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Simin Karimi und Pollet Samvelian

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Bilingual Speech of Highly Proficient Persian-French Speakers

Farzaneh Deravi, Jean-Yves Dommergues

Abstract

The linguistic analysis of the bilingual speech of thirty early, balanced and highly proficient Persian-French bilinguals reveals an important frequency and a rich variety of code-switches. The collected data did not suggest a correlation between the competence of these bilinguals and their code-switching rate. Based on the option best adapted to the context, they used complex morphological integrations as well as insertion of entire sentences from their second language. Though our participants' code-switching did not comply with the theoretical frameworks proposed in recent years, our investigation highlights the dominance of certain grammatical categories (nouns, verbs and adjectives) observed by other contact linguists.

1. Research objectives

Why do bilinguals switch between their languages and what are the mechanisms underlying these switches? What are the impacts of bilingualism on lexical selection and activation in speech production?

These questions are at the heart of the investigations conducted during the last thirty years in order to better understand bilingualism. It is generally agreed that the best method to study bilingualism is to adopt a multidisciplinary approach (ROMAINE 1995 and GROSJEAN 1998), combining progress made during the last years in linguistics, sociolinguistics, psycholinguistics and neurolinguistics.

Our research aims at a better understanding of bilingual speech, and more specifically, of the speech of highly proficient Persian-French bilinguals. In a previous study (DERAVI 2007), we adopted an approach anchored in two disciplines focusing on the comprehension of bilingual speech and production: contact linguistics and psycholinguistics. This article focuses on the linguistic analysis of the bilingual speech from a syntactic perspective in order to determine the grammatical patterns of our participants' code-switches. We also wanted to investigate the validity of the predictions of theoretical models elaborated during the last thirty years to describe the mechanisms underlying code-switching.

The next section provides a set of definitions before explaining the approach adopted for data gathering and data analysis that respects conceptual and methodological constraints underlying bilingual research. The general patterns of code-switches will be described based on the examples produced by our participants before presenting our conclusions.

2. Definitions

Among the various definitions proposed by researchers in the field, we have selected those suggested by GROSJEAN (1998, 2008, and 2010) and LI WEI (2000):

Bilinguals are people who use two (or more) languages (dialects) in their daily life. They acquire and use their languages for different purposes, in different domains in life, with different people. They rarely have the same linguistic competences in their languages. Their level of proficiency largely depends on their needs regarding a language and its degree of usage. Some bilinguals can be in the process of acquiring a language or a competence in a language while others have reached a certain level of stability. Bilinguals' language register can change: when their environment and the demands regarding a specific language change, their degree of proficiency also changes. When bilinguals interact with monolinguals they adapt their language accordingly.

Language mode is the state of activation of the bilingual's language and language processing mechanisms at a given point in time. When speaking to monolinguals in one of their languages, bilinguals are in a monolingual language mode. When they are communicating with bilinguals who share their two languages or when listening to a conversation between other bilinguals in which the two languages are used, they are in a bilingual language mode. They can also be in an intermediary mode on the continuum.

Code-switching is a communication strategy consisting of an alternate usage of the languages referring to the two phenomena: code-mixing and code alternating. It can be made of a single word, a phrase or a sentence. It integrates borrowing except for those words or expressions that appear in monolingual dictionaries or those which are frequently used by non-specialized monolingual media. Borrowing is a word, or a short expression, taken from a less activated language; it is adapted morphosyntactically and sometimes phonologically to the base language. Base language is the language which provides the morphosyntactic structure of an utterance in which code-switching and code-mixing occur.

3. Conceptual and methodological constraints

Among the various conceptual and methodological constraints put forward by other researchers in the field (GROSJEAN 1998 and LI WEI 2000), two can impact the collection and analysis of code-switching data: the choice of the participants and the language mode.

We tried to satisfy the constraints related to the choice of the participants by selecting a fairly homogenous sample of thirty Persian-French bilinguals (9 men and 21 women) in order to avoid differences in linguistic profiles criticized in previous studies undertaken within bilingual communities. Our participants were chosen among former students of French-Iranian bilingual schools. Table A reflects part of their characteristics. The participants are designated by a letter (F for women, H for men) followed by a number.

