Naive Language Shifts Across Sleep-wake States in Bilingual Sleeptalkers

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Study Objectives: To assess language used during episodes of sleeptalking in bilingual children.

Design: The investigation was accomplished through the parents who, after having received appropriate information, participated by filling out a survey on sleeptalking.

Settings: The study was performed in three bilingual schools of the Basque country, a region in northern Spain in which two completely different official languages are spoken.

Patients: A total of 1000 parents agreed to participate, and 681 children were studied.

Measurements and Results: Sleeptalking was reported by 383 (56.3%) of children (mean age 9 years; range: 3-17). Most individuals used their dominant (ie, native) language during sleep. However, a minority (<4%) were found to use their non-dominant language persistently during episodes of sleeptalking.

Conclusions: Balanced bilinguals (those who have equal proficiency in both languages) may sleeptalk in either of the two languages. Dominant bilinguals (ie, having greater proficiency in one language) may preferentially sleeptalk in their dominant language, with immediate past events probably influencing language use in individual subjects on particular nights. Several considerations are postulated as an explanation for the group who systematically exhibited a dominance shift during sleep.

Keywords: Sleeptalking; somniloquy; bilingualism; parasomnia; language speech

Sleeptalking (somniloquy) is a common parasomnia that ranges from mumbled nonsense to coherent sentences, but without detailed awareness of the event.1 Sleeptalking is usually an isolated phenomenon occurring during all stages of sleep in otherwise healthy subjects, and is rarely indicative of a pathologic disorder.2 Sleeptalking occurs spontaneously in a rather unpredictable fashion, although in some instances it may be precipitated by incidental factors, such as febrile illness or emotional stress. It may also be one of the clinical features accompanying obstructive sleep apnea syndrome (OSAS).1 Moreover, simple vocalizations, intelligible speech, and shouting may be an integral part of the behaviors displayed by patients suffering from sleepwalking (somnambulism) or sleep terrors (pavor nocturnus),3,4 or from REM sleep behavior disorder (RBD).5,6 In this context, sleeptalking is seemingly abnormal and presumably occurs as a result of generalized motor activation during NREM sleep and REM sleep respectively. In contrast to somnambulism and pavor nocturnus (in which there is usually no dream recall), sleeptalking in RBD may be related to abnormal, usually violent, dream content.6
Speculation has been raised on theoretical grounds as to whether bilingual patients may use one or the other language during sleeptalking. To our knowledge, there is only one report on this topic, which briefly mentions that multilingual patients always use the dominant language during sleeptalking episodes.\textsuperscript{4} Data on this topic are scarce, both in NREM and REM sleep parasomnias and in normal subjects. Therefore, we endeavored to study the language used by healthy bilingual individuals during episodes of sleeptalking. This may also provide a reference point when encountering sleeptalking associated with other parasomnias in bilingual patients.

METHODS

Taking into account that sleeptalking, although present at all ages, is more frequent in children and teenagers than in adults,\textsuperscript{,} we conducted the study in bilingual children.\textsuperscript{2} The study was performed in the Basque country, a region in northern Spain in which approximately 25\% of its inhabitants are bilingual in two languages, Spanish and Euskera. These languages are completely different and bear no resemblance to each other.

One thousand healthy children attending three bilingual schools were asked to participate, through their parents, in a survey of sleeptalking. Children attending these schools belonged to well-educated families with a medium to high standard of living. Only children considered bilingual (ie, able to speak fluently in both Spanish and Euskera) by their teachers were included, and that assessment had to be in agreement with parents' own opinions, as the survey specifically asked about bilingualism. Thus, only children considered bilingual by both their teachers and families were finally included. The parents were asked to complete a self-administered questionnaire (Appendix) compiled by one of the authors (JAP). Written information on the objectives of the study was given to all the parents. In order to get reliable answers, parents were instructed to skip any question about which they had any doubt. Parents were provided with the phone number of an investigator (EPS) so that they could discuss any situations of doubt.

