

Languages in dreams: A diary study

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Summary. Language is a vital part of our waking life, and according to the continuity hypothesis, language should also play an important role in dreams. Overall, 78 participants completed an online questionnaire regarding languages and dreaming. Of those, 70 completed a two-week dream diary eliciting language use in waking life and dreaming. The results indicated that with an increasing exposure to a language during the day, the respective language occurred more often in subsequent dreams. In addition, our results also indicate that the native language occurs relatively more often in dreams compared to the amount of native language use in waking life. Our findings are in line with the continuity hypothesis: language is indeed an important ingredient of dreams. An interesting topic for future research would be studying language choice in dreams, i.e. whether choosing a language based on features such as setting, conversation partner, situation, and identity in dreams is similar to choosing the appropriate language in waking life.

Keywords: Language, foreign languages, native language, dreaming, continuity hypothesis

1. Introduction

Language is a vital part of our waking life, through which we communicate and interact with and within our environment (Keating & Egbert, 2005). If language plays such an important role in our waking-life, and based on the continuity hypothesis of dreaming (Schredl, 2003), the same should apply to our dream world. According to this continuity hypothesis, aspects of our waking lives are represented and incorporated into our dreams (Hall & Nordby, 1972). In this context, dreams are defined as recollections of subjective experiences that occur during sleep (Schredl, 2018).

Several empirical studies (Bautista et al., 1992; Foulkes et al., 1993; Gabryś-Barker, 2015; de Koninck et al., 1988; Sicard & de Bot, 2013) investigated the incorporation of languages into dreams.

In a sleep lab study, Foulkes et al. (1993) showed that in the majority of dreams, language was represented in some form. In 71.4% of the dreams, dream characters are speaking to each other, while thinking, as another language-related activity, occurs less often (36.9%) (Foulkes et al., 1993). Participants were German and English native speakers with high proficiency in the respective other language. In half of the nights, the experimenters conducted the presleep and nocturnal interviews in English and in the other half of the nights in German. As expected, they found that German occurred significantly more in dreams on the German-interview nights, while for English-interview nights, the results were mixed (Foulkes et al., 1993).

There seems to be a positive correlation between language proficiency and language occurrences in dreams, i.e.

the more proficient dreamers are in a language, the more often the language appears in dreams (Sicard & de Bot, 2013; Gabryś-Barker, 2015; de Koninck et al., 1988). For example, de Koninck et al. (1988) investigated intensive language learning and found that the improvement in language learning, the number of language occurrences in dreams, and the number of verbal interactions in dreams positively correlate. In the study of Gabryś-Barker (2015), participants even reported higher proficiency levels in their dreams than in their waking lives.

In addition, the language environment also seems to play a role: Sicard & de Bot (2013) found that the majority of the participants reported dreaming more in the second language when they are abroad or in second language environments compared to when they are in their home countries. The longer immigrants live in a country the more often they dream in the country's language (Bautista et al., 1992).

It is also possible to dream in languages which are unknown in waking life, either existing languages that the dreamer does not speak in waking life (Sicard & de Bot, 2013) or languages that the dreamer cannot identify (Gabryś-Barker, 2015).

Overall, the empirical data shows that waking language use is reflected in dreams. So far, it has not been investigated how language use in persons speaking different languages in a natural setting affects their dream language use.

The aim of the following study is to examine how languages occur in dreams of people who speak and are exposed to multiple languages in a natural setting in their homes using the method of dream diaries. According to the continuity hypothesis (Schredl, 2003), the more people are exposed to a language during the day the more often they dream in that language. In addition, we hypothesized that native speakers dream more often in their native language even though the native language exposure during the day is less frequent, because native speakers were exposed to their native language throughout their lives. In this study, we also explored how language occurs in dreams, e.g., speaking, listening, thinking, etc.

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2. Method

2.1. Participants

Overall, 78 participants (69.2% female, 26.9% male, 2.6% divers, 1.3% prefer not to answer) filled out the online questionnaire with a mean age of 24.65 ± 7.05 years (range: 18 to 65 years). The questionnaire sample consisted of 83.3% students, 12.8% employed, 2.6% retired, 1.3% other. Participants' native language was mostly German (82.1%) followed by Language 3 (20.5%) and English (5.1%). The following languages were defined as native Language 3: Arabic, Cantonese, Czech, Italian, Polish, Russian, Spanish, Turkish.

