



UNIVERSIDAD DE QUINTANA ROO

## DIVISIÓN DE CIENCIAS POLÍTICAS Y HUMANIDADES

---

English-Spanish translation of the text  
“Assessing Phonological Knowledge”

---

**Monografía en la modalidad de traducción**

Para obtener el grado de  
**LICENCIADO EN LENGUA INGLESA**

PRESENTA  
**David Virgen Terrones**

ASESORES  
Dra. Edith Hernández Méndez  
Mtra. Ana Bertha Jiménez Castro  
Mtra. Vilma Esperanza Portillo Campos  
Mtra. Lizbeth Gómez Argüelles  
Lic. Edwards Anuar Be Cruz



Retamal, Quintana Roo, México, Noviembre de 2020



UNIVERSIDAD DE QUINTANA ROO

DIVISION DE CIENCIAS POLITICAS Y HUMANIDADES

English-Spanish translation of the text "Assessing Phonological Knowledge"

Presenta:

David Virgen Terrones

Monografía para obtener el grado de Licenciatura en Lengua Inglesa

COMITÉ DE SUPERVISIÓN

Asesor:

  
Dra. Edith Hernández Méndez

Asesor:

  
Mtra. Ana Bertha Jiménez Castro

Asesor:

  
Mtra. Vilma Esperanza Portillo Campos

Suplente:

  
Mtra. Lizbeth Gómez Argüelles

Suplente:

  
Lic. Edwards Ahual Be Cruz



Chetumal, Quintana Roo, México, Noviembre de 2020

## TABLE OF CONTENTS

ABSTRACT .....	2
INTRODUCTION.....	3
JUSTIFICATION.....	7
OBJECTIVES .....	8
I. THEORETICAL FRAMEWORK.....	9
1.1 Different Translation Schools .....	9
1.2 Vinay and Darbelnet taxonomy.....	10
II. METHOD .....	13
2.1 Instruments .....	13
2.2 Step-by-step through the process of translation.....	14
III. TRANSLATION OF THE TEXT.....	16
IV. ANALYSIS OF THE PROBLEMS AND OBSTACLES ENCOUNTERED DURING THE TRANSLATION PROCESS.....	38
4.1 Analysis of the problems according to its grammatical category.....	38
4.2 Sampled Chart of the taxonomy used in the translation.....	50
CONCLUSIONS AND RECOMMENDATIONS.....	53
REFERENCES.....	55
APPENDIX.....	58

## **ABSTRACT**

The aim of this monograph is to provide a faithful translation of the Chapter *Assessing Phonological Knowledge*. Different techniques from the Canadian school are used in this translation, besides an analysis of the translation problems encountered is given. Novice translators would have the opportunity to read and follow recommendations of translating texts of this sort.

## INTRODUCTION

These days, people are always communicating with others by direct contact. However, a major problem appears when human beings need to communicate with others who have a different language as a mother tongue. There is no doubt that translators play a significant role in this day and age since they solve these communication problems. Newmark (1988) claims that “Translation is rendering the meaning of a text into another language in the way that the author intended the text” (p.5). Similarly, Nida’s (1969) definition of translation is that “Translation consists in reproducing in the receptor language the closest natural equivalent of the source-language message, first in terms of meaning and secondly in terms of style.”(p.12). Considering this, I can believe that translation goes well beyond translating words from the source language into the target language; it is all about the rendition of accurate meaning.

Since remote times translation has played an important role in human development. When the Arabs conquered the Greek, the former, influenced by the Greek wisdom, made their own version of their philosophical and scientific works. Many of these versions were rendered into Latin during the middle ages in the School of Cordoba, Spain (Rodríguez, 2010).

Not only these master pieces were the first significant translations, the Old Testament was one of the first translations recorded in the 3<sup>rd</sup> century BC. To translate the text into Greek it took 70 scholars to complete the task. This translation was the first work used to translate into other languages. One century later Saint Jerome translated it into Latin which became the favorite text for the Roman Catholic Church for many years (Rodríguez, 2010).

There have been several acts of translations registered in history during several spans of times. During the XVI century, the Malinche is the most well-known representation of an interpreter in Mexico. The Malinche was a lady who played a key role as the interpreter of

Hernán Cortés by translating from one civilization to another, from Spanish to Náhuatl.

Translating was one of the most significant functions she used to do.

Flores (2006) states that “n V era ruz empez e l omplejo juego ver a l de traducción que incluía el pasaje por el náhuatl entre ar ina y los emisarios de o tezuma para tradu irle al maya a guilar para que ste a su vez le tradujera a ort s” (p.125)

The story of the Malinche is just one example of many around the world as far as the importance of the translators and interpreters in history. Humans are in permanent need of communication; since languages have existed the humanity has always needed a translators, without them we, our civilization, would not be as developed as it is nowadays.

Translating in this era seems to be quite easy with the implementation of internet. There is a huge variety of translation-software on the web that produces automatic translations of any type of texts. A great number of people have benefited with these wonderful tools. However, the majority of them are unqualified to do a specialized translation such as academic readings that require neither gaps nor misunderstandings in the final version.

MT was useful for realizing some level of communication, because participants could pick up some of the meaning even if some words were badly translated.

However, most MT systems make many translation errors. More precisely, many of the machine translated sentences are generally neither adequate nor fluent. In intercultural and multilingual collaboration based on MT, translation errors have caused mutual misconceptions. Moreover, it is difficult to identify translation errors because of the asymmetric nature of MT (Daisuke & Toru, 2009, p.361).

There is no doubt that these websites are currently a great tool for monolingual people on the grounds that they communicate with others even without having any knowledge of the target language. Bilingual people can use these websites to create a proper translation of any text.

There is no such thing as a computer- aided cure-all that will make a poor translator into a good one. However, used properly the right tools can help translators to improve the efficiency and quality of their work. Indeed, quality is the primary yardstick for assessing electronic translation tools (Austermühl, 2001, p.1).

According to the report of the Institute Cervantes (2018), in Mexico as in 20 other countries, the official language is Spanish. There are 577 million Spanish speakers around the world involving native speakers of the language and foreigners who speak Spanish as L2. Focusing on the native speakers, there are 480 million of them. Mexico, Colombia, Spain, Argentina, Peru, Venezuela, Chile, Guatemala, Ecuador, Cuba, Bolivia, Dominican Republic, Honduras, Paraguay, El Salvador, Nicaragua, Costa Rica, Panama, Uruguay, Puerto Rico and Equatorial Guinea are the countries that have Spanish as a mother tongue. This list of countries makes Spanish the second language with more native speakers around the world, this means that 7.6% of the population worldwide are native Spanish speakers. However, only 21 million of students study Spanish as a foreign language. Spanish may not be the official language in some countries but a considerable number of native Spanish speakers dwell in the next list starting with Andorra, Netherlands Antilles(Bonaire, Curaçao, San Eustatius, Saba, Saint Maarten), Argelia, Aruba, Australia, Belize, Brazil, Canada, China, United States, Philippines, Guam (United States), India, Virgin Islands (United States), Israel, Jamaica, Japan, Morocco, Norway, New Zealand, Russia, Occidental Sahara, Switzerland, Trinidad and Tobago, Turkey and the European Union.

It is clear that Spanish has millions of native speakers worldwide. However, there are some other millions of them that do not know other languages apart from their own. On account of this many Spanish speakers deal with many machine translators that mostly do not provide a loyal translation. Many students share the same problem; the lack of information in their own language is a day-to-day problem.

According to Pontaza (2018), Diana Lopez Tavarez, a Mexican PhD student from the University of Colorado has been translating thousands of scientific materials from English to

Spanish with the purpose of sharing the information to the Latin America schools. There is no doubt that several schools have benefited from these translations. That is exactly what this monographic work tends to do, to share a scientific chapter to the Spanish community.

The chapter “Assessing Phonological Knowledge” is a research paper from a well-known linguist, Cynthia Core. This text was taken from the book *The Handbook of Hispanic Linguistics*, edited by Erika Hoff and published in 2012 by the editorial Blackwell Publishing Ltd. This investigation examines the speech production of children who had already acquired their mother tongue using different methods and techniques to assess their phonological production. The present chapter, also provides definitions of phonological terms also. In addition, an analysis of the methodological considerations of the natural and elicited speech production is presented. The equipment and material used to gather all this data play a big role in this research that is why it has its own section in the research. This translation was requested by Professor Edith Hernández Méndez who is interested in having this book chapter with the purpose of using it in her Spanish classes as most of her classes do not know English. This translation will also be useful for students who do not have an advanced English level and are not able to read the text. This translation will serve the purpose so that students have, students will have a better understanding about Assessing Phonological Knowledge. It will be very helpful for students to have in their courses an article that can enhance their knowledge about how to assess phonological properties of children’s speech production.



## **JUSTIFICATION**

This monographic work is intended to contribute to the student's formation in the humanities major, since it would be used in the doctor Edith linguistics courses. Furthermore, it would be used as material for seminars.

Moreover, novice translators and students who are interested in the art of translation might benefit from this monograph as it can be used as a guide for future translations related with the same field or topic. Different techniques and methods are implemented in this work as well as the analysis of the difficulties encountered. The most relevant problems are examined in this paper with corresponding solutions, to have a clear view of the techniques and methods used for this translation.

Translation teachers could use this work as a material for their classes. There are several methods and techniques implemented in different parts of the text. The vocabulary of the text could be useful to enrich the vocabulary of the pupils, creating an easier path for future translations about this topic.

There is a large number of English-Spanish translations that support linguistic researches. This monograph, it is expected to enrich the data of linguistic translations. Linguists that do not know the English language would be able to learn this topic as well as the students from the field of humanities that would have access to this research, increasing their material and being provided with more information for their academic growth.

## **OBJECTIVES**

There are three principal objectives of this work, which are:

- To provide a faithful and accurate translation of the chapter “Assessing Phonological Knowledge”.
- To provide an analysis of the problems encountered during the whole process of translation and a description of the different techniques and strategies applied to solve them.
- To give recommendations and ideas that would help to solve possible problems when translating this kind of text to novice translators.

## **I. THEORETICAL FRAMEWORK.**

In this chapter, the translation schools will be presented, as well as their own translation techniques. Moreover, the methodology and the techniques used in this work will be explained in detail.

Firstly, in this section of the monographic work, three different translation schools will be presented: the Russian, the American and the Canadian. Secondly, there will be a deeper explanation of Vinay and Darbelnet taxonomy, from the Canadian school. Examples of each technique will be given so as to have a wider perception of techniques.

### **1.1 Different Translation Schools**

Certainly, there are several translation schools worldwide. Each school has its own techniques and procedures in order to make a faithful translation. The Russian school is based on the Retsker's theorists (1974) and Shveivetser (1987). This taxonomy has two different kinds of methods: The analogy, which consists of one-to-one equivalence, and the adequacy, which emerges when the one-to-one equivalence translation is not possible. The adequacy method is divided into four techniques, which are Concretization, Logical derivation, Antonymic and Compensation.