Table A: Biographic characteristics of our 30 Persian-French bilingual participants

Participant	Age @ experiment	Age @ start of bilingual speech	Age @ start bi-lingual school in Iran	Age @ start school in France or @ end of bilingual school in Iran	Bilingual practice in years	Length of bilingual education in years
H9	41	3	3	16	38	13
F21	45	7	6	18	38	12
F20	36	3	3	12	33	9
F19	44	5.5	5.5	18	38.5	12.5
F18	45	3	6	17	42	11
H8	45	8	6	17	37	11
F17	53	7	7	22	46	15
H7	42	6	6	18	36	12
F16	49	4	6	21	45	15
F15	43	6	6	18	37	12
H6	51	3	5	18	48	13
F14	43	5	7	15	38	8
F13	43	6	6	18	37	12
F12	51	6	6	19	45	13
H5	52	6	6	15	46	9
F11	42	1	6	18	41	12
F10	44	6	6	18	38	12
F9	44	0	3.5	17	44	13.5
F8	44	7	7	18	37	11
F7	40	5	6	17	35	11
F6	40	5	6	18	35	12
H4	39	3	9	16	36	7
H3	44	6	6	17	38	11
F5	42	5	6	17	37	11
F4	44	3	6	17	41	11
F3	39	4	4	18	35	14
H2	38	5	5	17	33	12
F2	48	0	4	17	48	13
F1	39	5	6	16	34	10
H1	39	5	7	15	34	8
Mean	44	5	6	17	39	11
Standard Deviation	4	2	1	2	5	2
Range	36 to 53	0 to 8	3 to 7	12 to 22	33 to 48	7 to 15

Their bilingual education started in their childhood (around the age of five) and on average they had benefited from eleven years of parallel bilingual education, in a context where neither of their languages was considered superior or inferior to the other one. Their bilingual education (11 years, on average) in combination with the length of their bilingual practice (39 years, on average) reinforced their stability in these languages. Some of the

participants were simultaneous bilinguals (according to SEBASTIAN-GALLES et al. 2005); their parents were mixed couples (in most cases Iranian father, French mother) and had been exposed to both languages since birth.

Our participants were asked to complete a linguistic questionnaire based on the model suggested by GROSJEAN (2000). The responses to the questionnaire also highlighted their degree of proficiency in four linguistic competences (oral production, oral comprehension, reading and writing). Rated from 1 (very poor) to 7 (excellent), the participants' self assessments for French were, on average, 6.3 for oral production, 6.7 for oral comprehension, 6.2 for writing and 6.7 for reading. In Persian, the average results were 5.9 for oral production, 6.6 for oral comprehension, 5.3 for writing and 6.1 for reading. As 29 of the 30 participants also practiced English on a regular basis, we also asked for a self assessment of linguistic competences in this language. The average results were 4.2 for oral production, 5.2 for oral comprehension, 4.3 for writing and 5.2 for reading. We consider our participants as early, balanced and highly proficient bilinguals given the early start of their bilingualism, the length of their bilingual practice and their level in the four linguistic competences.

A summary was elaborated for each participant, tracing his/her linguistic history and providing further details related to the use of various languages; in addition to their first three languages (Persian, French, English) some of them practice other languages, such as Greek, Italian, Spanish or Russian. Two examples are provided in Appendix A and B.

As for the constraint relative to language mode, we adopted a bilingual mode during data collection, which was facilitated by the fact that the experimenter belonged to the same bilingual community as the participants and that she knew the majority of them personally. The participants were informed that their conversations were recorded. Some researchers (BENTAHILA / DAVIES 1983) believe that this knowledge can encourage the participants to limit their code-switching. However, the impacts of this knowledge can be counterbalanced by the experimenter belonging to the same bilingual community (as highlighted by GROSJEAN 2008 and LI WEI 2000). The friendly links that related the experimenter directly (friends and former school companions) or indirectly to the participants (those participants whom the experimenter did not know before the interviews were presented to her by bilingual friends) contributed to relax the context of the recordings.

4. Data gathering and data analysis

The thirty interviews took place between November 2004 and May 2006 and represent a corpus of more than twenty-three hours of recording. Each bilingual was recorded at least during twenty-five minutes and several interviews took more than one hour. The interviews took place in Persian but the bilinguals could change languages if they wished and according to the topics discussed. Thus, the corpus includes mainly Persian utterances but also French and English ones and sometimes utterances from other languages spoken by these bilinguals.