The dream diary sample included 70 participants (68.6% female, 27.1% male, 2.9% divers, 1.4% prefer not to answer). Included were participants who filled out the online questionnaire, the dream diary, and reported at least one dream during the data collection period. On average, participants reported 5.53 ± 2.57 dreams (range: 1 to 12 dream reports). The mean age of the dream diary sample was 24.51 ± 7.3 years, the distribution of occupation was: 82.9% students, 12.9% employed, 2.9% retired, 1.4% other, and the distribution of native languages was: 82.9% German, 17.3% Language 3, 5.7% English. The same languages as in the questionnaire sample were defined as native Language 3.

Of the total sample, 72 indicated English as a foreign language with the following proficiency levels: none ($N = 2$), basic ($N = 0$), intermediate ($N = 6$), fluent ($N = 59$), native level ($N = 5$). Less than half of the participants ($N = 27$) indicated foreign language skills in an additional language, Language 3. The following languages were defined as Language 3, whereby for two participants, two languages were defined as Language 3: Arabic, Cantonese, Catalan, Czech, Dutch/Polish, French, Italian, Italian/French, Japanese, Korean, Persian, Polish, Portuguese, Russian, Spanish, Swedish, Tigrinya, Turkish. The participants rated their proficiency in Language 3 as basic ($N = 16$), intermediate ($N = 8$), and fluent ($N = 3$). For one participant with two languages for Language 3, the proficiency of one of the languages was reported as basic and of the other as intermediate. German was indicated as a foreign language by 14 participants with proficiency levels ranging from none ($N = 4$), basic ($N = 2$), intermediate ($N = 3$), fluent ($N = 2$) to native level ($N = 3$).

2.2. Materials

2.2.1 Questionnaire

In the questionnaire, basic demographic information of the participants was collected such as age, gender, occupation, native language, other language skills besides the native language, and their proficiency. Then, participants were asked about their daily language exposure. Language exposure refers to using, speaking, hearing, writing, reading and/or learning a language. In the questionnaire, the participants had to estimate the percentage, 0 to 100%, of the languages they reported being exposed to in their daily lives. The total of the percentages assigned to the languages had to sum up to 100%. In addition to the given language options German, English, Spanish, Italian, and Turkish participants had three text fields for additional individual language choices. A similar question was designed for the language exposure in dreams. In addition to the language options for the lan-

guage exposure during the day, there were also the options 'a language I do not speak/understand' and/or 'a made-up language or words'. A made-up language or words would be a fantasy language or words that were made up by the dreamer that have a meaning in the dream but not in waking life.

To receive information on participants' dream recall, nightmares, attitude towards dreams, and the effects dreams have on participants' waking lives, several questions of the English version of the Mannheim Dream Questionnaire (MADRE) (Schredl et al., 2014) were used in the questionnaire. Additionally, other questions were asked such as in which country the participant was born in, the country they are currently living in, about any stays abroad and their duration. The full questionnaire is included in the Supplement.

2.2.2 Dream Diary

The dream diary was designed to collect data about participants' sleep duration, dream recall, and dream reports for a period of 14 consecutive days. When participants were able to recall the dream content of the previous night, they were asked to report their dreams. The instruction was: "Please write down your dream of that night as completely as possible. You can write as much and as detailed as you like. Of course, you can leave out any details that you would not like to share." It was up to the participants in which language they wanted to write their dream report, in either German, English, or Turkish.

Afterwards, two four-point scales measured the emotional intensity of positive and negative dream emotions (from 'none' to 'strong'). Then, participants were asked to select the main language of their dream from eight language options ('German', 'English', 'Spanish', 'Italian', 'Turkish', 'A language I do not speak/understand', 'A made-up language or words', 'None'), and a free text input field for other languages. The next question concerned the form in which the dream language appeared in the dream. Participants had the following seven options: speaking, listening, thinking, reading, writing, language as the content, no concrete words, and one free text input field to define possible other forms in which the main dream language appeared in the dream. The same applied to any additional languages occurring in the reported dream. When more than one dream language was reported, participants were asked to estimate the language exposure of each language that appeared in the dream.

The same was asked for the language exposure during the preceding day. Participants were asked to select the languages they were exposed to during the day and estimate their percentages. Additionally, they were asked about the last languages they were exposed to before falling asleep (yes/no for English, German, etc.).