The American school holds its taxonomy on Malone's theories (1988). The following are the techniques implemented from this taxonomy. Matching: substitution and equation; zigzagging: divergence and convergence; recrescence: amplification and reduction; repackaging: diffusion and condensation; reordering and recording are the techniques.

The Canadian school is the most well-known and used taxonomy worldwide. Vinay and Darbelnet (1958) are the authors of this method. They offered seven different techniques that are divided into different groups. The direct translation has three techniques: literal, borrowing and calque. The oblique translation involves transposition, equivalence, adaptation and modulation.

## 1.2 Vinay and Darbelnet taxonomy

Vinay and Darbelnet proposed a classification divided into two groups: direct and oblique translation. This taxonomy is used in the translation of this work, because it has the most suitable techniques for this kind of text. Furthermore, this taxonomy offers techniques such as literal translation, which is not the only one but one of the most used techniques in this translation. Next, a description of these techniques together with my own examples is provided.

### 1. Direct translation

#### 1.1 Borrowing.

This technique consists of borrowing a word from the source language and translates it into the target language as it is in the source language. Such words could have modifications into the target language without changing the source language (**SL**) idea. Translators tend to use borrowing technique when the concept does not exist in the target language (**TL**) or when the Speakers of the TL already used the borrowing word. It is clear that borrowing is the simplest but not the least important technique.

Borrowing may sound superficially unproblematic: if the target language doesn't have a word for something, just borrow it from a language that does. But it is not as simple as that; it raises important questions of national identity, power and colonization (Fawcett, 1999, p.34).

Let us see an example of borrowing:

SL: Real *tortillas* are handmade.

TL: *Las verdaderas tortillas están hechas a mano.*

#### 1.2 Calque.

The Calque technique translates expressions and words from the source language and translates them literally into the target language. This technique is divided into two types which are lexical and structural calque.

Calque is a special kind of borrowing in which the TL borrows an expression from the SL by translating literally each of the original elements. The result creates

either, a lexical phrase which preserves the syntactic structure of the TL but at the same time introduces a new mode of expression or a structural phrase which introduces a new construction into the language (Waliszewski 2015 p.59).

Examples:

SL: Seashore.

SL: Turtleneck.

TL: *Orilla del mar.*

TL: *Cuello de Tortuga.*

### 1.3 Literal translation.

Literal is well-known as word-for-word translation. Basically, it transfers the text from the source language into the target language taking into consideration the grammar of the TL. It is possible to add or omit words so as to keep the same idea but without changing the position of words in the text.

Examples:

SL: Toddlers barely utter all the vowel sounds.

TL: *Los niños pequeños apenas emiten todos los sonidos de las vocales.*

## 2. Oblique translation.

### 2.1 Transposition.

The Transposition technique consists of replacement of grammatical category of a word to another without changing the idea of source language.

Examples:

SL: To produce all vowel sounds is the target.

TL: *La meta es producir todos los sonidos de las vocales.*

### 2.2 Modulation.

Modulation is the technique in which the message is not certain, because it can change depending on the different points of view.

Example:

SL: My first diving experience was in a shadow part of the ocean.

TL: *Mi primera inmersión de buceo fue en una parte poco profunda del océano.*

### 2.3 Equivalence.

Equivalence is the technique that while translating looks for a similar or equivalent situation to the target language without giving importance on the style and structure of the text. This technique is pretty useful when translators work with idioms, slangs, proverbs and the onomatopoeia of animal sounds.

Example:

SL: Do not count your chickens before they hatch.

TL: *No cantes victoria antes de tiempo.*

### 2.4 Adaptation.

This technique allows the text of the source language to be adapted into the target language; due to the fact that the message of the source language does not exist or does not have a natural equivalence in the target language. Translators have to adapt the message so that the target language could have an idea of the meaning of the source language.

Example:

SL: Friday 13 (The Movie)

TL: *Martes 13*

SL: Yours Faithfully

TL: *Le saludo atentamente.*

## **II. METHOD**

The chapter “Assessing Phonological Knowledge” from the book “The Handbook of Hispanic Linguistics” was written by Cynthia Core in 2012. In order to provide a faithful translation, the taxonomy of the Canadian school was used applying almost all techniques for the translation of the chapter. Next, the steps I followed to come up with an accurate translation are described. First, the instruments and tools that were necessary to accomplish this translation are presented.

### **2.1 Instruments**

All objects and resources that translators use when translating are called translation instruments. These instruments are of vital importance in developing a faithful translation. Dictionaries and glossaries are main sources of vocabulary and culture between one language to another.

It goes without saying that the role of dictionaries and terminological ones for translators cannot be exaggerated, Translation – orientated dictionaries are the linkers between different languages, different cultures, they are one of the main tools of work for translators and interpreters besides the fact that they help to state the knowledge and to save it through time. It is obvious the more powerful the development of science and technology is, the greater the number of terminological dictionaries is (Trossel, 2015, 1762).

Currently, technology has a great effect on translation due to the fact that several translation instruments, such as machine translators and a vast number of mono and bilingual

dictionaries are available online. Doherty (2016) stated that “technologies have increased productivity and quality in translation, supported international communication, and demonstrated the growing need for innovative technological solutions to the age-old problem of the language barrier (p.1).

The following are the instruments used for this translation:

Cambridge Advanced Learner’s Dictionary: This book does not only provide definitions or meaning of the words, it also gives the context with pragmatic examples.

Global ELT Phrasal Verbs Dictionary: This book gives definitions and meanings of the phrasal verbs. It mirrors the word register, if it is formal or informal. Different examples are given per entry word.

Wordreference: It is one of the most reliable multilingual free dictionaries online which provides different examples of context according to the word.

Google Translator: This webpage is a machine translator, which works with most languages than any other page available in the web. However, translations are not very faithful.

Linguee: This page allows to find different translations of a word or a sentence given by the user.

Articles: Articles are useful to get familiar with the authors writing style. As well as to enhance the vocabulary of a specific area.

Cambridge Dictionary Online: This dictionary is one of the vastest English monolingual dictionaries. It also provides faithful translation of idioms and proverbs according to the language also.

Thesis and Monographs: Thesis and Monographs related to translation helped me to have a broader knowledge of the topic and to become familiar with this work.

Glossaries: This instrument offers a list of words of a specific area; this aids save time looking for technical vocabulary.

## **2.2 Step-by-step through the process of translation.**

First of all, I needed a wide understanding of the chapter, so I read the text minutely so as to have a deep insight of the chapter. I selected two texts written by Cynthia Core, who is the



author of the chapter, in order to get familiar with her writing style and the technical vocabulary. “Non-word repetition assesses phonological memory and is related to vocabulary development in 20- to 24-month-olds” and “What linguists need to know about bilingual development” are the chapters I read so I could have a better understanding of the text to be translated and the author's writing style. While reading the articles, I observed that her writing is very tidy due to the fact that she does not go directly to the main point, she prefers to introduce it little by little. She tends to use compound adjectives and compound nouns. It is notable that she has a vast experience using specialized vocabulary. I could say that, thanks to the combination of those writing skills, she expresses herself very clearly.

Secondly, I read the source text more than once looking for unknown vocabulary, odd phrases or any unclear idea. Then I used the translation instruments to help me solve those meaning issues. One example of this is the word “utter” because I did not know the meaning of this word until I looked it up on wordreference. Another example is “onset” as many others were found online or in different translation resources. As a translator, I must be conscious of the meaning of every single word in the text. Ignoring the meaning of a single word could turn into an inaccurate translation. It is clear the importance of having a good command of both languages, which involves mastering the lexicon, semantics, morphology, pragmatics and syntax of the source and target languages.

Thirdly, I reread the chapter one more time just to ensure that there were no doubts or anything that made me hesitant about the author's ideas. Having fully comprehended the chapter, I started translating. It is of vital importance to mention the interference of the translation techniques as well as the translation instruments used in this process of the work in order to have a clear understanding of the whole translation process. The technique “literal translation” and the resource wordreference were the most used technique and tool along this translation. Afterwards, I reviewed the translation looking for something to polish. Then I made a comparison between both texts.

Next, I used a sworn translator to analyze the text and have me some suggestions to enhance it. After that, I sent the translation to Doctor Edith Hernandez, my head supervisor, who is a linguistics expert. She provided me with detailed feedback in which the most common errors were spelling. She also suggested changing some sentences applying other techniques from the same taxonomy. Those suggestions and advice were taken into consideration so I made the

changes before sending the draft to my other two supervisors. When I got the feedback from them, there was a discrepancy between one of them and my head supervisor regarding the definition of the term Phonology. The decision of changing the sentence was based on the criterion of register.

### **III. TRANSLATION OF THE TEXT**

#### **Evaluación del conocimiento fonológico**

---

**Cynthia Core**

##### **Resumen**

Este capítulo presenta una revisión de la fonología y los métodos para realizar investigación fonológica sobre el desarrollo del lenguaje, y describe diversas técnicas que se usan para evaluar propiedades fonológicas de la producción del habla de los niños, con un enfoque en el rango de edad entre 18 meses a 5 años. Este capítulo proporciona un breve resumen sobre la relevancia de la información fonológica en la investigación lingüística y la importancia de considerar las propiedades fonológicas de las palabras y las frases en la misma. Se definen el desarrollo fonológico y la terminología relacionada con la fonología; se discuten las consideraciones metodológicas para la recolección de datos tanto para la producción del habla natural y elicitada y su análisis correspondiente. Se proporcionan también definiciones de los constructos relacionados.

##### **¿Por qué estudiar fonología?**

---

Investigadores de diversas de disciplinas se han interesado en el desarrollo fonológico de los infantes. El desarrollo fonológico ha sido de interés en los estudios del desarrollo del lenguaje típico, del habla y de los trastornos del lenguaje. Además, el desarrollo fonológico se relaciona

con el desarrollo de la lectura, el deletreo y habilidades relacionadas, como la sensibilidad fonológica y la conciencia del fonema. Se ha usado el análisis del desarrollo fonológico para comprobar teorías lingüísticas del desarrollo del lenguaje y de la fonología, tales como la fonología prosódica (e.g., Spencer, 1986; Fikkert, 1994; Goad y Rose, 2004), la teoría de la optimalidad (e.g., Pater, 1997; Gnanadesikan, 2004), así como para investigar el aprendizaje estadístico en el desarrollo del lenguaje (Pierrehumbert, 2003; Saffran, Aslin, y Newport, 1996).

Las primeras producciones sonoras de los niños se relacionan con sus primeras producciones de palabras, lo que conforma una relación natural entre la investigación del aprendizaje de las palabras y el aprendizaje de los sonidos (Stoel-Gammon, 2010a). Antes de que un niño empiece a producir palabras o la gramática de su lengua, inicia la producción de sonidos con el juego vocal y el balbuceo. Las primeras palabras de los niños tienden a coincidir con las propiedades fonológicas de las producciones de su balbuceo (Vihman et al., 1985; Elber and Ton, 1985). El aprendizaje de los sonidos y el de las palabras están inextricablemente relacionados y se desarrollan juntos. Para que los niños aprendan palabras, deben dominar tanto contenido como forma; la forma consiste en las propiedades fonológicas de las palabras. Las propiedades fonológicas de las palabras, tales como patrones acentuales del léxico y la forma de las palabras, pueden influir en la forma en que los niños producen sus primeras palabras, y la composición fonológica de las palabras puede incluso influir en las palabras que los niños intentan decir (Shwartz and Leonard, 1982).