We started each interview by asking the Persian-French bilinguals to talk about their professional activities. Afterwards, other topics of daily life were discussed in a relaxed atmosphere. A small number of participants had worked in Iran for a few years at the end of their academic studies, but the use of Persian in a professional environment remained extremely limited for this sample of bilinguals. Therefore, we expected that this distance from Persian would force them to code-switch. In their conversations with other bilinguals, some of them tended to switch more than others, and this pattern was reproduced during our interviews. Those who knew the experimenter before the interview also used English during their code-switching, since English was one of their shared languages.

As mentioned before, all participants filled in a linguistic questionnaire. For some of them, we also recorded part of the questions and answers exchanged about this questionnaire. This provided them with additional occasions for code-switching, as the questionnaire was established in French, and they asked questions about its content in Persian or in French.

Given the size of our corpus (more than 23 hours of recordings) and the objectives of our research, we only analysed part of the exchanges conducted in Persian (as the base language). The extract studied represented more than ten hours of bilingual speech. Sometimes, several sentences were introduced in French or in English in the middle of the conversations. We took them into account in the analysis of the corpus. When the length of the French extracts exceeded one minute, we considered them as monolingual speech in this language and did not include them in our studies. We focused on the bilingual speech of our participants; the detailed breakdown of code-switches did not take into account the experimenter's own code-switches during the interviews.

For the detailed breakdown of code-switches, we distinguish several categories. The examples are derived from the analysed corpus:

- common nouns / compound nouns: *commissaire au compte, cousin, débat contradictoire, passion*;
- proper nouns: S*uffren, Sciences Po, Gaudi, Saint Louis;*
- noun phrases: *nivellement par le haut, pilotage de projets;*
- pronouns: *je;*
- adjectives: *résidentielle, cosmopolite, scientifique, lourd;*
- adverbs/prepositions/adverbial or prepositional phrases: *pendant sept ans, en liaison avec la télévision, du jour au lendemain, intellectuellement, petit à petit, bon, vraiment;*
- connective adverbs: *donc, mais;*
- conjunctions: *parce que, et ;*
- verbal constructions: verbal phrases (*est condamné, supportait, j'ai*), constructions with the verb /kardan/ "to do" (*regretté /mikonam/, proposé /koni/*), constructions with the verb /ʃodan/ "to become" (*réfléchi /miʃe/; adapté /miʃodan/*);
- interjections: *ah non, ah, bravo ;*
- sentences: *Tu ne peux pas savoir, Je me suis adaptée assez vite, Il pouvait s'exprimer.*

The objective of this classification was to show the dominance of some grammatical categories (nouns, adjectives) compared to others. This classification also facilitated the comparison of the code-switches of the Persian-French bilinguals with those obtained by other researchers for other language pairs.

According to the definition of code-switching used here, the detailed breakdown excludes borrowings which appear in Persian monolingual dictionaries and those words and expressions that are frequently used by non specialized monolingual media. Therefore, the following French words were excluded from the breakdown of code-switches: *idée, sujet, secret, écran, tennis, rendez-vous, discipline, génétique, maximum, minimum*. Similarly, English words not counted as code-switching include *email, internet, business*, *site*.

5. Corpus analysis

In the examples to follow, Persian elements are in italics, French ones in plain style and English words underlined.

5.1. General patterns: French code-switches

The examples provided below illustrate a rich variety of code-switches in Persian-French speech. When Persian-French bilinguals alternate between two clauses, they can start their utterances in one language and finish them in another.

(1) *Al'an ke xod-am bozorg ʃod-am* je m'intéresse à toutes ces histoires de familles.
Al'an *ke* *xod-am* *bozorg* *ʃod-am* ....
now that self-PRON.SUFF1SG big become:PAST-1SG ....
"Now that I have grown up myself, I am interested in all these family histories."

Within the same clause, bilinguals can change language at different places, and sometimes they borrow parenthetic expressions from a language in the middle of a clause.

(2) *Fekr mikon-am tʃand nafar hast-im* disons *dah nafar hast-im*.
Fekr *mikon-am* *tʃand* *nafar* *hast-im*
thought do:PRES-1SG some person exist:PRES-1PL
disons *dah* *nafar* *hast-im*
say:PRES.1PL ten person exist:PRES-1PL
"I think we are many, let's say, we are ten."