2.3. Procedure

Most of the participants were recruited via the mailing list of the Cognitive Science and Psychology study program at the University of Osnabrück. The data collection period took approximately 1.5 months during which participants first filled out the questionnaire and then the dream diary for 14 consecutive days. Both materials could be accessed via two separate links that were either sent via e-mail or text message.

As a form of compensation and motivation, Cognitive Science students could receive four, and Psychology stu-

Table 1. Mean Language Exposure During the Day and in Dreams (Questionnaire).

Language	Day	N	Dream	N	Statistical test ¹	
German	61.61% ± 21.73	72	73.30% ± 31.61	70	z = 3.8	p < .0001
English	33.31% ± 20.61	74	19.13% ± 24.64	72	z = -5.2	p < .0001
Language 3	13.98% ± 15.71	44	18.23% ± 28.22	43	z = 0.4	p = .707

Note. ¹Wilcoxon Signed Rank Test

dents three experimental subject hours for participating in the study. All participants were informed about the aim and purpose of the study and gave their consent by agreeing to participate in the study. Other than the requirement of being 18 years or older, there were no further inclusion criteria to participate in the study.

The study consisted of two parts: a questionnaire and a dream diary. Both were implemented with the online survey tool SoSci Survey (Version 3.3.10) which participants could access via a link. The language of questions and instructions was English. All relevant questionnaires are presented in the Supplement. After filling out the questionnaire, participants were asked to send their pseudonym code via email to the author so that they could receive daily reminders to fill out the dream diary questionnaire. Additionally, one to two reminders were sent throughout the day whenever a dream diary entry was missing.

From the questionnaire, the following questions were analyzed: native language, other language skills, language proficiency, language exposure during the day, language exposure in dreams.

For a total of 400 nights, participants stated that they recalled at least one dream. Overall, 388 dream reports were collected. There were 390 entries for the day and the dream questions as some participants answered these questions without providing a dream report. For the selection "none" as the dream language (N = 15), no further dream questions were asked in the dream diary. Subtracting all missing values, 390 entries of the day and 375 entries of the dream questions were included in the analysis. If participants indicated 'none' as their main dream language, only day questions and no further questions concerning the language exposure in their dreams were asked. Since 15 dream recalls were with no dream language, the number of entries of the day and the dream questions is unequal.

To investigate the language exposure during the day and in dreams, the languages that participants reported to be exposed to the most, were selected. In addition to German and English, a third language was defined for each participant, if applicable, and labelled as "Language 3". Language 3 was determined through the highest language exposure reported by the respective participant in the questionnaire.

2.4. Statistical Analysis

For the statistical analyses IBM SPSS Statistics, Version 26.06 for MAC was used. Data are presented as mean ± standard deviation (SD). In order, to test for possible differences in the language exposure during the day and in dreams (questionnaire data) Wilcoxon signed rank tests for paired samples were performed as the data were not normally distributed. Spearman's rank-order correlations were used to test for correlations between language exposure during the day and in dreams of the questionnaire data, whereas for the dream diary (repeated measures as most participants provided more than one dream), linear mixed model analyses were performed to test the effect of language exposure during the day and before sleep on the language exposure in dreams.

3. Results

Table 1 shows the mean language exposure participants estimated to be exposed to during the day and in their dreams. For German, the mean language exposure during the day is lower than in dreams, whereas for English participants reported the opposite. No significant difference was found for Language 3. For all three languages, English ($r = .576$, $p < .0001$), German ($r = .508$, $p < .0001$), and Language 3 ($r = .788$, $p < .0001$), strong positive correlations between the language exposure during the day and in dreams were found. Increased language exposure during the day was associated with increased language exposure in dreams.

In the sample of the questionnaire there were not sufficient English native speakers (N = 4) to test the difference between native and non-native language exposure. Therefore, the effect of the native language was only examined for German and Language 3 (see Table 2). The reported percent of language exposure is significantly higher in dreams than during the day for native speakers, whereas, for non-native speakers, the language exposure is significantly lower in dreams than during the day.

For the diary data, Table 3 shows the results of the mean language exposure of German, English, and Language 3 calculated per dream. Prior to nights with dreams, German was one of the last languages on 226 nights (61.1%),

Table 2. Mean Language Exposure of Native and Non-Native Speakers During the Day and in Dreams (Questionnaire).