## **Conceptos básicos y terminología**

---

La fonología se refiere al sistema de producción de sonidos del habla de un niño y las representaciones mentales de los sonidos de su lengua. Los sonidos individuales se refieren como segmentos o fonos, y a los sonidos de una lengua se les llaman fonemas. Los fonemas se describen en términos de rasgos fonológicos que definen únicamente a cada sonido. Los rasgos incluyen información sobre la sonorización, el lugar y la manera de articulación. El conocimiento fonológico de un niño consiste en la percepción y producción de los fonemas de

su lengua y en el conocimiento de la organización de los sonidos en esa lengua, o la fonotáctica de la lengua, por ejemplo, como qué sonidos son posibles en secuencias al inicio de palabra. La Fonología también consiste en los aspectos prosódicos suprasegmentales de una lengua, tales como el ritmo del habla, la entonación, los patrones acentuales a nivel de la palabra y frase, y claves sobre los límites de frases, como el descenso del tono y el alargamiento final.

La articulación se refiere a la forma (o precisión con la cual) un niño produce sonidos del habla individuales, por ejemplo, cómo un niño produce los sonidos de su lengua, tal como si una /s/ se produce equivocadamente. La fonología va más allá de la superficie o de los detalles fonéticos de la producción del habla a la forma en la que un niño usa los sonidos para cambiar el significado de las palabras, y se usa constantemente como un término vasto que abarca todos los factores de la producción del habla del niño y al conocimiento fonológico.

Las unidades fonológicas, que típicamente se miden y reportan en estudios del desarrollo fonológico, incluyen sonidos del habla individuales o fonemas. Los investigadores generalmente se enfocan en la producción de las consonantes más que en la producción de las vocales debido a que hay poca investigación disponible sobre el desarrollo de las vocales, y también porque hay más variabilidad en la producción de las vocales en los dialectos del inglés. Otras unidades fonológicas de interés incluyen la sílaba y sus partes, y las palabras. Una sílaba es la unidad primaria de la fonología que puede estar compuesta de una sola vocal, o una vocal en combinación con una o más consonantes, las cuales la preceden o la siguen.

Tabla 6.1 Alfabeto fonético internacional para los fonemas del inglés americano

Símbolo	Palabra Clave	Símbolo	Palabra Clave
Vocales			
/i/	b <u>e</u> (ser o estar)	/p/	p <u>i</u> g (cerdo)
/ɪ/	p <u>i</u> n (broche)	/b/	b <u>o</u> y (chico)
/e/	<u>a</u> te (comió)	/t/	t <u>e</u> a (té)
/ɛ/	r <u>e</u> nt (rentar)	/d/	d <u>o</u> ll (muñeca)
/æ/	h <u>a</u> t ( sombrero)	/k/	k <u>e</u> y (llave)
/u/	sp <u>o</u> on (cuchara)	/g/	g <u>i</u> rl(chica)

/ʊ/	w <u>o</u> uld (condicional)	/m/	map (mapa)
/o/	ph <u>o</u> ne (teléfono)	/n/	nose (nariz)
/ɔ/	jaw (mandíbula)	/v/	van (camioneta)
/ɑ/	f <u>a</u> ther (padre)	/ŋ/	th <u>ing</u> (cosa)
/ə/	<u>a</u> head (enfrente)	/f/	fall (caer)
/ʌ/	<u>o</u> ven (sobre)	/θ/	think (pensar)
/ə/	finger (dedo)	/ð/	<u>th</u> is (esto)
/ɜ/	bird (pájaro)	/s/	soup (sopa)
		/z/	zipper (cremallera)
Diptongos		/ʃ/	<u>sh</u> oe (zapato)
/aʊ/	<u>co</u> w (vaca)	/ʒ/	treas <u>u</u> re (tesoro)
/aɪ/	fly (volar)	/h/	house (casa)
/ɔɪ/	<u>to</u> y (juguete)	/tʃ/	<u>ch</u> in (mentón)
/oo/	<u>to</u> es (dedos del pie)	/dʒ/	judge (juez)
		/w/	win (ganar)
		/j/	<u>y</u> ellow (amarillo)
		/r/	ramp (rampa)
		/l/	lift (levantar)

---

La sílaba está compuesta por un inicio y una rima, y esta está compuesta del núcleo y la coda. A las consonantes que preceden a una vocal en la misma sílaba se les conoce como el inicio y a las consonantes que siguen después de una vocal en la misma sílaba se les conoce como *coda*. Al patrón general o estructura de una palabra en términos de los tipos y secuencias de sonidos que constituyen la palabra se le llama la *forma de la palabra* (o patrón fonotáctico) y se expresa en términos de la estructura CV (Consonante + Vocal) de los fonemas de la palabra.

El Alfabeto Internacional Fonético (IPA) usa para representar los sonidos del habla en su forma escrita, el cual es un conjunto de símbolos diseñados para representar los sonidos de las lenguas del mundo con una correspondencia de uno a uno. Al proceso de transcripción del habla usando los símbolos AFI se le llama *transcripción fonética*. La Tabla 6.1 contiene una

lista de símbolos del AFI que se usan comúnmente para transcribir el habla del Inglés estándar.

## **Panorama general del desarrollo fonológico**

---

En los inicios del habla significativo, los niños tienden a usar un limitado conjunto de consonantes previamente adquiridas (nasales, oclusivas, y semivocales) y estructuras silábicas simples, contando con una gran producción de estructuras CV(consonante + vocal) y CVCV. El periodo entre 1 a 2 años es de un incremento del uso principalmente de palabras aisladas que representan formas fonológicas antes del uso de combinaciones de palabras. En el proceso de combinación de palabras, los niños expanden su sistema fonológico rápidamente, adquiriendo más consonantes, logrando mayor precisión en las consonantes, y produciendo un rango más amplio de formas de palabras. Entre los 2 y 5 años, los niños adquieren un extenso vocabulario y su sistema fónico madura a ser casi como el de los adultos. A la edad de 5 años, la mayoría de los niños han adquirido la mayoría de las consonantes en todas las posiciones de la palabra. La Tabla 6.2 muestra una propuesta de las edades de adquisición para el caso del inglés, organizadas por sonidos tempranos, medios y tardíos.

Algunos de los factores que influyen en la precisión de la producción fónica del niño se relacionan con las habilidades auditivas, motoras y de memorización del niño, mientras que otros factores se relacionan con las propiedades fonológicas de las palabras y las frases que el niño trata de producir (Sosa y Stoel-Gammon, 2007). La frecuencia de la aparición de un sonido en una lengua, o de una palabra en el registro, parece facilitar la producción (ej., Pye, Ingram, y List, 1998 Zamuner, Gerken, y Hammond, 2004). También hay efectos contextuales de manera que los sonidos se producen con más precisión en posiciones silábicas que son más sobresalientes acústicamente, por ejemplo, en posición de la palabra inicial, sílabas asentadas. Estos efectos posicionales interactúan con propiedades del acento en la frase para afectar la precisión del niño de un sonido en particular de maneras complejas, lo cual típicamente facilita la producción del sonido debido al entorno marcado prosódicamente, aunque este no sea siempre el caso (e.g., Inkelas y Rose, 2008; Kent, 1982; Kirk y Demuth, 2006).

Dos propiedades léxicas que pueden afectar la precisión fonológica son la densidad del entorno y la probabilidad fonotáctica. La densidad del entorno se refiere a qué tan similares son dos palabras fonológicamente al contar el número de vecinos fonológicos que tiene una

palabra. Los vecinos fonológicos son palabras que difieren una de otra por solo un fonema (Luce y Pisoni, 1998), ej., *sit* (sentarse) tiene vecinos fonológicos como *hit*, *sat*, y *sip* (golpe, sentó y sorbo). La probabilidad fonotáctica es la verosimilitud de que un sonido ocurra en determinada posición en una palabra, o que una secuencia fónica pueda ocurrir en una palabra (Jusczyk, Luce, y Charles-Luce, 1994). Las secuencias fónicas con alta probabilidades fonotácticas se producen con más precisión que aquellas con baja probabilidad fonotáctica tanto en palabras existentes como inexistentes (Edwards, Beckman, y Munson, 2004; Zamuner, Gerken, y Hammond, 2004).

## Que estudiar

---

Las investigaciones fonológicas pueden ser tanto cualitativas como cuantitativas por naturaleza.

Los investigadores pueden estar más interesados en describir la naturaleza o patrones de las producciones de los niños, o examinar la precisión de la producción de un niño.

Tabla 6.2 Edades de adquisición propuestas para el caso del inglés, organizadas por sonidos tempranos, medios y tardíos.

Fonema	Edad de adquisición (años:meses) <sup>b</sup>	GFTA-2 Muestra de Edades Promedio <sup>c</sup>
Sonidos tempranos <sup>a</sup>		
/p/	3:0	2:0-3:0
/b/	3:0	2:0-3:0
/d/	3:0-3:6	2:0-3:0
/m/	3:0	2:0
/n/	3:0-3:6	2:0-3:0
/j/	4:0-5:0	5:0
/w/	3:0	3:0
/h/	3:0	2:0
Sonidos medios <sup>a</sup>		
/t/	3:6-4:0	3:0
/k/	3:6	3:0
/g/	3:6-4:0	3:0
/f/	3:6-5:6	3:0-4:0

/v/	5:6	5:0-6:0
/tʃ/	6:0-7:0	5:0
/dʒ/	6:0-7:0	5:0
/ŋ/	2:0-6:0 <sup>d</sup>	3:0-5:0
Sonidos tardíos <sup>a</sup>		
/θ/	6:0-8:0	7:0-8:0
/ð/	4:6-7:0	7:0
/s/	7:0-9:0	5:0
/z/	7:0-9:0	5:0-7:0
/ʃ/	6:0-7:0	5:0
/ʒ/	6:0-8:0 <sup>d</sup>	n/a
/l/	5:0-7:0	5:0
/r/	8:0	5:0-6:0

<sup>a</sup>Orden de adquisición: Shriberg (1993)

<sup>b</sup>Edad de adquisición: Smit et al. (1990)

<sup>c</sup>Edad en el cual 85% de las muestras de estandarización de la segunda prueba de articulación de Frystone y Goldman produjeron correctamente la consonante y los sonidos de los enunciados.

<sup>d</sup>Sander (1972)

Los investigadores desean saber acerca de la habilidad del niño para producir sonidos individuales, o acerca de la naturaleza de los errores en la producción del niño, o pueden interesarse por saber acerca de la extensión del sistema fonológico del niño, incluyendo aspectos como los sonidos, las clases de sonidos, la sílaba, y patrones de palabras producidos por el niño (Stoel-Gammon, 2010b).

