e. native Russian and second-language English) and age of arrival [F (1, 18) = 24.361; $p < 0.0001$, *effect size = .575*].

Paired dependent t-test analysis showed that the later-arriving group performed significantly better in the Russian NEFIPSS-A than the English NEFIPSS-A completion task (96.4% vs. 39.9% respectively; t = 8,430, df = 9, $p < 0.0001$, two-tailed). Interestingly, the mean performance of the early-arriving bilingual group is poor in both native Russian and English (56.8% vs. 53.8% respectively), as shown in Table 6.

Independent samples t-test analysis revealed, as expected, that the early-arriving group performed significantly worse in Russian than the later-arriving group (56.8% vs. 96.4%; t = 6.29, df = 18, $p < 0.0001$, two-tailed), as shown in Figure 3. Both the early- and later-arriving bilingual groups performed poorly on the NEFIPSS-A completion task in English (53.8% vs. 39.9% respectively), as shown in Figure 4; this difference was not statistically significant.

Table 6. Performance on NEFIPSS-A (Completion) by the Early- and Later-arriving Bilingual Groups in Russian and English Language

	Subject Group	**Mean**	**Std. Deviation**	**N**
NEFIPSS-A Russian	Later	96.4%	05.06	10
	Early	56.8%	19.25	10
NEFIPSS-A English	Later	39.9%	20.49	10
	Early	53.8%	16.90	10

5.4 NEFIPSS-B (Multiple Choice)—Structured Task-Recognition

Performance on the NEFIPSS-B multiple choice task (i.e., which examined ability to recognize appropriate forms for formulaic expressions in social situations in the multiple choice format) did not yield a main effect of language (native versus second-language) or age of arrival, but did show a significant interaction between these two factors (F (1; 18) = 6.285; p < .022; effect size = .259). As shown in Table 7 and Figure 4, the mean performance of both early- and later-arriving groups showed high scores in the English language protocol (100% and 96.8%). In the Russian language version, the later-arriving group performed better than the early-arriving group (100% vs. 89.9%), as shown in Table 7 and Figure 3. The early-arriving group performed better in English than in Russian (100% vs. 89%) and the later-arriving group received high scores in both Russian and English languages (100% vs. 96.8%, respectively). None of these differences was significant, possibly due to a ceiling effect.

Table 7. Performance on NEFIPSS-B (Multiple Choice) by the Early- and Later-arriving Bilingual Groups in Russian and English

	Subject Group	Mean	Std. Deviation	N
NEFIPSS-B Russian	Later	100%	0	10
	Early	89.8%	15.64	10
NEFIPSS-B English	Later	96.8%	6.40	10
	Early	100%	0	10

5.5 FANL-C—Structured Task-Meaning Comprehension

Performance on the FANL-C (i.e., which examined meaning comprehension of formulaic expressions using line drawings on four response cards) did not show significant main effect of language or age of arrival, but showed a significant interaction of language and age of arrival [F (1, 18) = 27.080; $p <$ 0.0001; *effect size* = .601]. Performance on the formulaic and novel subtests, two different tasks of the FANL-C, was compared. There was a significant main effect of task, formulaic vs. novel [F (1, 18) = 18.636, $p <$.0001, *effect size* = .501], and significant interaction between language, task, and age of arrival [F (1, 18) = 18,640; $p <$.0001, *effect size* = .509].

Paired dependent t-test analysis revealed that the early-arriving group demonstrated better performance identifying English formulaic expressions than Russian ones (92.5% vs. 83.5%; t = -3.139, df = 9, $p <$ 0.012, two-tailed), and the later-arriving group performed better on Russian formulaic items than English ones (97% vs. 85.5%; t = 5.129, df = 9, $p <$ 0.001, two-tailed) (Table 8).