The language in which children learned to speak (ie, their first acquired language) was considered to be the native or dominant language. As a rule, the native language was the language generally used both at home and outside home with friends. Children who learned to speak simultaneously in both languages—ie, having native proficiency in both languages—were considered balanced bilinguals. Children with greater proficiency in the native language than in the secondarily acquired language were considered dominant bilinguals. Sleeptalking was defined according to established criteria.\textsuperscript{1}

All returned surveys were carefully reviewed by one of the investigators (JAP). A minority of surveys were eliminated due to either inappropriate checking or more than one skipped question. Data were entered in a computer program and were reviewed independently by three different investigators (JAP, ABC, IM) to rule out possible mistakes during the process of coding.

RESULTS

Six hundred eighty-one children were finally studied. Their ages ranged from 3 to 17 years (mean 9.0; SD 2.6). There were 336 males (49.6\%) and 341 females (50.4\%) with 4 missing cases (who did not specify gender). Sleeptalking occurred in 383 (56.3\%) of 680 subjects who completed this item in the questionnaire. The mean age of the sleeptalkers group (9.0; SD 2.7) was statistically similar to that of the nonsleeptalkers group (9.1; SD 2.6); Student's \textit{t} test, \textit{p}=0.435. Pertinent demographic data are set forth in Table 1. Frequency of sleeptalking is shown in Table 2.

Most children were dominant bilinguals and were found to use the native language during episodes of sleeptalking. A subgroup of children (<4\%) was found to use the nondominant language persistently during sleeptalking. The group of balanced bilinguals showed a tendency to sleeptalk in either of the two native languages without preference (Table 3).

DISCUSSION

As expected, most children sleeptalked in the dominant (ie, native) language. In other words, language dominance tended to persist during sleep. Although this may seem to be a rather obvious finding, to our knowledge this is the first convincing demonstration of this feature. Nevertheless, the subgroup of children who regularly sleeptalked either indistinctly in any of both languages, or in the nonprimary language, warrants further comments.

Chance alone would predict a 50\% probability for each language in perfectly bilingual subjects. Bilingualism implies a high degree of fluency in both languages.\textsuperscript{7} Thus, it should be easy for these subjects to switch from one language to the other.\textsuperscript{8} There may be, however, an "asymmetry" in regard to the ability to use one language or the other in the single case. Balanced bilingual individuals have a native proficiency in both languages and may therefore speak at night in either of the two languages. Conversely, dominant bilinguals who have a greater fluency in one language\textsuperscript{9} may sleeptalk preferentially, but not only, in one language. Environmental factors—such as cultural and social atmosphere—as well as immediate-past experiences may tip the balance toward one language in a given subject on a particular night.

There is no linguistic explanation for the minority of subjects who regularly sleep-talked in their second (non-dominant) language. Moreover, the persistent nightly
Table 1.—Demographic data

<table>
<thead>
<tr>
<th>Sex</th>
<th>Sleep-talking n (%)</th>
<th>Non-sleep-talking n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>190 (49.9)</td>
<td>146 (49.3)</td>
</tr>
<tr>
<td>Male</td>
<td>191 (50.1)</td>
<td>150 (50.7)</td>
</tr>
<tr>
<td>Missing cases</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

Age distribution (years)

<table>
<thead>
<tr>
<th>Age distribution</th>
<th>Sleep-talking n (%)</th>
<th>Non-sleep-talking n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-5</td>
<td>31 (8.1)</td>
<td>10 (3.4)</td>
</tr>
<tr>
<td>6-8</td>
<td>146 (38.1)</td>
<td>124 (41.7)</td>
</tr>
<tr>
<td>9-11</td>
<td>135 (35.2)</td>
<td>102 (34.4)</td>
</tr>
<tr>
<td>12-14</td>
<td>61 (15.9)</td>
<td>54 (18.2)</td>
</tr>
<tr>
<td>15-17</td>
<td>10 (2.7)</td>
<td>7 (2.3)</td>
</tr>
<tr>
<td>Missing cases</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Native language

