THE READING LEVELS of a population of 93 Spanish deaf students were examined. All study participants had prelingual profound hearing loss; their ages ranged from 9 to 20 years. All were enrolled in compulsory education during 2002–2003 in the Canary Islands (Spain). They were evaluated with sentence and text comprehension subtests from the Evaluation of Reading Processes of Primary Education Students, whose Spanish acronym is PROLEC (Cuetos, Rodriguez, & Ruano, 1996). A questionnaire on reading attitude was also used (Espín, 1987). Study results were consistent with those of previous research: Deaf students, at the end of their primary school education (mean age 13 years), have reading levels similar to or lower than the reading levels of hearing students at the onset of primary school education (mean age 7 years). These deaf students also have an indifferent attitude toward reading.

The Spanish educational system has three main components: infant (birth to age 6 years), primary (from the first to sixth levels, ages 6–12 years), and secondary (ages 12–18 years). The compulsory educational system for all children includes both primary education and a part of secondary education called compulsory secondary education (levels 1–4, ages 12–16 years). Compulsory education comprises 10 years of schooling: ages 6–16 years.

Reading development is one of the first and most important targets of Spanish primary education programs. Reading skills make children autonomous learners, and thus considerably facilitate academic and social success.

Despite many years of effort dedicated to reading development, results are not satisfactory. In Spain, both researchers and teachers are perplexed at the surprisingly low reading levels of children who have finished compulsory education. The mean scores for 15-year-old Spanish students are below the mean in the members states of the Organization for Economic Cooperation and Development (OECD): 38% of the students achieve level 1 or 2, that is, the necessary level to complete basic or simple reading tasks, respectively; only 4% achieve the highest level, 5 (OECD, 2000). All these data show that many...
people who are not hearing impaired and have attended compulsory education do not achieve a functional reading level, that is, the level needed for efficient use of reading in personal, professional, and social activities.

It is within this context that the specific problem of deaf students should be analyzed. For deaf people, reading presents some added difficulties to those faced by hearing people. The deaf tend to have less language-specific knowledge (semantic and syntax), as well as less of the oral skills necessary for reading (i.e., phonological processing). Further, the encyclopedic language knowledge necessary to understand texts is poor.

It is obvious that prelingual profound hearing impairment hinders oral development. But because people with hearing impairments can perceive graphic symbols (as letters), nonspecialists tend to assume that deaf people should have no specific difficulties during reading development. But empirical data gathered in recent decades confirm historically and dramatically that this assumption is far from true (e.g., Alegría & Leybaert, 1986; Allen, 1986; Conrad, 1979; Di Francesca, 1972; Harris & Beech, 1995; Kyle, 1981; Trybus & Karchmer, 1977). Generally speaking, reading development is a specifically hard task for people who are deaf, regardless of communication system, linguistic and geographical contexts, and parents’ hearing status. Deaf students’ reading development is very slow throughout the school years, and these students achieve low reading levels. The mean reading age of these students, 8 years, is very similar to the reading age of hearing students at the onset of primary school. Apparently, the reading level of 15-year-old deaf students is similar to that of hearing students in the third year of primary education (Harris & Beech, 1995; Paul & Jackson, 1994). If one accepts that hearing students generally achieve functional reading levels in the fourth or fifth year of primary education, then one must conclude that more than 30% of deaf people should be considered illiterate when they finish compulsory education, at age 16 years (see Alegría, 2004, and Holt, 1994, for a review).

In the last 16 years, no published research paper has analyzed the reading competence of Spanish deaf people. The last known research examined reading levels of 106 Spanish prelingually profoundly deaf children enrolled in the first through eighth years of primary education. Scores were compared to those obtained by 157 hearing students in the first through fifth years of primary education. This research showed that deaf students did not reach the level of 7-year-old hearing students, and it confirmed that reading levels of Spanish deaf people were similar to those of deaf people elsewhere in Europe and the Americas (Asensio, 1989).