Table 8. Mean Scores for FANL-C Test in Russian and English, for Later- and Early-arriving Bilingual Groups, for Formulaic and Novel Tasks

	Subject Group	Mean	Std. Deviation	N
FANL-C Formulaic RUSSIAN	Later	97%	4.83	10
	Early	83.5%	8.83	10
FANL-C Novel RUSSIAN	Later	99%	2.10	10
	Early	96%	5.16	10
FANL- C Formulaic ENGLISH	Later	85.5%	10.65	10
	Early	92.5%	5.89	10
FANL-C Novel ENGLISH	Later	97.5%	3.54	10
	Early	96.5%	4.12	10

Independent samples t-tests revealed that on the Russian formulaic portion of the test, the later-arriving group performed significantly better than the early one (97% vs. 83.5%; t = 4.24, df = 18, $p <$ 0.0001, two-tailed), as shown in Figure 3. In the English formulaic portion of the test, the early-arriving group

performed better than the later-arriving group (92.5% vs. 85.5%), as shown in Figure 4, but these differences were not significant. For the novel portion of the test, both the early- and later-arriving groups received high scores in both English and Russian, and the groups did not differ significantly in their performance on the novel portion of the test.

5.6 Classification—Recognition of FE Form

The classification test reflects knowledge, or storage in long term memory, of the correct form of the expression. Performance on the Classification task, whereby participants categorized expressions presented aurally as formulaic or novel, showed a significant main effect of age of arrival, F (1, 18) = 4.395; $p < 0.05$; *effect size = .196*). However, it did not show a significant main effect of language, nor did it show interaction between language and age of arrival.

Paired dependent t-test analysis showed that the later-arriving group performed significantly better in the Russian than English language (94.7% vs. 90%; $t = 2.526$, *df* = 9, $p < 0.032$, two-tailed), whereas the early-arriving group did not show a significant performance difference in Russian vs. English (86.9% vs. 86.7%), as shown in Table 9.

Independent samples t-test analysis revealed that in Russian, the later-arriving group was significantly better in classifying the utterances as novel or formulaic than the early-arriving group (94.7% vs. 86.9%; $t = 2.446$, *df* = 18, $p < .025$, two-tailed), as shown in Figure 3, whereas in English, both later- and early-arriving groups did not statistically differ in their performance (90% vs. 86.7%). Please see Table 9 and Figure 4.

Table 9. Mean Scores for the Classification Task in Russian and English, for the Later- and Early-arriving Bilingual Groups

	Subject Group	Mean	Std. Deviation	N
Classification Formulaic/Novel Russian	Later	94.7%	3.21	10
	Early	86.9%	9.56	10
Classification Formulaic/Novel English	Later	90%	4.25	10
	Early	86.7%	7.27	10

5.7 Comparison between Native Speakers of English and Bilingual Groups

Please refer to Figure 4, which compares performance between the three groups on all tasks except the task on formulaic words in conversation (presented in Figure 2). Mean performance of native speakers of English on all tasks was analyzed and compared to the mean performance of the early- and later-arriving bilingual groups, in English. Independent Samples t-tests were used to analyze the differences. Comparisons between the native speakers of English (i.e., control group) and the early-arriving group revealed higher performance by the control group on the tasks described below. The control group showed significantly higher proportions of formulaic words used in conversation

than the early-arriving (24.6% vs. 20.9%; $t = -2.15$, $df = 18$, $p < 0.05$); the control group showed higher mean performance than the early-arriving group on the NEFIPSS-A completion task (90.2% vs. 53.8%; $t = -5.834$, $df = 18$, $p < .0001$), the formulaic subtest of the FANL-C (97.5% vs. 92.5%; $t = -2.44$, $df = 18$, $p < 0.03$), and on the Classification task (95% vs. 86.7%; $t = -3.129$, $df = 18$, $p < 0.006$). For other tasks, the NEFIPSS-B (the multiple choice format, recognition task) and the novel subtest of the FANL-C, performance differences were not significant.