<table>
<thead>
<tr>
<th>Native language</th>
<th>Sleep-talking n (%)</th>
<th>Non-sleep-talking n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euskera</td>
<td>77 (20)</td>
<td>42 (14.1)</td>
</tr>
<tr>
<td>Spanish</td>
<td>233 (60.7)</td>
<td>201 (67.7)</td>
</tr>
<tr>
<td>Both</td>
<td>74 (19.3)</td>
<td>54 (18.2)</td>
</tr>
</tbody>
</table>

Table 2.—Frequency of sleep-talking

<table>
<thead>
<tr>
<th>Frequency of sleeptalking</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 night / month</td>
<td>254 (66.3)</td>
</tr>
<tr>
<td>1-2 nights / month</td>
<td>47 (12.3)</td>
</tr>
<tr>
<td>3-4 nights / month</td>
<td>42 (11.0)</td>
</tr>
<tr>
<td>5-8 nights / month</td>
<td>16 (4.2)</td>
</tr>
<tr>
<td>&gt;8 nights / month</td>
<td>24 (6.2)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>383 (100)</td>
</tr>
</tbody>
</table>

Table 3.—Language dominant shifts across states

<table>
<thead>
<tr>
<th>Native language</th>
<th>Sleep language</th>
<th>Dominance shift</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euskera</td>
<td>65 (84.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td>1 (1.3)</td>
<td>Spanish</td>
<td>1 (1.3)</td>
</tr>
<tr>
<td>Both without preference</td>
<td>11 (14.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Euskera</td>
<td>9 (3.9)</td>
<td>Euskera</td>
<td>9 (3.9)</td>
</tr>
<tr>
<td>Spanish</td>
<td>169 (72.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both without preference</td>
<td>55 (23.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Euskera</td>
<td>22 (29.7)</td>
<td>Spanish</td>
<td>21 (28.4)</td>
</tr>
<tr>
<td>Both with preference</td>
<td>31 (41.9)</td>
<td></td>
<td></td>
</tr>
</tbody>
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Sleeping in bilingual children—Pareja et al
NREM parasomnias can report vivid dreamlike mentation related to dream content, although adults with injurious since behavior in such disorders is not considered to be associated with the parasomnia episode. Theoretically, psychogenic dissociative disorders may also account for language dominance shifts across sleep-wake states in bilingual persons. Transitions from one personality to another have been documented during overnight polysomnographic monitoring. Even two or more personalities may interact in the oneiric state.

In conclusion, our study indicates that a predominance of bilingual subjects used their native language during episodes of sleepwalking. Whether this finding holds true for language release in bilingual subjects suffering from nocturnal behavioral disorders (parasomnias) remains to be determined.

APPENDIX

SURVEY: “SLEEP-TALKING”

Age:
Bilingual:
Sex:
Yes / No

1. Was the first language learned by your child?
- Euskera
- Spanish
- Both simultaneously

2. What is the language usually used by your child at home?
- Euskera
- Spanish
- Both without preference

3. What is the language usually spoken by your child at school?
- Euskera
- Spanish
- Both without preference

4. What is the language usually used by your child with his/her friends?
- Euskera
- Spanish
- Both without preference

5. Does your child sleeptalk?
- Yes
- No

6. If the previous question was answered affirmatively, how often does he/she do it?
- < 1 night / month
- 1-2 nights / month
- 3-4 nights / month
- 5-8 nights / month
- > 8 nights / month

7. If your child sleeptalks, what language does he/she speak while sleeping?
- Euskera every time
- Spanish every time
- Usually Euskera
- Usually Spanish
- Euskera and Spanish without preference

ACKNOWLEDGEMENT

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REFERENCES

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