Los análisis cuantitativos típicamente dependen de un único resultado para cuantificar las producciones de los niños. Estos tipos de medidas se han usado para reportar el número de diferentes consonantes o formas silábicas que usan los niños, sin preocuparse por la precisión de la producción del niño (Paul y Jennings, 1992; Recorla y Ratner, 1996; Carson et al., 2003). Algunos investigadores han sugerido que son necesarias tanto las tareas elicidadas como las



tareas de habla espontánea para evaluar las habilidades fonológicas del niño (Miccio, 2002; Tyler et al., 2002). Las tareas elicítadas aseguran que todos los fonemas de interés sean parte de la muestra, y las tareas de habla espontánea proporcionan información sobre la prosodia y las relaciones entre la producción del habla y el lenguaje.

## **Habla espontánea**

---

Los métodos de evaluación fonológica se pueden dividir entre los que se aplican al habla espontánea del niño y los que elicitan el habla. Las muestras del habla espontánea son las más ecológicamente válidas, ya que proporcionan al investigador una idea del desempeño típico del niño y muestran cómo este usa los sonidos en el habla continua, la cual a menudo es diferente a la manera como se producen las palabras aisladamente. Representan las habilidades típicas del niño más que las habilidades óptimas o máximas.

Una dificultad al usar muestras del habla espontánea como base para la valoración fonológica es que en condiciones naturales hay considerablemente más variabilidad que en las tareas elicítadas. Los niños pueden repetir una palabra varias veces, y la producción de la misma palabra puede variar en una misma sesión y en diferentes. En consecuencia, hay decisiones que deben tomarse acerca de cómo valorar las producciones múltiples de una misma palabra destino. Los niños pueden evitar decir palabras que contengan sonidos que no pueden producir, o pueden seleccionar palabras que pueden producir con mayor precisión. Algunos niños pueden no hablar mucho o nada, y algunos niños pequeños limitan su habla a simplemente nombrar sus juguetes, o repetir una frase, como “i ra una pelota... i ra un perro.” Esto limita la variedad de contextos lingüísticos en los que se produce una palabra. El muestreo espontáneo puede también ser problemático al analizar el habla de los infantes que presenta un vocabulario limitado o que es ininteligible.

Una forma de dar alguna estructura a las tareas elicítadas es tener una colección estándar de juguetes para que los niños jueguen (ejemplo, Williams and Elbert, 2003). Estos deberían abarcar objetos que contengan una variedad de diferentes sonidos y que den oportunidades para producciones mono y polisilábico. Se pueden recoger muestras espontáneas durante alguna interacción entre el niño y su cuidador, pero las actividades de juego y de lectura conllevan particularmente una lengua elicítada en los niños pequeños (ver Rowe, capítulo 13 de este

volumen).

Una de las más grandes amenazas para grabar los datos del habla del niño es la interferencia del sonido de fondo, así que es crucial anticipar este problema y planear prevenirlo al mayor grado posible durante la recolección de los datos. El ruido no deseado puede provenir de los juguetes, de la gente en la sesión de la recolección de datos, o del sonido ambiental, como el micrófono cuando se frota contra la ropa. Para ayudar a reducir el sonido creado por los juguetes, usamos una suave superficie para que los niños jueguen en ella, como un tapete de foami o una colcha. Es difícil comprender a muchos niños pequeños, particularmente en un video o en una grabación de audio. Si el investigador siente que la producción del niño no es clara, o es ambigua, una estrategia para ayudar en futuros análisis es repetir el enunciado del niño. Así que si un niño señala un ote y di e “da o” para “That's a oa t” ( se es un ote ) el examinador puede repetir despu s del niño “That's a oa t”( se es unbote).

Otras cuestiones preocupantes involucran la validez para comparar las producciones del niño en muestras separadas. Morris (2009) encontró que el número de palabras diferentes producidas por diez niños de 18 a 22 meses de edad, en dos sesiones de muestra de 20 minutos, no se correlacionaban. El número de palabras diferentes producidas en una única sesión variaba de 44 a 219 entre los informantes. Con base en sus resultados, Morris determinó que una sesión de conversación de 20 minutos no era necesariamente suficiente para obtener diferentes palabras y dar medidas estables de formas de palabra o del número de consonantes en el inventario fonético de un niño. Esto señala la falta de información sobre cuestiones de medición en fonología. Los investigadores han recomendado tamaños de muestras para el habla espontánea basados en el número de enunciados producidos en una sesión (Robb and Bleile, 1994) y el tiempo de la sesión (Carson et al., 2003; Rescorla and Ratner 1996; Stoel-Gammon, 1987). Hasta la fecha, no hay estudios que establezcan la duración de una sesión de muestra para obtener datos fiables de cada niño, ni tampoco existe una orientación clara sobre cómo manejar los datos de las múltiples sesiones de muestra cuando el número y la calidad de la producción de los niños varían de una sesión a otra. Debido a que las habilidades de los niños pueden cambiar rápidamente con el tiempo durante las primeras etapas de desarrollo, las sesiones deben ser programadas con intervalos frecuentes, ya sea semanal o mensualmente. La muestra densa puede ayudar a revelar los patrones de desarrollo con más detalle. (ver Lieven

and Behres, Capítulo 15 en este volumen).

## **Producción elicitada**

---

Cuando el habla es elicitada, con frecuencia se realiza para contar con una base para evaluar de manera estándar y con referencia a la norma la articulación y fonología o para que los investigadores realicen estudios sobre un conjunto de constructos fonológicos o léxicos de interés.

## **Pruebas estandarizadas**

Las pruebas estandarizadas de articulación generalmente miden la producción de los sonidos individuales del habla y proporcionan datos con referencia a la norma para determinar cómo las habilidades de producción fónica de un niño se relacionan con las de sus compañeros a través de una valoración estándar. Véase Eisenberg y Hitcock (2010) para una revisión de las pruebas estandarizadas de articulación y fonología. El método de elicitación de palabras reales suele ser una tarea en la que se nombra una imagen diseñada como muestra de una variedad de sonidos de las consonantes. El investigador le muestra al niño una imagen de un objeto familiar y le pide que lo nombre. Si el niño no produce espontáneamente el nombre objetivo, entonces el investigador le puede decir al niño que repita o que imite al investigador diciendo la palabra de inicio. Las pruebas estandarizadas generalmente arrojan valoraciones estándares basadas en el número de sonidos objetivo que el niño produce erróneamente. De esta forma, las pruebas estandarizadas generalmente no revelan información sobre los sonidos que el niño produce correcta o incorrectamente, sino que están diseñadas para determinar si un niño produce el mismo número de sonidos con precisión como los otros niños de su edad. Para poder decir si un sonido en particular se adquiere en una edad esperada, se puede consultar datos normativos publicados (ejemplo, Smit et al., 1990; Sander, 1972), o consultar las normas publicadas en el manual de una prueba de articulación. No obstante, se advierte que hay poco consenso entre las normas publicadas de cuándo se adquieren los sonidos. Existen diferencias en los estudios debido a la definición de *adquisición* que el investigador propone y a la metodología usadas en las producciones elicitadas en los estudios. Edwards y sus colegas (Edwards and Beckan, 2008a) han encontrado que la producción precisa de los sonidos se desarrolla gradualmente, así que,

puede que haya un periodo de tiempo en el cual un niño está produciendo un sonido, aunque menos preciso que la forma adulta, y este periodo puede continuar por mucho tiempo. Las normas sobre las edades para la producción no consideran este fenómeno.

### **Las tareas elicidadas realizadas por los investigadores**

En las tareas de elicitación desarrolladas por los investigadores, los niños pueden nombrar objetos o imágenes de palabras existentes, o pueden repetir palabras o estímulos de palabras inexistentes que el investigador les presenta. En ocasiones, los investigadores quieren controlar las propiedades que influyen en la precisión de los sonidos producidos, como la densidad del contorno, la frecuencia de un sonido o la secuencia de sonido (probabilidad fonotáctica), o la complejidad fonética de una palabra. En otros casos, los investigadores pueden estar interesados en la producción de un sonido en particular o una clase de sonido. En estos casos, los investigadores querrán crear sus propias tareas de elicitación. (como ejemplos de las tareas generadas por los investigadores, véase Munson, Edwards, and Beckman, 2005a; McLeod et al., 1994; Preston and Edwards, 2007; Wolk, Edwards, and Conture, 1993; Yavas and Core, 2006). Se ha usado la repetición de palabras existentes en estudios de la adquisición de las consonantes en diferentes lenguas (Edwards and Beckman, 2008a), y como un predictor del desarrollo gramatical (Dispaldro et al.,2009).

### **Repetición de palabras inexistentes**

La repetición de palabras inexistentes se ha convertido en una de las técnicas más usadas para estudiar la memoria fonológica a corto plazo o la memoria de trabajo fonológica (Gathercole and Baddeley, 1989; 1990), así como para examinar los efectos léxicos en el desarrollo fonológico (ver Stoel- Gammon, 2010a). Las habilidades de la memoria fde trabajo fonológica se\_asocian con el aprendizaje de las palabras en los niños pequeños (Gathercole and Baddeley, 1989) y adolescentes (Gathercole et al., 1997; 1999). La repetición de palabras inexistentes es una medida que parece diferenciar a los niños con o sin transtorno del lenguaje\_(Bishop, North, and Donlan, 1996; Dollaghan and Campbell, 1998; Gathercole and Baddeley, 1990). Recientemente, se han usado medidas de repetición de palabras inexistentes con niños de 20 meses (Hoff, Core, and Bridges, 2008), y también con niños bilingües (Ebert et al., 2008;

Gutiérrez-Clellen and Simon-Cerejido, 2010; Girbau and Schwartz, 2008; Parra, Hoff, and Core, 2011). En las tareas de repetición de palabras inexistentes, el investigador produce (o reproduce una presentación pre-grabada) de una palabra inexistente y el niño la repite. Para los niños más grandes, se graban los estímulos para asegurar la consistencia de la presentación (por ejemplo, Girbau and Schwartz, 2008; Gathercole and Baddeley, 1989). Para los niños muy pequeños (de 18 a 22 meses de edad), encontramos que necesitábamos modificar la manera en que presentábamos los estímulos, así que usamos un juego para nombrar a los juguetes en el cual se les pedía a los niños que repitieran el nombre del juguete presentado por el investigador. Adicionalmente, para distinguir las habilidades articulatorias generales de los niños de su habilidad para repetir secuencias de sonidos de palabras inexistentes, aplicamos una tarea de repetición de palabras reales y una tarea de repetición de una palabra inexistente relacionada fonológicamente. Encontramos que, incluso controlando la precisión de la repetición de palabras existentes, las habilidades de repetición de las palabras inexistentes de los niños predijeron la extensión de su vocabulario. (Hoff, Core, and Bridges, 2008).

## **Equipo**

---

El estado actual del almacenamiento y la grabación de los medios digitales ha provocado una revolución en la recolección de datos del habla. El estado del arte sobre la grabación del habla del niño se conforma por videos y audio digitales de excelente calidad. El video permite al investigador ver la cara del niño y observar el contexto más amplio de la pronunciación. Esto mejora la habilidad para determinar qué sonidos fonéticamente similares produce el niño al observar la boca del mismo. El audio digital de excelente calidad le permite al investigador examinar visualmente la onda acústica o el espectrograma de un enunciado mientras lo escucha, y esto también ayuda a mejorar la precisión de la transcripción fonética.