Similarly, as expected, comparisons between the control group and the later later-arriving group showed higher performance by the control group on the tasks described below. The monolingual control group showed significantly higher proportions of formulaic words used in conversation than the later-arriving group (24.6% vs. 18.1%; $t = -6.01$, $df = 18$, $p < 0.0001$); similarly, the control group showed higher mean performance than the later-arriving group on the NEFIPSS-A sentence completion test (90.2% vs. 39.9%; $t = -6.951$, $df = 18$, $p < .0001$), the FANL-C formulaic task (97.5% vs. 85.5%; $t = -3.456$, $df = 18$, $p < .003$) and the Classification task (95% vs. 90%; $t = -2.683$, $df = 18$, $p < .015$). For other tasks such as NEFIPSS-B and FANL-C novel task, performance differences were not significant.

6. Discussion

The aim of this study was to examine the effects of age of arrival (AoA) on the acquisition of formulaic language in English as a second language, and to evaluate the state of knowledge and use of Russian formulaic language for two bilingual groups. The tasks probe competency in the use (production) of FEs, recognition of the correct FE form, and comprehension of the FE meaning. Comparison between the three groups in English showed that both early- and later-arriving bilingual Russian-English speaking groups performed significantly worse than the monolingual English-speaking control group on the proportion of English FEs in conversation, formula completion in conversational speech, and English structured formulaic tasks probing production competence, which partially supported our first hypothesis (see Figure 4). The groups did not differ in FE recognition or meaning comprehension tasks (i.e., NEFIPSS-B-multiple choice, classification, and formulaic subtest of the FANL-C).

The second hypothesis, that the early-arriving bilingual participants would outperform the later-arriving bilingual group on both proportion of English FEs in conversational speech and English structured formulaic tasks probing production, was not supported. On the English formulaic production tasks (formula completion in conversational speech and NEFIPSS-A- completion), the early-arriving group performed as poorly as the later-arriving group, in contrast to the significantly higher performance of both bilingual groups on the comprehension and recognition tasks. This was all the more surprising given reports in the literature that L2 speakers have been observed to utilize more FEs than their native speaker counterparts (Ellis, 1983; De Cock, 1998, 2004), presumably to achieve greater fluency. It is likely that in many cases, L2 speakers use a greater quantity but fewer unique FEs than comparable native speakers (De Cock, 2004).

Results on the performance between the early- and later-arriving bilingual groups in the Russian

language supported our third hypothesis, that later-arriving bilingual speakers would perform better than the early-arriving bilingual speakers on the Russian language tasks. Later-arriving participants performed significantly higher than the early-arriving participants on the proportion of Russian FEs used in conversation, formula completion for conversational speech formulas, and on structured Russian formulaic tasks (NEFIPSS A & B, FANL-C, and classification). Performance of the early-arriving bilingual group on the Russian production tasks differed from performance on the Russian comprehension tasks. The early-arriving group scored significantly lower on the Russian formulaic tasks probing production (i.e., proportion of Russian FEs used in conversational speech, formula completion in conversation, and NEFIPSS-A completion) than on the Russian recognition tasks (NEFIPSS-B multiple choice, classification) and comprehension (FANL-C formulaic subtest), as shown in Figure 3. This pattern of higher performance on the Russian comprehension and recognition tasks vs. Russian production tasks for the early-arriving group was observed for this bilingual group in the English language as well (i.e., better scores on the English comprehension/recognition formulaic tasks than on the English production tasks for the early-arriving bilingual group), as shown in Figure 4. Comparison between the Russian and English languages for the early- and later-arriving groups supported hypotheses four and five, respectively, comparing Russian with English performance in the two groups. In within-group comparisons, as might be expected, the early-arriving bilingual group performed significantly better in English than in Russian, and the later-arriving bilingual group performed significantly better in Russian than in English. The early-arriving bilingual group, compared to their performance on the Russian tasks, demonstrated higher proportions of English FEs (than Russian FEs) in conversational speech, higher performance on English formula completion in conversational speech, and higher scores on English structured formulaic tasks, whereas the later-arriving group scored significantly higher on the proportion of Russian FEs (than English FEs) in conversational speech, on Russian formula completion in conversation, and on the Russian structured formulaic tasks. The later-arriving group performed significantly better on the recognition and classification tests in both languages, suggesting that they had acquired a higher level of knowledge of formulaic expressions in both languages.