Language	Day	N	Dream	N	Statistical test ¹		
German	Native	65.82% ± 18.35	62	82.35% ± 21.65	62	z = 4.9	p < .0001
	Non-native	35.50% ± 23.74	10	19.00% ± 27.67	10	z = -2.7	p = .007
Language 3	Native	27.19% ± 19.49	16	44.19% ± 32.08	16	z = 2.5	p = .012
	Non-native	6.43% ± 4.43	28	2.85% ± 5.71	27	z = -3.1	p = .002

Note. ¹Wilcoxon Signed Rank Test

Table 3. Mean Language Exposure During the Day and in Dreams per Dream (Diary).

Language	Day	N	Dream	N
German	71.39% ± 27.64	370	77.14% ± 38.80	356
English	25.62% ± 26.56	379	18.96% ± 35.99	364
Language 3	9.83% ± 20.86	216	9.31% ± 27.03	208

English occurred as the last language before sleeping on 159 nights (42.0%), while Language 3 was only in 8% (N = 31) the last language before sleeping.

For German, the language exposure during the day significantly affected German language exposure in dreams (F = 141.9, p < .0001); the language exposure before sleep did not significantly affect the language exposure in dreams (F = 0.9, p = .34) – both variables were entered simultaneously. When participants reported being exposed to English during the day, it significantly affected their dream language (F = 143.3, p < .0001). In comparison to German, when English was the last language participants reported being exposed to before sleeping, it additionally affected that English was the dream language on that same night (F = 19.6, p < .0001). For Language 3, the language exposure during the day significantly affected the language exposure in dreams (F = 237.6, p < .0001). Being exposed to Language 3 before sleeping had a marginally significant effect that Language 3 appeared as a dream language (F = 3.6, p = .059).

The German native speakers reported higher exposure to German in dreams compared to their exposure to German during the day, whereas, for non-native speakers, being exposed to German during the day was similar to the exposure to German in dreams (Table 4).

The Language 3 non-native speakers reported lower exposure to Language 3 in dreams compared to their exposure to Language 3 during the day, whereas, for native Language 3 speakers, being exposed to Language 3 during the day was similar to the exposure to Language 3 in the dream (Table 5).

Based on the questions related to the dream, the majority of the dreams (N = 299) of a total of 390 entries regarding questions about the dream included one dream language, whereas 57 dreams included two dream languages. A few dreams (N = 19) included more than two languages. No dream language at all occurred in 15 dreams. Of 454 language occurrences in dreams, the language that majorly occurred in the dreams of participants was German (N = 296), followed by English (N = 111). For Language 3, there were 33 occurrences in dreams, a made-up language or words (N = 5) as well as an unknown language (“A language I do not speak/understand.”) (N = 5), barely occurred in the reported dreams.

A dream example with “None” as a dream language, i.e., dreams with no language:

“My hair falls out every time I run my fingers through it.”

In one dream report with “A language I do not speak/understand.” as a dream language, the dreamer reports having difficulties finding the right words for certain things in the respective language that was being spoken in the surroundings. The dream report was translated from German to English by the author:

“While shopping I tried to explain something ‘shoes that are not sports shoes’, I could not think of the word ‘sporty’ in the other language spoken around me. I was looking for a backpack that you can pack so that many things fit in it. I was constantly searching for the right words!”

Figure 1 shows that the main and other dream languages differed significantly in the form they appeared in the dreams. Participants thought four times more in the main dream language than in the other dream languages. Whereas, in the categories reading, writing and content other dream languages clearly outweigh the main dream language.

In the category “Other”, participants elaborated how the dream languages appeared besides the options given. Three participants stated that other dream languages appeared in the form of music in the background of their dreams. One participant mentioned code-switching, i.e., words of one language appeared in between sentences of another language.

Additional Dream Examples

The following dream example shows the different language-related activities in dreams. The dreamer is a native German speaker who has a native-like proficiency level in Danish.

“I was on the way to a hotel in Denmark and had to pass the boarder and there were a lot of policemen checking the documents of the people who wanted to enter Denmark. I said to my boyfriend (in German), who was travelling with me that I’ll manage everything, because I can speak Danish. One of the officers asked me for some forms and told me to have my passport ready and I started to argue about the form because I didn’t know that I would need it and did not have it. The conversation was in Danish. So, he sent me to an office box where I filled the form on a computer. I don’t recall exactly what I wrote, but I remember becoming aware of that I was dreaming and that I was astonished that as I looked at the text it was actually Danish and also making sense. Because normally when I try to read in my dreams it is either not working or the text is a random bunch of letters [...]”