The examples also show code-switching between and inside phrases.

(3) *Masalan in* linguiste *bud*.
Masalan *in* linguiste *bud*
for example this linguist be:PAST-3SG
"For example this one was a linguist."

These bilinguals switch codes within verbal phrases, between verbs and their objects as well as between verbs and their auxiliaries.

(4) Fiche de paie *dar-e.*
Fiche de paie *dar-e*
pay slip have:PRES-3SG
"He has a pay slip."

(5) Congé maternit-*am-o* prolongé *kard-am.*
Congé maternit *-am-o* prolongé *kard-am*
maternity leave -PRON.SUFF1SG-FOC extended do:PAST-1SG
"I extended my maternity leave."

Within noun phrases, they alternate between determinants and nouns as well as between nouns and adjectives.

(6) *Je ʃahr-e* médiévale-*e.*
Je *ʃahr-e* médiévale-*e*
one city-EZAFE medieval-be:PRES-3SG
"It is a medieval city."

5.2. General patterns: English code-switches

English is the third language for a majority of the bilinguals who constituted our sample. Some of them used it during the interview as they knew that they shared this language with the experimenter. Here are two examples:

(7) *Tu-je* life insurance-*im.*
Tu-je life insurance *-im.*
in-EZAFE life insurance -be:PRES-2PL
"We are in life insurance (business)."

(8) Deadline-e *vahʃatnɑk gozaʃt-am.*
Deadline-*e* *vahʃatnɑk* *gozaʃt-am.*
deadline-EZAFE horrible put:PAST-1SG
"I put a horrible deadline."

Our corpus did not reflect the whole range of English code-switching patterns but illustrated the fact that they can occur within a clause, between and within phrases. The general trend was similar to the results obtained by MAHOOTIAN (1993) in her research on Persian-English bilingual utterances.

5.3. Detailed breakdown of code-switches to French and English (base language: Persian)

We elaborated a detailed breakdown of code-switches to determine which grammatical categories are more frequently used by our thirty participants. For each participant, we calculated the length of the extract analysed, the average speech rate computed over his/her utterances and the number of code-switches counted in each of the grammatical categories listed in Section 4.

The normal speech rate is estimated between 100 and 200 words per minute (CHRISTOFFELS / DE GROOT 2005). Speakers have different speech rates and the individual delivery

changes according to the context. The average speech rate for our thirty participants was 170 words per minute, with a standard deviation of 39 words per minute. For each participant, we calculated the average speech rate and the length of his/her analysed extract. To approximate the total number of words per extract and per participant, the length of the recording was multiplied by the participants' average speech rate. Then, we assumed that half of the words had not been pronounced by the participants themselves as they were taking part in an interview with another speaker; therefore, the total number of words produced by each participant was divided by two. This was a lower limit, as we had already excluded from the corpus the utterances where the experimenter's speech turn exceeded two minutes, and the remaining corpus mainly included our participants' utterances. By comparing the total number of code-switches (from which the number of sentences was deducted) to the total number of words produced by each participant, we obtained the percentage of code-switches for each participant.

Table B presents the total breakdown of code-switches to French and English for the different grammatical categories, in utterances where Persian is the base language, for all the participants. The total length of the extract studied (ten hours and twenty-three minutes) and the total number of the words of the analysed corpus (approximately 105,000 words) result from the calculations described above. This total number was divided by two, in order to represent only words produced by the thirty participants (52,500 words).

Table B: Total breakdown of French and English code-switches of 30 Persian-French bilinguals (Base language: Persian)

	French	English
Common nouns / Compound nouns	985	92
Proper nouns	238	53
Pronouns	2	–
Adjectives	148	7
Noun phrases	7	–
Adverbs/ prepositions/ adverbial or prepositional phrases	116	4
Connective adverbs	16	–
Conjunctions	2	–
Verbal constructions		
Verbal phrases	4	2
Constructions with /kardan/ "to do"	66	17
Constructions with /ʃodan/ "to become"	13	–
Interjections	14	1
Sentences	199	5
Total number of code-switches (30 participants)	1810	181
Average percentage of code-switches (excluding sentences)	3.1%	0.33%
Analysed corpus: total number of words ≈ 105000, length 10 hours 23 min.		