The results are ambiguous with respect to the age effects and English formulaic language acquisition. In the between-group contrasts, the participants in the early-arriving group, who were of the ages at or before puberty when arriving in the US, did not perform significantly better on L2 production measures of American English FEs than the participants in the later-arriving group, who were at the age of majority. Processes for acquiring FEs in the second language are poorly understood, but are likely to follow trajectories different from those supporting grammatical competence (Van Lancker Sidtis, 2009; Van Lancker Sidtis, & Sidtis, 2018; Wray, 2018). Given the importance of FE competence in communication, whether in the first or second language, it is essential to further pursue these questions in order to develop coherent models of language learning.

Explanations for these results arise from two domains, social and brain maturational. The social factors, relating to exposure to the two languages respectively, were carefully controlled in this study. However, further details about relative exposure to the second language might profitably be pursued. Developmental schedules of cerebral maturation may account for limited or impoverished acquisition of the formulaic language after a certain age, with exposure being a crucial factor (Lin, 2018). Grammatical and formulaic language may be acquired according to two disparate processing modes, as proposed in the dual process model of language (Erman & Warren, 2000; Locke, 1993; Van Lancker-Sidtis, 2004; 2015). According to the dual process hypothesis, novel, grammatical language is subserved by the left hemisphere, while formulaic expressions rely on a right hemisphere-subcortical system (Van Lancker-Sidtis, 2004; 2015). These processes may be accommodated by different brain maturational schedules (Kempler, Van Lancker, Marchman, & Bates, 1999; Thatcher, Walker, & Giudice, 1987), accounting in part for a discrepancy in early consolidation of grammatical knowledge contrasting with later acquisition of formulaic language. Much earlier broad-based exposure may be required for native competence in FEs. This, too, remains to be explored.

There are strong implications for L2 teaching arising from this research. Idioms, for example, are challenging to teach (Irujo, 1986; Cooper, 1998; McPherron & Randolph, 2014;). The utterances must be stored in long term memory and take unforgiving stereotypical shapes and unconventional canonical meanings (Conklin & Schmitt, 2012; Gholami & Gholami, 2018; Carrol & Conklin, 2017). FE meanings are often nonliteral and use is tightly tied to social context and embedded in the native culture (Kuiper & Tan Gek Lin, 1989); register errors may occur (Wray, 2012). The studies reported here suggest that L2 learners would do well to begin working with formulaic sequences as early as possible (Maisa & Karunakaran, 2013).

The deficiencies in FE production in the two samples tested in the current study were striking when impressionistically compared to their grammatical competence. While formal language testing probing phonology, grammar, and lexical semantics was not performed on the participants in this study, all had college or post graduate education, worked in a professional capacity in English-speaking management or supervisory positions, and were highly functional in American English. For both groups, the total time in the USA was comparable (mean = 21 & 22 years). The results from this study on quantifying abilities in FEs reveal that production competence had not attained native levels in either the early arriving or the later arriving group. However, both groups performed as well as the monolingual native speakers in the comprehension and recognition tasks. It follows from these results that extensive training in use of formulaic expressions, cultivating awareness of FEs (Girard & Sionis, 2003; Boers, Eyckmans, Kappel, Stengers, & Demecheleer, 2006) and focusing on the production modality, should begin early in the course of L2 learning, as early as grammar school. It is likely that for many adult second language speakers, the form of the FE utterance is stored in mental representation, although not with the salience or confidence necessary to recruit into discourse.