The following example is a dream report of a native German speaker with Portuguese as the main dream language, the proficiency level of Portuguese in waking life is basic.

Table 4. Mean German Exposure of Native versus Non-native Speakers During the Day and in Dreams (Diary).

German	Day	N	Dream	N	Statistical test ¹	
Native	75.64% ± 23.70	337	82.29% ± 34.79	324	F = 8.3	p = .004
Non-native	27.97% ± 27.86	33	25.00% ± 29.27	32	F = 0.1	p = .726

Note. ¹Linear Mixed Model Analysis

Table 5. Mean Language 3 Exposure of Native versus Non-native Speakers During the Day and in Dreams (Diary).

Language 3	Day	N	Dream	N	Statistical test ¹	
Native	33.21% ± 34.32	48	38.13% ± 45.91	47	F = 0.4	p = .555
Non-native	3.15% ± 5.08	168	0.90% ± 4.93	161	F = 16.6	p < .0001

Note. ¹Linear Mixed Model Analysis

“I dreamed about visiting my boyfriend’s family in South America. I was making attempts to speak in their language and sounded quite good to myself. I can’t recall the contents of the conversation. I just remember answering in short and simple terms. In the end I felt I never was part in the conversation but just speaking to myself.”

Another dreamer (German native speaker, fluent English proficiency) reported study-related activities:

“[...] I was constantly looking at my laptop because I had to study. I was also very stressed because I felt like I needed to leave soon and hurry. But it turned out I only had to leave in two days. I got an email with the feedback for one of my papers. [...]”

The following dream example illustrates the language choice in dreams which can differ from language choice in waking life. The dreamer’s home and native language is Russian, the self-reported English proficiency is fluent.

“There was a dream-episode with my father giving me some piece of advice (for some reason - in English, even though he is a Russian-speaking person). I was talking to friends of mine. Usually, we are communicating in English when we are together because M. is German, German-speaking, and B. is Kazakh, Kazakh- and Russian-speaking. We were casually chatting, but mainly in Russian.”

4. Discussion

The results of this study revealed that with increasing exposure to a language during the day, the respective language occurred more often in the dreams of the subsequent nights. For German native speakers, the percentage of German occurring during the day was less compared to the percentage of German occurring in dreams. For Language 3 (languages other than German and English), on the other hand, there was no significant difference between daytime and nighttime percentage of Language 3. Regarding how languages occurred in dreams, the results of this study support previous findings (Hartmann, 2000; Schredl & Hoffmann, 2003), such that reading and writing are rare dream activities compared to speaking, listening, and thinking. In the language that was reported to be predominant in the dream, the participants were thinking markedly more compared to thinking in other minor dream languages (60.7% vs. 15.6%), whereas the ratio was more balanced for speaking and listening.

Before discussing the results in detail, some methodological limitations of this study should be mentioned. For the purpose of the study, a convenience sampling (friends, family members, and fellow students) was appropriate to investigate how waking languages affect dream languages as participants of this study were linguistically diverse. It was not expected that the sampling strategy biased the results.