Hay tres partes del sistema de equipo que se consideran al recolectar los datos del habla. El primero es el micrófono, que recolecta la señal del habla del niño; el segundo es el artefacto que toma la señal del micrófono y la graba a un archivo digital (grabadora); y el tercero es un juego de equipo que permite al oyente evaluar el habla – normalmente audífonos. Los investigadores deben verificar las especificaciones del equipo para asegurarse de que las

tres partes del sistema cuenten con la calidad apropiada para capturar las propiedades físicas del habla, de forma que posibilite tanto los juicios de percepción de la precisión del habla como el análisis acústico del habla utilizando el software adecuado para esto. El equipo debe ser apto para transmitir o recibir una señal auditiva de aproximadamente 50 Hz a 15000 Hz para poder recibir todas las frecuencias de los sonidos del habla.

Hay una gran variedad de micrófonos disponibles. Siempre que una cámara de video digital tenga una entrada de micrófono externo, el investigador puede usar un micrófono por separado para asegurar la calidad de la grabación del audio. Los micrófonos de superficie, los cuales se apoyan sobre una superficie plana y recoge las señales de sonido desde múltiples direcciones, son útiles cuando un niño permanece en el mismo lugar y el investigador quiere entender el habla del adulto y la del niño.

Los micrófonos inalámbricos, al usarse con los niños, les permiten la libertad de moverse libremente, mientras se mantenga una distancia constante entre la boca del niño y el micrófono, y esto mejora la calidad de la señal del habla en la grabación.

Los procedimientos de recolección de datos siempre deben comenzar con una prueba del sistema de sonido, la cual se puede hacer con una salida de audio conectada a la grabadora de video. Al usar audífonos intraurales o auriculares, el investigador puede escuchar los sonidos mientras los graba. Esto previene contratiempos como fallas de batería o malas conexiones. Algunos investigadores optan por recolectar un audio separado como respaldo usando una grabadora de audio digital con un micrófono externo de buena calidad para asegurar la calidad del audio.

### **Análisis de datos: transcripción**

---

Una vez que las muestras han sido grabadas, se deben transcribir fonéticamente. El transcriptor escribe una glosa para las palabras objetivo, la cual es la palabra de origen como la produce un hablante adulto con ortografía normal, y típicamente también en AFI. Después se transcribe la producción del niño usando transcripción amplia o estrecha. La transcripción amplia es fonémica y no incluye información acerca de detalles fonéticos finos como la aspiración o grado de sonoridad. El uso de diacríticos adicionales puede incrementar el nivel de detalle en la transcripción, pero las transcripciones más detalladas generalmente dificultan alcanzar la

concordancia con el intertranscriptor. Se usa la transcripción amplia generalmente para representar la habilidad fonémica del niño, mientras que la transcripción estrecha incluye detalles fonéticos y representa la precisión fonética de la producción fónica del niño.

Hay varias limitaciones que considerar con las transcripciones fonéticas; la primera es que requiere de mucho tiempo y de oyentes entrenados, conocedores de la ciencia del habla (las propiedades de los sonidos individuales) y las características fonológicas y fonéticas de los sonidos de la lengua que transcriben. La experiencia del transcriptor con el habla del niño, la experiencia con la transcripción fonética, el conocimiento de la fonética y los sonidos de la lengua que se transcriben, así como la lengua materna del transcriptor, influyen en la transcripciones fonética (Edwards and Beckman, 2008b). En estudios comparativos de diversas lenguas o en estudios de niños bilingües, es importante contar con un hablante nativo de cada lengua que realice las transcripciones con el fin de evitar el sesgo perceptual de un oyente no nativo (Munson et al., 2010).

Debido a que las transcripciones fonéticas se basan en juicios subjetivos de transcriptores individuales, los investigadores normalmente reportan los acuerdos alcanzados o la confiabilidad de la transcripción. La confiabilidad se expresa como un porcentaje del acuerdo entre las transcripciones realizadas por dos transcriptores. Resulta problemático usar este método para validar las transcripciones, ya que el acuerdo entre los evaluadores se puede relacionar con muchos factores, entre ellos el tipo del habla que se transcribe y la formación de los transcriptores. El grado de acuerdo entre los transcriptores contribuye a la validez de un estudio. Si en un estudio hay poco acuerdo entre los transcriptores, la validez de los análisis basados en la transcripción es cuestionable. Los transcriptores pueden coincidir en la mayoría de los sonidos que produce el niño y pueden usar el mismo símbolo del AFI para transcribir los sonidos, pero para las producciones intermedias y los sonidos distorsionados, hay más probabilidad de que los transcriptores no estén de acuerdo. Estos puntos de desacuerdo son precisamente los que podrían proporcionar más información sobre las habilidades del niño; así que, sin el acuerdo de los transcriptores en estas producciones menos precisas, se pierde una considerable cantidad de información sobre dichas habilidades (Pye, Wilcox, and Siren, 1988). Otro método para lograr la validez de una transcripción fonética es usar un método por consenso, como el que describe Morris (2009) o Shriberg, Kwiatkowski y Hoffman (1984). En este método de validación, los transcriptores trabajan de manera independiente transcribiendo

los datos, después se comparan las transcripciones, y un tercer transcriptor escucha las discrepancias hasta que los transcriptores lleguen a un acuerdo sobre todos los sonidos producidos por el niño. En los casos donde dos transcriptores no están de acuerdo, un tercer transcriptor escucha los datos y contribuye con su percepción a la discusión hasta que se alcance consenso entre los transcriptores.

Phon, un programa de análisis fonológico en CHILDES (ver Corrigan, Capítulo 18 en este volumen), contiene un modo de transcripción ciega y permite que dos transcriptores independientes escuchen una producción y transcriban fonéticamente lo que escuchan. Una vez que ambas transcripciones estén preparadas, un modo de validación les permite a los transcriptores ver cualquier discrepancia entre los mismos, y acceder a los archivos de sonido de aquellas producciones para juzgar o validar la producción. La transcripción validada es la que se usa para analizar en los análisis finales. En este tipo de la validación de la transcripción, las producciones para las cuales no hubo consenso se pueden eliminar del análisis, para lograr una mayor confiabilidad de los datos fonológicos.

Se puede apoyar la transcripción fonética con un análisis acústico para determinar detalles más finos de la producción de los sonidos, como la sonorización o aspiración de una consonante. Mientras que el análisis acústico puede apoyar y ayudar a la transcripción en muchos casos, muchas propiedades fonéticas, como el tiempo al producir un sonido, están sujetas a la influencia de las variables del hablante, como la velocidad del habla y los patrones acentuales de la palabra o frase; y el análisis acústico no se puede usar para resolver todas las ambigüedades en la transcripción fonética (Rose, en prensa).

## **Análisis**

---

Hay dos tipos primarios de análisis fonológicos para el habla espontánea. El primero es un análisis independiente, el cual se usa típicamente para reportar las habilidades de producción del habla de niños muy pequeños en las primeras etapas del desarrollo lingüístico, desde el comienzo del habla hasta los 24 meses. El segundo es un análisis relacional, el cual refleja qué tan cercana es la producción del niño al objetivo y se usa para los niños que están en las últimas etapas del desarrollo fonológico en las que producen una variedad de formas de palabras y combinaciones fónicas.



## **Análisis independientes**

Un inventario fonético es la forma primaria del análisis independiente. Esta medida es meramente descriptiva y refleja los sonidos producidos por el niño; generalmente se organiza por la posición de la palabra. El investigador escucha el habla espontánea producida por el niño (generalmente durante una actividad con un juguete y acompañado de un padre) y cuenta los sonidos que produce el niño en la posición inicial, media y final. El investigador no decide si la producción del niño es correcta o precisa. Se trata simplemente de un informe de los sonidos escuchados. Normalmente, un sonido debe ocurrir en dos palabras diferentes para que se considere parte del inventario fonético del niño. Los inventarios fonéticos generalmente se reportan con el número de fonos que produce un niño (Dyson, 1988; Stoel- Gammon, 1985; Roberts et al., 1998; Rescola and Ratnez 1996). El número puede organizarse por la posición de la palabra (Inicial, media y final), o puede simplemente ser una tabla que contenga todos los sonidos que un niño usa según la posición en la palabra. Los inventarios fonéticos generalmente reportan la información de las consonantes producidas, pero otros inventarios son posibles como análisis independientes – por ejemplo, inventarios de las vocales (las vocales producidas por un niño) o inventarios de las formas de la palabra (la variedad de la sílaba fonotáctica y formas de palabras producidas por un niño). Ver Velleman (1998) para ejemplos de borradores de trabajo de inventario que ayudan en la organización de los datos.

## **Análisis relacionales**

Un análisis relacional refiere la producción del niño a un objetivo deseado, por lo general una forma adulta aceptable de una palabra, y la meta es medir la precisión y examinar los patrones de errores. Los resultados pueden enfocarse en los sonidos individuales, como el porcentaje de consonantes correctas (incluyendo las variantes de las consonantes), el porcentaje de vocales y fonemas correctos. También se pueden enfocar en la precisión de la forma de las palabras, como la coincidencia de la forma de las palabras, o incluso si todas las palabras combinan las formas adultas posibles y aceptables en medidas como la proximidad de la producción de todas las palabras o el porcentaje de las palabras correctas. Los investigadores pueden quizás querer reportar la información del uso específico de los patrones fonológicos o procesos fonológicos del niño, particularmente para el uso clínico, como la anterioridad o la

oclusión. Estos se miden en porcentaje de ocurrencia con respecto a la posibilidad de que ocurra un proceso (por ejemplo, Williams and Elbert, 2003).

Un problema con el que se enfrentan los investigadores en las tareas elicítadas es si los enunciados producidos espontáneamente o por imitación de un modelo adulto se deberían analizar como el mismo tipo de respuesta. Los que han investigado las diferencias entre las producciones espontáneas e imitadas encontraron que se llevan a cabo similarmente en las dos condiciones y que estas están altamente relacionadas y reflejan aproximadamente las mismas habilidades en los niños, aunque para algunos niños la condición imitada es más precisa que la condición espontánea, y vice versa (Goldstein, Fabiano, and Iglesias, 2004; Wertzner et al., 2006). Hay escasa investigación sobre esta cuestión, por lo que algunos investigadores han escogido exclusivamente las tareas de repetición para evitar la posibilidad de tener producciones espontáneas y repetidas, las cuales pueden ser producidas por los niños de manera diferente (Edwards and Beckman, 2008b).