Nevertheless, since 1985, medical, prosthetic, social, and educational resources for deaf people in Spain have improved considerably: Early intervention programs have improved considerably and are more widely available; there are more and better auditory technology resources (e.g., cochlear implants, hearing aids); school resources for both special and inclusive education have improved, in forms such as teacher specialization (in fields such as speech therapy) and the provision of information and training to families; there is more emphasis on alternative and augmentative communication systems (Manually Coded Spanish and Cued Speech); sign languages are being used more. But despite strong research efforts concerning deaf people’s reading development, and despite the everyday experience of parents, teachers, and speech therapists, very low reading levels among the deaf are still being confirmed. It is therefore necessary to reexamine and analyze these reading levels.

The principal aim of the present study was to obtain up-to-date data on the comprehension reading levels of Spanish deaf students in the 21st century. In three experiments, we aimed to derive specific information from a measure of sentence comprehension levels (experiment 1), a measure of text comprehension levels (experiment 2), and a measure of attitudes toward reading (experiment 3).

**Experiment 1:**
**Measuring Sentence Comprehension Levels**

**Method**

The study participants were all deaf students in the Canary Islands enrolled in the educational system during the 2002–2003 school year:

- The sample consisted of 93 deaf students (46 female and 47 male), ages 9 years 5 months to 20 years 4 months ($M = 13$ years 4 months). The participants were enrolled in 34 schools and were segmented into two subgroups: the Primary Education Deaf Subgroup (levels 4–6); and the Compulsory Secondary Education Deaf Subgroup (levels 1–4).
- All of the students had prelingual sensorineural hearing loss without any other associated handicap; 95.4% had profound bilateral deafness, on the basis of BIAP classification (i.e., the mean loss for the 250, 500, 1000, and 2000 Hz frequencies was equal to or above 90 dB).
- A total of 17.2% of the study population had started in the educa-
tional system before the age of 3 years, 24.7% between ages 3 and 4, and 58.1% after age 4 years.

- A total of 92.5% of the study participants had hearing parents; 7.5% (7 students) had one or two deaf parents.
- A total of 88.1% of the study participants were users of spoken language at home; 3 used bimodal communication and 8 used Spanish Sign Language.
- At the educational centers, spoken language had been used by 37.6% of the participants (n = 35), bimodal communication by 24.7% (n = 23), sign language by 14% (n = 13), and Cued Speech by 1.1% (n = 1). Despite the impression created by these data, education of the deaf in the Canary Islands and in Spain generally is actually mostly oral.
- A total of 59.1% of the study participants had more than 1 year of early attention in the period from birth to age 3 years; 92.5% of participants used some form of hearing aid; 86% of participants used a behind-the-ear bilateral device.
- IQ measured with standardized tests (the Wechsler Intelligence Scale and the Raven Matrices Test) was within the mean.

**Materials**

A sentence comprehension task was used, similar to those usually carried out by students in class when they have to demonstrate their reading skills. The difficulty level was similar to that found in primary education, when reading skills are being developed. We used the Sentence Comprehension Subtest of the Evaluation of Reading Processes of Primary Education Students (Spanish acronym PROLEC; Cuevos, Rodriguez, & Ruano, 1996), standardized with Spanish hearing students from 6 to 11 years old. The objective of this subtest is to check if the student can extract the meaning of simple sentences, for which no special memory resources are requested. The subtest has 12 items (see Appendix A). The maximum score is 12. For items 1–9, the test taker must “read each sentence and do exactly what the sentence says.” For items 10–12, the test taker must point to the picture that corresponds to the meaning of the sentence. For instance, after reading the sentence “The horse is smaller than the elephant” (item 10), the test taker must point to one out of three alternative drawings showing three animals (a horse, an elephant, and a giraffe) of different relative sizes.