The average percentage of code-switches for the thirty participants is 3.1% in French and 0.33% in English. As mentioned earlier, there were important variations between these Persian-French bilinguals. Some of the participants alternated more and others not at all. Thirteen participants did not code-switch to English. The majority of the bilinguals did not

comment on their code-switching. Only a few of them said in the beginning or at the end of interviews that they had refrained from code-switching because they considered it as a sign of laziness or a lack of sufficient proficiency in their languages. Table C and D are based on Table B and indicate the percentage of code-switches in French and English, respectively, for each category.

Table C: Total breakdown of French code-switches of 30 Persian-French bilinguals (Base language: Persian) and percentage per category

	French	Percentage
Common nouns / Compound nouns	985	54.4
Proper nouns	238	13.1
Pronouns	2	0.1
Adjectives	148	8.2
Noun phrases	7	0.4
Adverbs/ prepositions/ adverbial or prepositional phrases	116	6.4
Connective adverbs	16	0.9
Conjunctions	2	0.1
Verbal constructions		
Verbal phrases	4	0.2
Constructions with /kardan/ "to do"	66	3.6
Constructions with /ʃodan/ "to become"	13	0.7
Interjections	14	0.8
Sentences	199	11.0
Total number of code-switches (30 participants)	1810	100

Table D: Total breakdown of English code-switches of 30 Persian-French bilinguals (Base language: Persian) and percentage per category

	English	Percentage
Common nouns / Compound nouns	92	50.8
Proper nouns	53	29.3
Pronouns	–	0
Adjectives	7	3.9
Noun phrases	–	0
Adverbs/ prepositions/ adverbial or prepositional phrases	4	2.2
Connective adverbs	–	0
Conjunctions	–	0
Verbal constructions		
Verbal phrases	2	1.1
Constructions with /kardan/ "to do"	17	9.4
Constructions with /ʃodan/ "to become"	–	0
Interjections	1	0.6
Sentences	5	2.8
Total number of code-switches (30 participants)	181	100

The majority (54%) of French code-switches of the Persian-French bilinguals concerned "common nouns / compound nouns" category, followed by "proper nouns" (13%). The dominance of this category has been also observed by other authors: bilinguals seem to favour this category in their code-switching (PFAFF 1979; GROSJEAN 1982; MYERS-SCOTTON 2002). The second major category was represented by sentences (11%). In her analysis of Spanish-English utterances, POPLACK (1980) also obtained an important number of code-switches in this category. Adjectives occupied the third position (8%) and were followed by adverbial and prepositional phrases (6.4%) and then by verbal constructions with the verb /kardan/ "to do" (3.6%).

For code-switches to English, the main category was nouns and compound nouns (51%) followed by proper nouns (29%), verbal constructions with the verb /kardan/ "to do" (9%), adjectives (4%) and sentences (3%). Overall, the percentage of code-switches related to the different grammatical categories was similar for French and English code-switches.

6. Results

We compared our participants' code-switching patterns to those observed by other researchers. Many of them have underlined that code-switching is constrained by syntactic and morphosyntactic patterns which may or may not be of a universal kind (AUER 1998). However, the dominance of certain grammatical categories which represent the majority of code-switches holds for all the utterances analysed by different linguists: nouns, verbs and adjectives.

The utterances of our corpus were not compatible with the equivalence principle of POPLACK (1980) and the word/grammar integrity corollary proposed by BELAZI et al. (1994), since our participants applied Persian morphology to French words and adapted a word distribution according to Persian word order (different from the French word order). We found an important number of counter-examples which contradicted JOSHI's (1982) model: our participants switched language at the level of determinants, quantifiers, possessives and auxiliary verbs and their utterances did not follow the direction suggested by the asymmetry constraint described by this researcher. Contrary to the predictions of DI SCIULLO et al. (1986), code-switches between verbs and their objects were produced by our participants. We also found counter-examples to MYERS-SCOTTON's (2002) proposal, since our participants used content and system morphemes from the same language.[1]

In the majority of French code-switches (54%), Persian-French bilinguals used a French noun while adapting it to the grammatical rules of Persian. Many instances of usage of possessive affixes, plural and definitiveness marking as well as compound verbs followed that pattern. Verbal constructions (with /kardan/ and /ʃodan/) represented 4.5% of the code-switching data. Within this category, the utterances with the verb /kardan/ counted for more than 80% and those with the verb /ʃodan/ approximately 16% of verbal constructions. This type of verbal constructions is also frequently used in Persian monolingual speech.