En las tareas de imitación, particularmente en las de repetición de palabras inexistentes que pueden estar propensas a más variabilidad en la producción de los hablantes adultos, el uso de un formato estándar para la presentación puede ser de ayuda para asegurarse que todos los niños escuchen los mismos estímulos producidos de la misma manera. Gathercole y Baddeley (1989) usaron estímulos grabados previamente. Los cuales se presentaron con tres segundos de intervalo en sus estudios de repetición de palabras inexistentes. En nuestra experiencia, los niños pequeños no responden bien a los estímulos pre-grabados. En respuesta a las dificultades para conseguir que nuestro equipo de recolección de datos pronunciara los estímulos inexistentes de la misma forma todas las veces, intentamos usar un perro peludo con una bocina en su parte trasera, y eso hizo llorar a los niños (ver una experiencia similar en Ambridge, Capítulo 8 de este volumen). En su lugar, el investigador presentó los estímulos en vivo, pero en ese caso los errores y las inconsistencias en la presentación son inevitables y, por consiguiente, la presentación del investigador y la repetición del niño deben ser considerados en las medidas de precisión. En una tarea de imitación, la producción del niño debe ser anotada en relación con el modelo adulto que le fue presentado. En nuestros datos, encontramos variación dialectal en la producción de los niños, de manera que cuando un niño presentó una variación aceptable de una consonante de acuerdo con su dialecto, se valoró como correcta. Un buen ejemplo de esto fue la producción de la semivocal palatal (el sonido que corresponde a la

“ll”) en “ a a llo” en español. Si el niño produce la semivocal como una fricativa porque ese es el sonido que es estándar en su dialecto, lo aceptamos como una producción correcta.

Las medidas de precisión comúnmente utilizadas para los sonidos individuales son el porcentaje de las consonantes correctas, el porcentaje de las vocales correctas y el porcentaje de los fonemas correctos. El porcentaje de las consonantes correctas (PCC) se usa ampliamente y tiene diversas variantes (Shriberg and Keiatowski, 1982; Shriberg et al., 1997). Se calcula la unidad de medida básica cuando se da un punto por cada consonante que produce un niño correctamente en relación con el objetivo adulto, dividido por el número total de consonantes en una palabra.

Pocos investigadores han propuesto unidades de medida de la palabra completa para medir la precisión. La medida de toda la palabra más ampliamente reportada es la longitud promedio de la oración fonológica de Ingram (Promedio de longitud fonológica), y la medida relacional es proporcional a la proximidad de toda la palabra (Ingram and Ingram, 2001; Ingram, 2002). La PDLF se calcula como la medida independiente de la precisión a nivel de palabra del niño. Cada palabra que produce el niño recibe un punto basado en el número de sonidos producidos por el niño y el número de consonantes en la palabra que se produjeron con precisión a partir de la referencia de la forma adulta. Esta medida se usa para rastrear el desarrollo en la habilidad fonológica en un niño a través del tiempo, pero hay poca información disponible sobre las propiedades psicométricas de esta medida. La proporción de la proximidad de toda la palabra (PPTP) es una proporción de PDLF dividido por el PDLF de la forma adulta de la palabra objetivo.

Stoel-Gammon (2010b) reportó una medida de la complejidad de la palabra proporcionalmente y una medida proporcional de la complejidad de la palabra. A cada palabra en una muestra se le asigna o se le otorga un puntaje de “ complejidad” on a se en patrones de palabra, estructuras silábicas, y clases de sonido. La complejidad como un concepto en el desarrollo fonológico no está bien acordado, aunque en este caso se relaciona con los patrones de las primeras producciones de los niños pequeños y la información normativa sobre la adquisición de los sonidos. En general, los patrones de desarrollo observados en niños en cuanto a sonidos y patrones adquiridos tempranamente se describen como menos complejos, y aquellos relacionados con sonidos y patrones adquiridos posteriormente se describen como más complejos. La palabra medida de complejidad se puede utilizar como un análisis

independiente considerando únicamente la producción del niño, o como un análisis relacional mediante el cálculo de una proporción de la complejidad de los enunciados de un niño con las correspondientes formas adultas de las palabras objetivo. La medida de Stoel-Gammon es similar al índice de complejidad fonética desarrollado por Jakielski, Maytasse, y Doyle (2006) y descrito en Morris (2009).

Un problema que surge con las tareas elicítadas es que un niño no pueda repetir la palabra deseada, incluso cuando lo solicita el investigador. Para que una tarea elicítada, como es un test estandarizado, sea calificada de la misma manera con todos los niños, cada uno de ellos debe producir todos los ítems de la prueba. La información faltante en un conjunto de datos crea un dilema al momento de evaluar. En el caso de nuestras tareas de imitación de palabras existentes e inexistentes, hemos dado un 0 cuando no hay respuesta, lo cual ha sido problemático porque las respuestas no precisas pueden ser valoradas con 0 en algunos casos, sin embargo, la falta de respuesta es muy diferente de una respuesta con poca precisión. Hemos calculado puntos producidos de PCC contra todos los ítems administrados, incluyendo los que están sin respuesta. En los análisis de nuestras enormes bases de datos, las dos medidas fueron altamente correlacionadas, y la diferencia en los valores promedio no afectó nuestros análisis. Pero este es un buen ejemplo de un caso en el cual una medida ponderada o una medida de precisión más compleja, como las mencionadas anteriormente, pueden ser más robustas, particularmente para niños de manera individual o para grupos pequeños.

## **Programas de Análisis Automatizados**

---

Hay pocos programas de software que ofrecen análisis automatizados o semi automatizados de las transcripciones fonéticas del habla. El programa Fonético Internacional de Lógica (PFIL), desarrollado por Kim Oller y sus colegas, es un software comercial que se usa para análisis fonológicos. Funciona con el sistema operativo de Windows, y los datos se guardan en un formato propio. La PFIL permite una medida de precisión ponderada, desarrollada por Oller y colegas (Oller and Ramsdell, 2006), así como lo hace PCC.

Phon es un software de acceso libre diseñado para la investigación fonológica (Rose et al.,

2006). Es parte del sistema de <sup>1</sup>CHILDES soporta multimedia, y permite búsquedas automatizadas de grandes bases de datos fonológicas. Phon tiene algunos atributos únicos, como la habilidad de unir videos multimedia y archivos de audio directo a las transcripciones. Las características de la búsqueda de Phon permiten a los usuarios diseñar sus propias preguntas fonológicas complejas basadas en los sonidos o características y considerar la sílaba o la posición de la palabra y los patrones acentuales en el análisis de los datos. Permite a los usuarios rastrear la producción de un niño a través del tiempo en el caso de estudios longitudinales, y permite la comparación del grupo en el caso de estudios transversales, por ejemplo, por grupos de edad o poblaciones. Se pueden exportar los datos (como Unicode de símbolos de AFI) en una hoja de cálculo y analizarlos por separado para mayor precisión.

### **Constructos relacionados**

Hay algunas medidas psicolingüísticas relacionadas con la fonología, las cuales valen la pena mencionar, dada la frecuencia con la que se describen en la literatura sobre el desarrollo de la habilidad lectora y las discapacidades lingüísticas. *El procesamiento fonológico, la conciencia fonológica, la sensibilidad fonológica y la memoria fonológica* son términos que se refieren al procesamiento psicológico de los sonidos del habla más que a la producción o al conocimiento directo de los sonidos de estas. Estas medidas de conocimiento fonológico están fuertemente asociadas con los resultados de alfabetización en los niños pequeños en edad escolar.

El proceso fonológico se refiere a un trío de habilidades que están relacionadas con el desarrollo de la alfabetización. Las tres habilidades son la conciencia fonológica, la memoria fonológica, y el nombramiento automático rápido. La conciencia fonológica se refiere a un conjunto de habilidades meta cognitivas que involucran la manipulación de los sonidos y la secuencia de sonidos en las palabras. El término puede referirse a un número de diferentes habilidades que se enfocan a más grandes o más pequeñas unidades fonológicas, como la palabra o la sílaba, o fonemas individuales. En general, la conciencia fonológica se refiere a las tareas para determinar la conciencia sobre las sílabas, las unidades subsilábicas (arranques y rimas), y fonemas individuales. Las tareas en el nivel silábico generalmente se reportan como

---

CHILDES: Sistema del Banco del habla de los niños que componen el idioma de los niños

más fáciles que las tareas de inicio y rima o en el nivel fonémico, las tareas en el nivel fonémico son las más difíciles. La conciencia fonémica se refiere a la capacidad de manipular fonemas individuales dentro en una palabra y se mide generalmente al poner a un niño a suprimir los fonemas iniciales o finales de una palabra y a decir la parte restante de la palabra, o al identificar o nombrar los sonidos al comienzo y al final de la palabra. Como sucede con otras medidas de conocimiento fonológico, el tipo de tarea influye en el desarrollo. Por ejemplo, identificar las rimas que combinan es más fácil que producir o generarlas. La posición de un sonido en la palabra y los rasgos de los sonidos del habla también pueden afectar el desempeño. Por ejemplo, es más fácil identificar los sonidos en la posición inicial que en la posición final (de Graaff et al., 2008), y es más fácil eliminar un obstruyente final que una sonora (Yavas and Core, 2006). Hay varias medidas estandarizadas de conciencia fonológica y conciencia del fonema disponible. *La sensibilidad fonológica* es un término propuesto por Stanovich (1992) para abarcar el conjunto de habilidades relacionadas que están asociadas con la conciencia fonológica en diferentes niveles de dificultad. En la bibliografía sobre los estudios del desarrollo de la lectura, la conciencia fonológica con frecuencia se refiere a la sensibilidad fonológica, particularmente cuando se usan diferentes tareas de conciencia fonológica como una medida compuesta.

A la *memoria fonológica* también se le llama memoria ejecutiva verbal, y generalmente se evalúa a través de la repetición de palabras inexistentes. Se ha propuesto como la memoria para los sonidos del habla, aunque las medidas de repetición de palabras inexistentes se usan también con otros constructos, como la percepción del habla y los aspectos motores de la producción y planeación del habla. Los conjuntos más utilizados de palabras inexistentes son de la CNRep (Gathercole and Baddeley, 1996), NRT (Dollaghan and Campbell, 1998), y Munson, Edwards, y Becman (2005b). Para una revisión de las tareas de las palabras inexistentes, ver Archibald and Gathercole (2006). Hay también publicaciones recientes de tareas de repetición de palabras inexistentes para el español) (ver Gutiérrez-Clellen and Simon-Cerejido, 2010; Girbau and Schwartz, 2008; Ebert et al., 2008; Summers et al., 2010).

## **Conclusión**

---

Este capítulo revisó la evaluación de la fonología en los niños pequeños y describió las formas

en las que la fonología se estudia en el desarrollo lingüístico. La fonología y los constructos basados en la fonología como la frecuencia de los sonidos y las combinaciones afectan el aprendizaje de la palabra, y las propiedades pueden influir en qué palabras dicen los niños y con qué precisión pueden producirlas y pueden influir en las palabras que los niños intentan producir. Se puede recolectar información fonológica a través de muestras de habla espontánea o con tareas elicidadas, como una prueba estandarizada de articulación. Ambas medidas independientes (cualitativas) y relacionales (cuantitativas) se pueden usar para analizar datos fonológicos. Las tareas de repetición de palabras inexistentes son útiles para investigar la interfaz léxica fonológica y para las habilidades de la memoria fonológica en los niños pequeños. Hay varios factores que pueden afectar la fiabilidad de la información fonológica (habla del niño), los cuales incluyen los métodos de elicitación, la calidad de la grabación, y la fiabilidad de la transcripción fonética. Recientemente, los métodos automatizados para la organización y análisis de los datos están disponibles, y estas herramientas deberían mejorar la productividad investigativa sobre el desarrollo fonológico y el papel de la fonología en el desarrollo lingüístico.