**Results and Discussion**

Detailed results of the task for Experiment 1 are provided in Table 1 (see the column headed “Experiment 1”). The mean for the whole deaf group (N = 93) was 7.99, which indicates that the whole deaf group gave correct answers to 66.6% of the questions. This mean is lower than the mean of 7-year-old hearing students, who achieve ceiling values soon. According to PROLEC, the mean for the first year of primary education (SD = 1.1); M = 11.42 for the second year (SD = 0.7); M = 11.25 for the third year (SD = 0.9); and M = 11.47 for the fourth year (SD = 0.7). The mean for the Compulsory Secondary Education Deaf Subgroup (mean age 14 years 8 months) was below the scores for hearing students in the first year of primary education. We conclude from these findings that sentence comprehension is a task on which profoundly deaf students achieve low or moderate levels of success, even in a common classroom task with very linguistically simple sentences.

**Experiment 2: Measuring Text Comprehension Levels**

**Method**

**Participants**

Experiment 2 had the same participants as Experiment 1.

**Materials**

We used the Text Comprehension Task from PROLEC. The objective of this task is to check if the student can extract the meaning of texts and integrate it with previous knowledge. Four texts are proposed: two narrative and two expository (see the narrative text example in Appendix B). Each text comes with four questions: Two have a literal answer (L), and two have an inferential answer (I). There are a total of 16 questions; 16 is the maximum score.

**Table 1**

Correct Responses in Sentences Comprehension (Experiment 1) and Text Comprehension (Experiment 2)

<table>
<thead>
<tr>
<th>Study participants</th>
<th>n (%)</th>
<th>Mean age (years, months)</th>
<th>Mean range (years)</th>
<th>Experiment 1 M (SD)</th>
<th>Experiment 2 M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole deaf group</td>
<td>93 (100)</td>
<td>13.4</td>
<td>9–20</td>
<td>7.99 (3.41)</td>
<td>6.99 (5.73)</td>
</tr>
<tr>
<td>Primary education deaf subgroup</td>
<td>36 (38.7)</td>
<td>11.2</td>
<td>9–14</td>
<td>6.64 (3.75)</td>
<td>5.25 (5.63)</td>
</tr>
<tr>
<td>Compulsory secondary education deaf subgroup</td>
<td>57 (61.2)</td>
<td>14.8</td>
<td>12–20</td>
<td>8.84 (2.90)</td>
<td>8.09 (5.56)</td>
</tr>
</tbody>
</table>

*Notes. N = 93. The maximum score in Experiment 1 was 12; in Experiment 2, it was 16.*
**Results and Discussion**

The mean for the whole deaf group \(N = 93\) was 6.99, which means that the deaf group correctly answered 43.7% of the questions (see Table 1, the column headed “Experiment 2”). This mean value is lower than the mean value obtained by 7-year-old hearing students, according to PROLEC: \(M = 8.0\) for the first year of primary education (\(SD = 4.0\)); \(M = 11.6\) for the second year (\(SD = 3.0\)); \(M = 12.3\) for the third year (\(SD = 2.8\)); \(M = 13.5\) for the fourth year (\(SD = 2.3\)). Hearing students progressively improve their scores, though they never reach ceiling values. In contrast, students in the Compulsory Secondary Education Deaf Subgroup obtained the same mean value as first-year hearing students. The mean percentage of mistakes made by the whole deaf group is 56.3%, while for the hearing students it is 29.0% (although age differences must be taken into account). The task requires more elaborated skills, even for hearing students. Only 6 members of the study sample out of 93 (6.5%) had 16 correct answers, while 24 (25.8%) scored 0. The “text type” variable shows that both hearing and deaf students find narrative texts easier to understand than expository texts. As for “question type,” literal questions are easier to answer than inferential ones. In summary, the deaf population in the present study performed similarly to poorly performing hearing readers, and showed a tendency to retain only the literal meaning of texts.

**Experiment 3: An Approximation to Hearing People’s Attitudes Toward Reading**

**Method**

Experiment 3 had the same participants as Experiments 1 and 2.