[1] Detailed counter-examples are listed in DERAVI (2007).

Globally, the dominance of nouns and verbal constructions was similar to the findings of other linguists in this domain (PFAFF 1979; GROSJEAN 1982 and MYERS-SCOTTON 2002). PFAFF's (1979) results for Spanish-English bilingual utterances showed 84% for isolated lexical items, 10% for phrases (10%) and 6% for complete sentences. Among isolated lexical items, there were 74% nouns, 6% verbs and 4% adjectives. POPLACK (1980), also working on Spanish/English bilingualism, excluded borrowed words from her definition of code-switching, found an important number of sentences (20.3%), tag-insertions (22.5%), alternation among phrases (18.7%), nouns (9.5%), clauses (8.4%), interjections (6.3%) and other code-switches including quotations, phrases, conjunctions and idiomatic expressions (14.3%).

Our participants also switched languages at the level of adjectives (8%) and adverbs/ prepositions (6%). They started a sentence in Persian and finished it in French or the reverse. Within the detailed breakdown of code-switches, French sentences constituted 11% of code-switching. POPLACK (1980) accounted for the dominance of sentences in her sample by the weak proficiency of her bilingual speakers, who seemed to prefer this form to morphological integration. Conversely, our Persian-French bilinguals, who benefited from a long bilingual practice, used complex morphological integrations as well as insertion of entire sentences from their second language, based on the option best adapted to the context of their speech. Their code-switches occured at various levels, within clauses and phrases. When they alternated languages between two clauses, they started their utterances in one language and finished them in another. Within a clause, they alternated at different places. Within verbal phrases, these bilinguals switched codes between verbs and their objects, as well as between verbs and their auxiliaries. Within noun phrases, they alternated between determinants and nouns as well as between nouns and adjectives.

7. General discussion

Our investigation of the mechanisms underlying code-switching highlighted an important frequency and a rich variety of code-switches by early, balanced and highly proficient Persian-French bilinguals. Given their biographic characteristics and despite a lesser practice of Persian (compared to their use of French or English), they were very much at ease with their bilingualism and felt integrated in both cultures, although a majority of them did not practice Persian every day. Some of them regretted their code-switching and expressed concerns about not being able to excel in their languages as they did in the times of their biligual schooling. However, the lesser practice of Persian did not prevent the majority of them to speak with a perfect intonation and great ease in this language, independently from the topic of discussion (professional or otherwise). Furthermore, we did not find difference related to age or sex, to the number of years they had been away from Iran, to their academic studies (scientific or literary) nor to their professions (engineer, architect, medical doctor, economist, teacher). We did not find any correlation between the competence of these bilinguals (in the oral production of a language) and their percentage of code-switching.

The linguistic analysis of our participants' speech confirmed the general patterns observed by other researchers, for a new pair of languages (Persian and French) and a fairly

homogeneous sample of early, balanced and highly proficient bilinguals. As emphasized by MYERS-SCOTTON (2005) and GROSJEAN (1982, 2008), bilingual speakers generally do not engage in code-switching because they have difficulties with expressing their intentions well enough in one language. They switch largely to say something that seems better said in the other language.

Similar to the results obtained by other researchers, nouns represent the dominant category in our participants' code-switching. As underlined by MYERS-SCOTTON (2002), their insertion within the morphosyntactic frame of another language is less complex than that of verbs, prepositions and predicate adjectives.[2] Function words like prepositions and conjunctions are used less in code-switching.

The detailed breakdown of code-switches showed an important frequency of code-switches for these proficient bilinguals in the presence of other bilingual speakers. To investigate the impact of bilingualism on their speech production mechanism, we conducted three psycholinguistic experiments with these bilinguals. We used a word/picture interference paradigm, in order to determine the processes underlying their lexical access (activation and selection). Our results support the predictions of a cascade activation model and a language non-specific model of lexical access (DERAVI 2009), which is also compatible with the practice of code-switching. Speech planning in one of their language remained open to the representations of their other language, during initial and later stages of speech production.