### **Términos clave**

***Densidad del contexto vecino.*** El número de palabras que difieren de un solo fonema de la palabra objetivo.

***Fonema.*** La unidad más pequeña de sonido de una lengua que se puede usar para contrastar los significados en dicha lengua.

***Fonética.*** El estudio de la producción y percepción de los sonidos del habla, que incluye descripciones acústicas y fisiológicas de los sonidos.

***Conciencia fonológica.*** La habilidad de identificar y manipular los sonidos de una lengua en una tarea auditiva.

***Memoria fonológica.*** Memoria ejecutiva de corto plazo para los sonidos del habla.

***Procesamiento fonológico.*** Un conjunto de habilidades relacionadas a la codificación fonológica, que incluyen la conciencia fonológica, la memoria fonológica, y el nombramiento automático rápido.

***Sensibilidad fonológica.*** Habilidad para analizar los sonidos del habla en una variedad de niveles, que incluye habilidades de conciencia fonológica y fonémica.

**Fonología.** El estudio de los sonidos y sus patrones de sonidos en una lengua, que incluye las maneras en que los sonidos se unen para formar palabras y cambiar los significados. La fonología puede incluir el estudio de las sílabas, los patrones acentuales, la prosodia, y la entonación.

**Probabilidad fonotáctica.** Una medida de la probabilidad de la ocurrencia de una secuencia de sonido en un lenguaje.

**Fonotáctica.** Las secuencias de sonido posibles y las estructuras silábicas en las palabras de una lengua.

#### **IV. ANALYSIS OF THE PROBLEMS AND OBSTACLES ENCOUNTERED DURING THE TRANSLATION PROCESS.**

In this chapter the analysis of the translation process is presented and explained in detail. The problems are presented as following: First, the syntactic problems, second, the lexical; third, the morphological and finally, the semantic problems. Every problem is presented along with the original sentence in its source language. Subsequently, the problem with its corresponding solution is explained in detail. Finally, the solution of the problems is presented in the final translation version.

##### **4.1 Analysis of the problems**

In this chapter, the category of the problems will be explained with detail starting with the syntactic, lexical, semantic and morphological problems, followed by a morphological and semantic problem and ending with a morphosyntactic problem.

###### **4.1.1 Syntactic problems**

There were plenty of syntactic problems that are the passive voice, the pro-drop phenomenon, the order of the adjectives and ellipsis. All of them will be explained with their respective examples.

###### **4.1.1.1 The passive voice**



The source sentences were in English and the tense was passive voice. My main error was to keep most of the times the passive voice instead of changing it into active voice. The passive voice is barely used in Spanish, on the contrary, the active voice is used more frequently. The following are examples related to the previous.

### **Example one**

#### **Original sentence**

Researchers in a variety of disciplines are interested in the phonological development of young children.

#### **First translation**

*Investigadores en una variedad de disciplinas están interesados en el desarrollo fonológico de los niños pequeños.*

In the first translation the technique used was literal translation; however, owing to the fact that in Spanish the passive voice is not frequently used, it was changed into an active voice.

#### **Final translation**

*Investigadores de diversas disciplinas se han interesado en el desarrollo fonológico de los infantes.*

### **Example two**

#### **Original sentence**

Methodological considerations for data collection for both naturalistic and elicited speech productions and analysis are discussed.

#### **First translation**

*Se discute y analiza las consideraciones metodológicas para la recolección de datos para ambas producciones del habla naturalista y elicitada.*

First this sentence was translated using the modulation technique the change of “discute” for “discuten” was in order to give coherence to the sentence then the Syntax of the sentence was changed from passive into active so “analiza” changed into “análisis”.

### **Final translation**

*Se discuten las consideraciones metodológicas para la recolección de datos tanto para la producción del habla natural y elicitada; y su análisis correspondiente.*

### **Example three**

#### **Original sentence**

Table 6.1 contains a list of IPA symbols commonly used to transcribe standard English speech.

#### **First translation**

*La Tabla 6.1 contiene una lista de símbolos del IPA comúnmente usados para transcribir el habla estándar Inglés.*

The sentence was change from passive voice to active voice, owing to, the passive voice is not frequently used in Spanish. At the end of the sentence the order of the adjective was not accurate “el habla estandar Inglés” was modified to “el habla del Inglés estándar” this happened because in Spanish the noun goes first followed by the adjective, which in English is the other way around.

#### **Final translation**

*La Tabla 6.1 contiene una lista de símbolos del AFI que se usan comúnmente para transcribir el habla del Inglés estándar.*

#### **4.1.1.2 The pro-drop phenomenon**

The pro-drop phenomenon was the most challenging to me, for the reason that I was not aware of the omission of the subject. In some languages, this phenomenon may appear dropping the pronoun in a sentence due to the fact that it is inferable in the conjugation of the verb.

## **Example one**

### **Original Sentence**

Before a child begins to produce the words or grammar of his language, he begins with sound production in vocal play and babbling.

### **First translation**

Antes de que un niño empiece a producir palabras o la gramática de su lengua, él empieza con la producción de sonidos en el juego vocal y balbuceo.

This sentence was translated successfully using the literal translation technique. However, there was a tiny mistake the pronoun „él“ in Spanish does not need to be translated because Spanish is a pro-drop language which means that it permits the omission of the pronominal subject. The words “*empieza con*” were changed to “*inicia*” so as to sound natural.

### **Final translation**

Antes de que un niño empiece a producir palabras o la gramática de su lengua, empieza con la producción de sonidos en el juego vocal y en el balbuceo.

## **Example two**

### **Original sentence**

Additionally, in order to parse the general articulation abilities of children from their ability to repeat noundword sound sequences, we administered a real-word repetition task and a phonologically matched nonword repetition task.

### **First translation**

Adicionalmente, para poder analizar las habilidades articulatorias generales de los niños desde su habilidad para repetir secuencias de sonidos de palabras inexistentes, nosotros administramos una tarea de repetición de una palabra existente y una tarea de repetición de una palabra inexistente unida fonológicamente.

This is another clear example of the Pro-drop phenomenon. In this sentence the error was to translate the pronoun „we“ into Spanish as „nosotros“. For the previous error the pronominal subject „we“ is omitted and the word „administramos“ infers who is the pronominal subject. The

word “administramos” was changed for “aplicamos” which suits better in the context. The word “unida” was also changed to “relacionada” because of the same reason.

### **Final translation**

Adicionalmente, para distinguir las habilidades articulatorias generales de los niños de su habilidad para repetir secuencias de sonidos de palabras inexistentes, aplicamos una tarea de repetición de palabras reales y una tarea de repetición de una palabra inexistente relacionada fonológicamente.

#### **4.1.1.3 The order of the adjectives**

Adjectives order is one of the basic errors I had also to deal with too concerning the syntactic problems. Clearly established in the book English Grammar I, written by Macola-Rojo, C. (1998). The rule of the attributive adjective which is; The adjective is placed before the noun it modifies, forms a unit with the noun modified. The problems are presented below.

#### **Example one**

##### **Original sentence**

Typically, a sound must occur in two different words in order to be considered a part of the child's phonetic inventory.

##### **First translation**

Normalmente, un sonido debe ocurrir en dos diferentes palabras para ser considerada parte del inventario fonético del niño.

Firstly, the original sentence was translated into Spanish using the literal translation technique. Nevertheless, an adjective problem arose at the middle of the sentence “different words” was translated inaccurately owing to I did not follow the rule of the attributive adjective. This is why I changed “diferentes palabras” for “palabras diferentes”.

##### **Final translation**

Normalmente, un sonido debe ocurrir en dos palabras diferentes para que se considere parte del inventario fonético del niño.

## **Example two**

### **Original sentence**

This prevents mishaps from battery failure or poor connections.

### **First translation**

Esto previene contratiempos como fallas de batería o conexiones malas.

This sentence was translated into Spanish using the transposition technique, in the end of the sentence the noun phrase “poor connections” was translated to “*conexiones malas*” which is suitable due to the fact that it joints completely to the idea of the author. However, the phrase “*conexiones malas*” sounded odd and so the order of the phrase changed to “*malas conexiones*” this change made the sentence coherent.

### **Final translation**

Esto previene contratiempos como fallas de batería o malas conexiones.

## **4.1.1.4 Ellipsis**

The Ellipsis problem is a problem I had when translating particular sentences. I used the literal translation technique, instead of using the modulation one which fits best in the ellipsis problem. Owing to the fact that ellipsis can omit some words of the sentences without exchanging the meaning of the sentence.

### **Example**

#### **Original sentence**

At the point of word combinations, children expand their phonological system quite quickly, acquiring more consonants, gaining greater accuracy of consonants used, and producing a broader range of word shapes.

#### **First translation:**

*En el punto de las combinaciones de palabras, los niños expanden su sistema fonológico muy rápido adquiriendo más consonantes, ganando mejor uso de exactitud de consonantes, y produciendo un rango más amplio de formas de las palabras.*

In the first translation the technique I used was literal translation. However, it was changed for the modulation technique so as to make it sound natural.

In the first translation the noun phrase “*En el punto*” was exchanged for “*En el proceso de combinación de palabras*” due to the fact it sounds more natural because the previous sentence refers to that process. The words phrase “*de las combinaciones de palabras*” were cut out due that the sentence keeps its semantic content even without them; this is called ellipsis.

#### **Final translation:**

*En el proceso de combinación de palabras, los niños expanden su sistema fonológico rápidamente, adquiriendo más consonantes, logrando mayor precisión en las consonantes, y produciendo un rango más amplio de formas de palabras.*

#### **4.1.2 Lexical problems**

The lexical problems were a challenge to me, on the grounds that, if your lexicon is not big enough translating these specific problems could become a really hard task. As it is showed next in the lack of vocabulary and the preposition sections.

##### **4.1.2.1 Lack of vocabulary**

The whole lexical problems have to do with the lexicon. In this part there are some problems regarding the lack of the vocabulary from the translator.

#### **Example one**

##### **Original sentence**

Methodological considerations for data collection for both naturalistic and elicited speech productions and analysis are discussed.

##### **First translation**

*Se discute y analiza las consideraciones metodológicas para la recolección de datos para ambas producciones del habla naturalista y elicitada.*

This sentence was translated using the modulation technique; however, there is an obvious lexical problem: the phrase “*habla naturalista*” sounds odd in Spanish that is why it was replaced by “*habla natural*”.

### **Final translation**

*Se discuten las consideraciones metodológicas para la recolección de datos tanto para la producción del habla natural y elicitada y su análisis correspondiente.*

### **Example two**

#### **Original sentence**

Table 6.2 shows proposed ages of acquisition for English organized by early, middle, and late sounds.

#### **First translation**

*La tabla 6.2 muestra las edades de adquisición propuestas por organización Inglesa de sonidos primero, medio y último.*

The first translation was changed using the modulation technique. At the end of the sentence the words “*primero, medio y ultimo*” was changed to “*tempranos, medios y tardios*” in order to make the sentence accurate because of the lack of technical vocabulary in my first language.