**Materials**

We used Espin’s (1987) questionnaire on reading attitudes. Espin used her questionnaire to evaluate 7- to 8-year-old suburban children who were enrolled in educational compensation programs. The test measures degree of interest in reading and motivation to read. It was inspired by Campbell’s inventory of attitudes toward reading among young children (Campbell, 1966, cited in Lapp & Floop, 1978). Espin’s test includes 13 items (see Appendix C). For each item, there is a question and five drawings that represent different degrees of interest in the skill being measured: I like it a lot; I like it a little; I neither like nor dislike it; I dislike it a little; I dislike it a lot. The student points out the drawing that best represents his or her degree of interest. The total score for the test is the sum of the scores for each item. The maximum score is 65 points, a value that indicates very high motivation and positive interest in reading. The mean score (39) is indicative of indifference toward reading. The minimum score (13) indicates that the test taker has negative motivation and a negative attitude toward reading.

**Results and Discussion**

In the present study, the mean for the whole deaf group \(N = 93\), without any variation for the educational-level variable, was 37.8 points (\(SD = 11.603\)). This shows an indifference toward reading. Given the difficulties with sentence comprehension tasks shown by the study participants, it seems possible that these results can be given a completely different interpretation. Maybe this score is not reliable simply because of the comprehension difficulties shown by the deaf study participants.

**Summary and Discussion**

Our results agree with those obtained in previous research and confirm the poor reading development of profoundly deaf readers. Why do deaf students obtain such poor results in reading comprehension tasks? Reading is a secondary linguistic competence very much related to oral linguistic development, which is a primary linguistic competence (see Alegría, 2004, Liberman, 1971, and Perfetti & Sandak, 2000, for a review). If reading is intrinsically connected to oral language, this raises two questions: Do deaf people in general have enough linguistic competence to successfully tackle reading training? Do deaf people in general have sufficient language-specific knowledge? The answers to these questions can be found in the scores obtained by our own deaf students: less than 50% correct answers in frequent-word recognition, in a task in which one must chose the correct word from a set of four picture options; 17% in an antonyms task (chose the antonym word from among four candidates); 9% in the semantic categorization task (from four candidates, choose the one that does not belong to the semantic category). These data suggest that the level of lexical knowledge of the deaf population is similar to or lower than that of hearing 6-to-8-year-olds. In a comprehension prepositions task, the deaf population scored 50%. By comparison, hearing students at the first and second levels of primary education score above 90%. Similar results were obtained in a morphology task. These data confirm results from other researchers (Quigley & Paul, 1984; Quigley, Power, & Steinikamp, 1977; Santana & Torres, 2003), and enable us to conclude that when vocabulary comprehension and grammatical competence are poor (i.e., there are difficulties with word order and with
functional words such as articles, prepositions, and pronouns), competence in reading comprehension is also poor. Therefore, deaf students have neither sufficient nor efficient oral linguistic development—not only when they start their training in reading but when they finish secondary education.

Why doesn’t that primary linguistic competence develop sufficiently? The answer is not simple, because understanding and facilitating the acquisition of literacy by deaf children clearly requires attention to a multitude of factors, both biological and sociocultural. Many factors, including etiology, time of onset, severity, progression, configuration, type of hearing loss, and different educational approaches, all interact to produce large differences in these children’s spoken-language performance. Nevertheless, we would like to concentrate on one aspect that may be sufficiently relevant. As long as deaf students do not have technical, communicative, and educational aids that provide them with full and efficient perception of the sounds of speech and discourse, it will not be easy for them to achieve spoken language first and printed language decoded to speech, from which it is derived (Alegria, 1996; Leybaert, Alegria, Hage, & Charlier, 1998; Santana, Torres, & Garcia, 2003). One of these important basic linguistic competences is related to one of the most important scientific findings of the 20th century for education: that a child’s explicit awareness and use of the phonological components of language plays a significant role in reading and spelling development. At least part of the literacy difficulties faced by deaf children are caused by restricted development of phonological awareness and phonological processing abilities (Leybaert, 2000; Perfetti & Sandak, 2000; Sterne & Goswami, 2000). A clear and complete audiovisual perception of speech is a key factor in the successful development of spoken language in hearing persons, for whom printed language is primarily an alternative representation of spoken language. Deaf people need the same development of spoken language as hearing individuals, and so the same complete speech perception (LaSasso & Metzger, 1998). This key factor should be accomplished as part of a systematized project of intervention—that is, from an early age (early detection and early intervention), first at home (with the indispensable and essential participation of parents) and later at school, in natural and functional communicative situations.