A qualitatively observed anecdote is related to these findings. Figure 5 represents an FE example that we have shown to numerous audiences, who are mixed in language background. The cartoon uses a trope that is standard in New Yorker cartoons: a formulaic-derived caption ("why, this is fit for me" from "this is fit for king") with a literally-intended drawing (a king opening a gift). The literal-idiomatic contrast itself serves to provide the humorous element (Figure 5); an examination of a year of New Yorker publications yielded a proportion of nearly one-half of the cartoons relying on this rhetorical device. On displaying this cartoon during a presentation or lecture, a show of hands in the audience reveals who has not comprehended the humor: these are invariably the second language speakers. When the meaning is explained, many of these second language speakers endorse post hoc recognition of the FE. From these and like observations, as well as the results reported in this study, it is likely that many FE forms are weakly acquired by the adult second language speaker, and that this repertory could be productively utilized in the classroom with a goal of moving the competence more confidently into the production mode.

"Why, this is fit for me!"

Figure 5. New Yorker Cartoon with a Graphic Representation of the Literal Interpretation of an Idiom *This is Fit for a King* (Copyright Permission)

Given their social nature, repetition of FEs in varying social contexts and use in conversational interaction in the classroom are valued features of teaching L2 learners (Wood, 2002). Implementation of the lexical approach of teaching L2 would naturally include collocations of all kinds (Nattinger & DeCarrico, 1992; Lewis, 1997). Methods, reviewed or empirically validated, have described successful teaching of FEs, enabling greater naturalness and fluency (Myles, Hooper, & Mitchell, 1998; Lightbown, 2000; Gatbonton & Segalowitz, 2005; Ellis, Simpson-Vlach, & Maynard, 2008; Meunier, 2012; Gutowska, 2017). Increasing competence in FE production in L2 speakers may lead to greater ability to process FEs in a native-like manner, as unitary utterances (Krashen & Scarcella, 1978). The findings from the current study, that recognition and knowledge for formulaic expressions in L2 is relatively in place in the second language speaker, as also reported by Alali and Schmitt (2012), gives

408

impetus to the prospects of developing greater skills in production. Knowledge of the expressions provides a foundation. Emphasis on the appropriate use, in spoken form, of conversational speech formulas, idioms, and other conventional expressions should form a part of the L2 curriculum throughout the course of learning.

Acknowledgements

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Appendix

Appendix I. Procedures, Stimuli, and Measures for Conversational and Structured Tasks

Conversational Tasks:

1. Conversational Speech Sample: A list of Russian and English guiding open-ended questions (i.e., about family, travel.) was used to elicit a speech sample. Russian questions were equivalent in content and length of utterances to the English questions. Russian and English responses were audio-recorded and transcribed by a native speaker of Russian and a native speaker of English accordingly. Formulaic expressions were identified based on the categorization system generated by the investigator, faculty advisor, and other research assistants. Operational definitions for categories of formulaic expressions are presented in Table 5 (or Appendix??). All identified categorizations were collapsed for the purposes of this study.

2. Formula Completion in Conversational Speech: 5 formulaic expressions in Russian and English were presented in spoken form during conversation. The participants were asked to "remember old sayings" (i.e. idioms and proverbs) and complete each sentence (e.g., examiner says: "people who live in glass houses… ". and expected response is "*shouldn't throw stones"*).

Structured Tasks:

3. The Northridge Evaluation of Formulas, Idioms and Proverbs in Social Situations (NEFIPSS): A compatible Russian version was created for both NEFIPSS-A and NEFIPSS-B. Social situational Russian statements and Russian formulaic expressions were generated for this test. The Russian test items were matched to the English test items in a number of words and syntactic form.

3a. NEFIPSS-A (Completion). 18 formulaic expressions (6 speech formulas, 6 idioms, and 6 proverbs) in each language (Russian and English) were presented in social situations, in the spoken and written form. Participants were asked to provide an appropriate verbal or written response by completing a formulaic phrase. E.g., *Mary is waiting impatiently for Bob. When he arrives, Mary would probably say…….what took* _____ _____? This test probes production skill for FEs.