Of course, more multidisciplinary studies are needed to improve our understanding of bilingual speech. MYERS-SCOTTON (2006) has insisted on the need for psycholinguistic experiments repeating natural code-switching in order to reflect the flexibility of bilingual speech processing. It would be interesting to determine whether there is a speech production cost (in terms of processing time), linked to the presence of code-switching, at the level of isolated words, longer phrases and even sentences. As Persian and French follow different word orders, it would be judicious to investigate the impact of this difference on the processing costs with a sample of early, balanced and highly proficient Persian-French bilinguals.

Attitudes towards bilingualism are changing as our knowledge of bilingual speakers improves. We remain convinced that the progress accomplished in this field will not only specify the outline of this multidisciplinary and complex subject, but will also clarify the relationship between language and cognition.

[2] The important role played by nouns, adjectives and verbs in code-switching has also been highlighted by GROSJEAN (1982), who points out that content words (lexical morphemes) carry the major part of semantic and pragmatic information, and this explains their insertion in bilingual speech.

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Appendix A: Participant H1's linguistic history

H1 is thirty-nine years old. His parents are Iranian. He grew up in Iran and attended bilingual school from the age of five. This bilingual education lasted ten years, with two years of interruption during which H1 lived in France and attended a French school. In his bilingual school in Iran, all subjects were taught in French, except for Persian literature and grammar, religious studies, history and geography, which were taught in Persian. H1 came to France after the closure of bilingual schools in Iran in 1980 to finish high school and start his undergraduate and postgraduate studies in a scientific field. He is now working as a consultant. H1 is married to another Persian-French bilingual and speaks both languages with his children.

H1 mainly uses French in his professional life. He also practices English and Persian depending on his assignments and while travelling abroad. In addition, H1 practices Italian. He underlines that during all his years as a university student and a French resident, he has always spoken Persian at home. French and Persian are the languages that he uses within his family and friendly circles. With his French friends and colleagues, H1 practices French exclusively. With his childhood friends who are bilingual like him, he uses the bilingual speech with more or less code-switching depending on his interlocutors.

H1 mostly uses French to read books and write texts, letters and cards and he reverts to Persian for these activities only on few occasions per year. The same pattern applies to TV programs. However, H1 indicates that he tries to listen to the radio in Persian on a weekly basis and reads newspapers in this language a few times per month. As for English, H1 never reads books in this language nor listens to the radio, but he can read newspapers, and he writes texts in English on a few occasions per year. He watches TV programs in English on a weekly basis.

H1 believes that his dominant language is French but he also grants high grades to his linguistic competences in Persian and English. He thinks that his oral linguistic competences in Persian are above his writing skills. As for Italian, H1 attributes higher grades to his oral production and comprehension (4 over 7) while he considers his writing (1 over 7) and his reading (2 over 7) weaker.

Appendix B: Participant F17's linguistic history

F17 is fifty-three years old. Like in H1's case, her parents are Iranian and she grew up in Iran. She attended bilingual school from the age of seven until she finished high school. Four out of the eight hours of classes per day were taught in French and four in Persian. During the last high school years before obtaining her baccalaureate, only history, geography and French literature were taught in French and the other subjects were taught in Persian. F17 completed her undergraduate studies at an Iranian university during 4 years before coming to France to continue her postgraduate studies. She then settled in France, except for a period of six years when she lived in Switzerland. F17 is now working as an economist. Married to a French, she speaks both languages (Persian and French) with her children.

The languages she uses professionally are French and English. F17 uses Persian, French and English within her family and friendly circles and while travelling. With her French-speaking colleagues and friends, she practices French exclusively. With her childhood friends and those members of her family who are bilingual like her, she uses bilingual speech (Persian-French) with more or less code-switching depending on her interlocutors. F17 also practices bilingual speech (French-English) with her international friends. She learned Arabic between the age of thirteen and sixteen but recognizes not practicing this language anymore. F17 has started Spanish at the age of twenty-two and keeps practicing it, especially when she travels to Spanish-speaking countries.

F17 uses mainly French and English to read books and when she watches TV programs. She reverts to Persian for these activities on a few occasions per year. She never listens to the radio in Persian but several times per month, she reads newspapers and magazines in this language. On a weekly basis, F17 uses Persian to write texts, letters and cards.

F17 believes she has the same competences in her first two languages, followed by English. She grants lower grades to her linguistic competences in Spanish (2 over 7), as she has fewer opportunities to practice it.

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