Everyone wants children to succeed in reading and writing. The pleasures of reading a favorite story, the enormous knowledge base accessible to efficient readers, and the communication system that literate societies depend upon all foster the desire for children to achieve high levels of literacy through the education process. The results obtained by deaf students in the tasks examined in the present study might give the impression that this study makes no innovation. Yet the results of this evaluation are of great importance, at both the national and local levels, to development of new intervention models. The process of evaluation of reading competence of deaf students confirms that these students show specific educational needs in regard to their cognitive development. Also, it shows that apparently such needs are not being sufficiently attended to, since deaf students are not achieving even the most basic objectives of compulsory education. Even though “no one knows yet how deaf children learn to read” (Musselman, 2000, p. 25), poor reading levels of Spanish deaf students found in the present study should result in serious analysis of current models of deaf early intervention and education, not only from an institutional perspective but from the perspectives of teachers, speech therapists, parents, and specific psychopedagogical teams.

Note

The present project is the result of research by the Equipo de Investigación Modelo Oral Complementado (http://www.uma.es/moc), whose members include, among others, the authors of the present study, together with the psychology and social workers of the Equipos Psicopedagógicos Específicos de Discapacidades Auditivos of the Consejería de Educación del Gobierno Autónomo de Canarias. This research was subsidized by the Dirección General de Ordenación Educativa of the Consejería de Educación del Gobierno Autónomo de Canarias (http://www.educa.rcanaria.es/).

Our thanks to the headmasters, headmistresses, and teachers of the Canary Islands schools and educational centers, who have taken a very active part in the development of this research. And, naturally, to the deaf boys, girls, and teenagers of the centers who have participated and who with patience and goodwill have agreed to dedicate to us some of their time to collaborate in research that is destined to improve understanding of these young people.

Correspondence concerning the present article should be sent to Santiago Torres Monreal, Departamento de Psicología Básica, Universidad de Málaga, Facultad de Psicología, 29071, Málaga, Spain (monreal@uma.es), or to Rafael Santana Hernández, Departamento de Educación, Universidad de Las Palmas de Gran Canaria, Juana de Arco 1, 35004, Las Palmas de Gran Canaria, Spain (rsantana@dedu.ulpgc.es).
References


Appendix A

PROLEC Sentence Comprehension Subtest

1. Close and open your hand three times.
2. Sign in the notebook with your pencil.
3. Place the pencil over the notebook.
4. Draw a three with three apples.
5. Draw two clouds and one sun.
6. Draw a square inside a circle.
7. Draw a hat on the clown.
8. Cross out the dog’s nose.
9. Draw a moustache on the mouse.
10. The horse is smaller than the elephant.
11. The boy is fatter than the girl.
12. The soldier is taller than the Indian.

Carlos wanted to go to the cinema to see his favorite film, but his parents wouldn’t let him go. Very angry, he went to his bedroom and opened his money box where he kept his savings. For some moments he thought about getting out down the window, but he saw it was too high. So he lay on his bed for a while and in the end he went to watch the television with his parents.

1. Where did Carlos want to go? (L)
2. What did he open his money box for? (I)
3. Why did he think of going out down the window? (I)
4. Where did he finally go? (L)

Appendix C
Espín’s Reading Attitudes Questionnaire

1. Do you like to be given books as presents?
2. Do you like reading books at home?
3. Do you like discovering a new word when you are reading?
4. Do you like reading?
5. Do you think you will like reading when you are older or an adult?
6. Do you like reading when the teacher says it is reading time?
7. Would you like to have some time everyday to read whatever you like from the library?
8. When you go to a friend’s, do you like reading his books?
9. Do you like reading books even if the teacher does not tell you to?
10. Do you like your teacher to read you stories aloud?
11. Do you like reading aloud when your teacher asks you to?
12. Do you like the teacher to call you to read together with him?
13. Do you like giving books to your friends as presents?