3b. NEFIPSS-B (Multiple Choice). Participants were presented with the same 18 social situations and formulaic expressions as in NEFIPSS-A, in a spoken and written form, in each language. Participants were asked to select the formulaic phrase that best represents the social situation in a multiple choice,

via verbal or written response. E.g., *Mary is waiting impatiently for Bob. When he arrives, Mary would probably say…a). how is it you're late?; b). what took you this much time?; c). I don't understand your tardiness; c). what took you so long?* This test probes comprehension of the meaning of FEs.

4. Formulaic and Novel Language Comprehension Test (FANL-C): 20 formulaic and 20 novel (literal) expressions were presented in a randomized order auditorily and in a written form, in English and Russian. Participants were asked to select a picture (out of the choice of 4 pictures) that best represents the meaning of the expression, by pointing. The Russian formulaic and novel expressions were matched in length and syntactic complexity to the English expressions. 80 pictures were newly generated for the Russian formulaic expressions. Formulaic and Novel sections of FANL-C were scored separately. This test probes knowledge of the meaning of FEs without using verbal responses.

5. Classification Task: The participants listened to a randomized set of 40 pre-recorded novel and formulaic expressions on a computer screen, in both English and Russian. Participants were asked to identify whether expressions were formulaic (idiomatic) or novel (literal) by pressing separate buttons when they heard formulaic and novel expressions. This test probes knowledge of FEs.

Measures: Percent accuracy was calculated for all tasks except Conversational Speech Sample, based on the number of correct responses, in both languages. For Conversational Speech Sample, the proportion of words in the formulaic expressions was used as a measure of formulaic language use in conversational speech for each participant, in each language. It was obtained by dividing the total number of words in the formulaic expressions by the total number of words in the speech sample. Bilingual participants were tested in two sessions, one session for all English tasks, and another session for all Russian tasks.

Appendix II. Operational Definitions for Categories of the Formulaic Expressions

Operational definitions for 6 categories of the formulaic expressions:

1.　Speech formulas: Single- or multi-word expressions occurring in naturalistic conversational contexts and discourse, that are usually non-literal in nature with signature connotations or nuances, are routinized/overlearned, rely on procedural memory for production, stored holistically at least at one level (stored as a cohesive unit, unitary form), tend to reoccur depending on individual preference, and serve various functions in supporting conversation (maintaining conversational flow/form, supporting social bond between speakers, supporting semantic/theme/topic). Example: How are you?; What's new?

2.　Discourse elements: Single- or multi-word expressions (intensifiers, hedges, adverbs) that are typically used to support flow of discourse and do not add to the content of the sentence, allow processing time for speaker and listener, maintain turn or defer turn to another speaker. Similar in function to pause-fillers, but are lexical (actual known words). Example: or something; well; like.

3.　Conventional expressions/collocations: Multi-word expressions consisting of fixed sequences

of words that occur commonly together in naturalistic conversational contexts that are often more literal in nature, are routinized and produced procedurally, and typically support the structure and flow of discourse or support theme/meaning. Example: In the mean time; As far as I know; at this point in time; that being said (lexical bundles fall into this category; Biber, 2009).

4. Idioms & Proverbs: Multi-word expressions occurring in naturalistic and contrived conversational contexts and discourse, that may be literal or non-literal in nature, learned early in childhood (may be through single-exposure), and typically serve a function of supporting theme or meaning in conversation. Example (idiom): It's raining cats and dogs. Example (proverb): Actions speak louder than words.

5. Non-lexical pause fillers: Non-lexical/non-word language units produced to fill pauses during naturalistic conversational contexts for the purpose of maintaining conversational turn or providing additional processing time for lexical retrieval. Example: ah; ahm.

6. Utterance initials/stems: Single- or multi-word expressions repetitively used to initiate an utterance, phrase, or sentence during naturalistic conversational contexts and discourse; often produced procedurally/automatically to support the form/flow/structure of spoken discourse. Example: I think, I would like, I know.