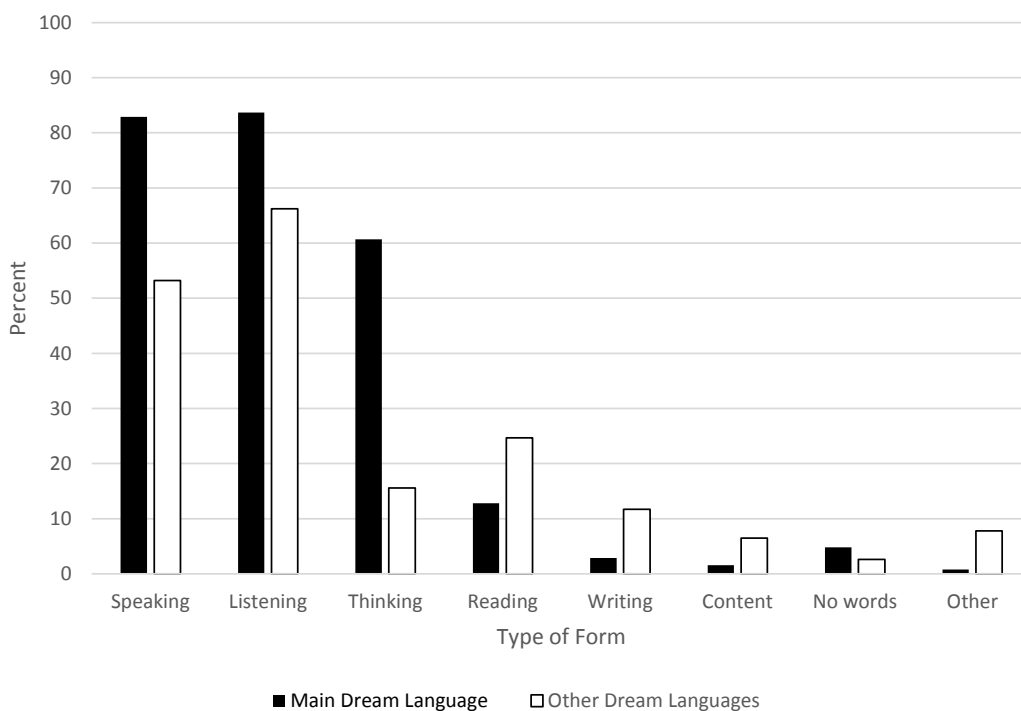


Figure 1. Form of Main and Other Dream Languages.

Using English as the language of instruction did not pose a problem because all participants were sufficient in English, even though some dream reports were provided in German or Turkish.

For this study, a retrospective measure (questionnaire) and a prospective measure (dream diary) were used. Both measures yielded positive correlations between the amount of language exposure during the day and in dreams. Therefore, there was presumably no retrospective respective prospective bias.

Language is not only important in our waking life (Keating & Egbert, 2005), but as this study demonstrated, language also directly influences our dreams. The more we are exposed to a language in our waking life, the more the language occurs in our dreams. This is in line with previous study results (Bautista et al., 1992; Foulkes et al., 1993; Gabryś-Barker, 2015; de Koninck et al., 1988; Sicard & de Bot, 2013), supporting the continuity hypothesis (Schredl, 2003).

Considering the native language in dreams and during the day, our results indicate that the amount of the native language occurring in dreams is higher compared to the amount of native language used in waking life. This might be explained by the fact that the dreamers have usually been exposed to their native language(s) during their entire lives and these experiences might show up in current dreams. While for German, the effect was significant, the effect for Language 3 was only marginally significant. The amount of Language 3 as a native language in dreams only occurred slightly more than during the day. One reason for this might be that the language environment of the study participants was mostly German. Living in a German-speaking environment implicates that the participants are often exposed to German, also outside this empirical study and therefore, as native Language 3 speakers are exposed to German, the effect of the native language on dream content is reduced. The finding of Sicard & de Bot (2013), that waking-life language environment influences the dream occurrences of this language, supports this argument.

In dreams with more than one language, participants were asked to distinguish between their main dream language and other dream language(s). Overall, speaking and listening are the most frequent language-related dream activities, supporting the results of Foulkes et al. (1993), who found that in 71.4% of the dreams, dream characters are speaking to each other. Dreamers think more often in their main dream language compared to other dream language(s).

Other language-related dream activities such as reading and writing occur more often in other dream languages compared to the main dream language. A possible explanation might be that the majority of the participants were University students studying, reading, and writing in English, their non-native language (only four participants were native English speakers).

To summarize, the findings of this study support the theory that language is important to humans, not only in waking life but also in dreams. Language choice is an important factor in waking life, i.e. choosing a language based on features such as setting, conversation partner, situation, and identity (Woolard, 2005). Therefore, it would be interesting to investigate language choice in dreams. Another interesting aspect would be whether emotions associated with language use in dreams might reflect proficiency levels in waking life, e.g. worries about language performance might be associated

with negative emotions related to the use of this language in dreams. Additionally, creative language use in dreams should be investigated further such that participants of this and previous studies have reported to dream in languages they do not know in waking life (Sicard & de Bot, 2013), languages that cannot be identified by the dreamer (Gabryś-Barker, 2015), or languages that do not even exist, i.e. fantasy languages in dreams. Studying this aspect would be interesting to understand the creativity of dreams.

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