#### **Final translation**

*La Tabla 6.2 muestra una propuesta de las edades de adquisición para el caso del inglés, organizadas por sonidos tempranos, medios y tardíos.*

### **4.1.2.2 Preposition problems**

There are some preposition problems that were wrongly used, so exchanging the wrong preposition to a suitable one was the solution to some lexical problems. Thus, the techniques used in some sentences were not accurate so they were changed for another appropriated technique.

### **Example one**

#### **Original sentence**

Phonological development and terminology related to phonology are defined.

#### **First translation**

*Se define el desarrollo fonológico y la terminología relacionada a la fonología.*

The problem was that the preposition “a” is not the correct one because word “relacionada” is followed by “on”. The sentence changed from passive voice into an active voice owing to the fact that it sounds more natural in Spanish.

#### **Final translation**

*Se define el desarrollo fonológico y la terminología relacionada con la fonología.*

### **Example two**

#### **Original sentence**

At the point of word combinations, children expand their phonological system quite quickly, acquiring more consonants, gaining greater accuracy of consonants used, and producing a broader range of word shapes.

#### **First translation**

*En el punto, de las combinaciones de palabras, los niños expanden su sistema fonológico muy rápido adquiriendo más consonantes, ganando mejor uso de exactitud de consonantes, y produciendo un rango más amplio de formas de las palabras.*

I used the literal translation technique, however; it is clearly not acceptable in this sentence. Therefore, the modulation technique was applied, changing the whole sentence.

#### **Final translation**



*En el proceso de combinación de palabras, los niños expanden su sistema fonológico rápidamente, adquiriendo más consonantes, logrando mayor precisión en las consonantes, y produciendo un rango más amplio de formas de palabras.*

#### **4.1.3 Semantic problem**

In some sentences the logic and the meaning of some ideas were not translated accurately. Due to the previous, the semantic problem can clearly be appreciated. The next sentence is a notorious example of a semantic problem encountered when translating.

##### **Original sentence**

Before a child begins to produce the words or grammar of his language, he begins with sound production in vocal play and babbling.

##### **First translation**

*Antes de que un niño empiece a producir palabras o la gramática de su lengua, él empieza con la producción de sonidos en el juego vocal y el balbuceo.*

As you can see the literal translation technique is presented once again. It was necessary to omit the pronoun “él” because Spanish identifies who is addressing to, due to the conjugation of the verb. “*En el*” was added before “*balbuceo*” in order to make the sentence coherent.

##### **Final translation**

*Antes de que un niño empiece a producir palabras o la gramática de su lengua, inicia la producción de sonidos con el juego vocal y el balbuceo.*

#### **4.1.4 Morphological problems**

In this section the morphological problems highlight the mistakes made when structuring words and phrases.

##### **Example one**

### **Original sentence**

Instead, we had the examiner present the stimuli live, but in that case errors and inconsistency in presentation are inevitable, and thus both the examiner's presentation and the child's repetition need to be considered in the accuracy measure.

### **First translation**

*En su lugar, tuvimos al investigador presentando los estímulos en vivo, pero en ese caso los errores y las inconsistencias en la presentación son inevitables, y por consiguiente la presentación del investigador y la repetición del niño deben ser considerados en la medida de precisión.*

This sentence was translated wrong due to the fact that I used the literal translation technique. The sentence sounded odd, so the modulation technique was applied this made the sentence coherent. Besides the previous error, there is another mistake. The noun phrase “the accuracy measure” was translated as “*la medida de precisión*” which is not suitable. The word „measure“ was translated as a singular word when normally in English it is used a plural word so the translation was changed to “*las medidas de precisión*” in order keep the original idea.

### **Final translation**

*En su lugar, el investigador presentó los estímulos en vivo, pero en ese caso los errores y las inconsistencias en la presentación son inevitables y, por consiguiente, la presentación del investigador y la repetición del niño deben ser considerados en las medidas de precisión.*

### **Example two**

#### **Original sentence**

Syllable is made up of an onset and a rhyme, and the rhyme is made up of the nucleus and the coda.

#### **First translation**

*La sílaba esta compuesta por un ataque y una rima, y la rima esta compuesta de el núcleo y el coda.*

This sentence is an example of the literal translation; however, there is a morphological problem the coda was translated first as “*el coda*” instead of “*la coda*”. This substitution was necessary so as to have gender agreement in Spanish. Another change was necessary, the word “*la rima*” were replaced for “*esta*” due to the fact it sounds unusual in Spanish.

### **Final translation**

*La sílaba está compuesta por un inicio y una rima, y esta está compuesta del núcleo y la coda.*

#### **4.1.5 Morphological and semantic problem**

This is an example of a sentences wrongly translated with semantic and morphological problems.

### **Original sentence**

Children may say one word several times, and productions of the same word may vary within a session and across sessions.

### **First translation**

*Los niños probablemente digan una palabra muchas veces, y la producción de la misma palabra podrá variar dentro de una misma sesión y a través de las sesiones.*

This sentence was translated using the literal translation technique. Nevertheless, the first translation was not a suitable translation because the tense in Spanish was not accurate. The adverb “*probablemente*” together with the verb “*digan*” were translated wrongly because I thought the modal “may” has a different use. I was not considering the probability of this modal so “*probablemente*” was changed to “*pueden*” and “*digan*” to “*repetir*” maintaining the source idea.

### **Final translation**

*Los niños pueden repetir una palabra varias veces, y la producción de la misma palabra puede variar en una misma sesión y en diferentes.*

#### **4.1.6 Morphosyntactic problem**

As its name says it is a combination of morphology and syntactic problems.

### **Gender agreement**

#### **Original sentence**

Phon, a phonological analysis program within CHILDES (see Corrigan, Chapter 18 this volume), contains a blind transcription mode and allows two independent transcribers to listen to a production and phonetically transcribe what they hear.

#### **First translation**

*Phon, un programa de análisis fonológico dentro de CHILDES (ver Corrigan, Capítulo 18 este volumen), contiene un modo de transcripción ciego y permite a que dos transcripores independientes escuchar una producción y transcriban fonéticamente lo que escuchan.*

In this sentence the literal translation technique was applied making the sentence suitable and understandable. Despite this there is a gender agreement problem. The word “ciego” was not translated correctly for the reason that it does not make the gender agreement with the word “transcripción” so the suffix “go” was changed to “ga” in order to make the sentence coherent.

#### **Final translation**

*Phon, un programa de análisis fonológico en CHILDES (ver Corrigan, Capítulo 18 en este volumen), contiene un modo de transcripción ciega y permite que dos transcripores independientes escuchen una producción y transcriban fonéticamente lo que escuchan.*

### **4.2 Sampled Chart of the taxonomy used in the translation.**

In this section, a chart with the taxonomy used in this translation is presented. Every method comes together with its own example taken from this translation.

<b>Direct translation</b>	<b>Source language</b>
The direct translation is divided into three types which are:	Researches in a variety of disciplines are interested in the phonological development of young children.
<b>Literal Translation</b>	<b>Target language.</b>

	<p><i>Investigadores de diversas disciplinas se han interesado en el desarrollo fonológico de los infantes.</i></p>
<p><b>Linguistic Borrowing</b></p>	<p><b>Source language</b></p> <p>Some researchers choose to collect a separate <b>audio</b> back-up using a digital audio recorder with a good quality external microphone to ensure audio quality.</p> <p><b>Target language</b></p> <p><i>Algunos investigadores optan por recolectar un <b>audio</b> separado como respaldo usando una grabadora de audio digital con un micrófono externo de buena calidad para asegurar la calidad del audio.</i></p>
<p><b>Calque</b></p>	<p><b>Source language</b></p> <p>As long as a digital video camera has an external microphone jack, the examiner can use a separate microphone to ensure the quality of the audio recording.</p> <p><b>Target language</b></p> <p><i>Siempre que una cámara de video digital tenga una entrada de micrófono externo, el investigador puede usar un micrófono por separado para asegurar la calidad de la grabación del audio.</i></p>

<p><b>Transposition</b></p>	<p><b>Source language</b></p> <p>This prevents mishaps from battery failure or poor connections.</p> <p><b>Target language</b></p> <p><i>Esto previene contratiempos por fallas de batería o malas conexiones.</i></p>
<p><b>Modulation</b></p>	<p><b>Source language</b></p> <p>A variety of microphones types are available.</p> <p><b>Target language</b></p> <p><i>Hay una variedad de micrófonos disponibles.</i></p>
<p><b>Equivalence</b></p>	<p><b>The equivalence technique was not needed in this translation.</b></p>
<p><b>Adaptation</b></p>	<p><b>Source language</b></p> <p>Phonology goes beyond the surface or phonetic details of speech production to the way a child uses the sounds to change meaning in words, and is often used <b>as an umbrella</b> term to refer to all of the factors of child speech production and phonological knowledge.</p> <p><b>Target language</b></p> <p><i>La fonología va más allá de la superficie o de los detalles fonéticos de la producción del habla a la forma en la que un niño usa los sonidos para cambiar el significado de las palabras, y se usa constantemente como un término <b>vasto</b> que abarca todos los factores de</i></p>

Regarding the analysis in general, my principal problems when translating the chapter “Using Phonological knowledge” were syntactical, lexical, semantic, morphological, as well as spelling and orthography. I had various errors but my most common problem was keeping the passive voice and the least one was the ellipsis. Reading different articles from the same author helped me to understand about her writing style. In addition to this, it helped me to have a better understanding of this academic text, which is part of the linguistics field. An expert in linguistics provided me feedback that solve several doubts and errors I had with some technical terms. The most challenging part was to identify the techniques and change them when the translations were unsuitable. My other supervisors also provided me feedback which made easier to identify sentences wrongly translated and exchange them into a faithful translation.

## **CONCLUSIONS AND RECOMMENDATIONS**

The main objective of this monography was to provide a faithful and accurate translation of the chapter “Using phonological knowledge” from the book “Research Method in Child Language: A Practical Guide”. The monography contains a faithful translation of the chapter that passed through several revisions from three different experts in the fields of translation and linguistics. Furthermore, it also includes a consistent analysis of the problems encountered during the whole process of this work, with their respective techniques and strategies applied in order to solve them.

There were numerous problems encountered while translating this chapter. Firstly, there were various lexical problems owing to the fact that the text contained specialized vocabulary; in order to understand all of this specific vocabulary, several tools were needed. Secondly, I faced syntactic problems, my most frequent mistake was keeping the passive tense into the target language, which rarely uses passive tenses. In addition to the syntactic problems, I had to deal with the interference of my mother tongue that made me do errors such as the Pro-drop phenomenon and the order of the adjectives. Errors and mistakes can vary depending on the kind

of text. All in all, each problem was solved successfully after a detailed revision with an expert in linguistics.

Among the most used translation techniques the main technique used in this work was Literal translation. However, there were some occasions during the process of this translation in which it was wrongly applied. Nevertheless, those errors were corrected. The adaptation technique, which has no comparison with the literal translation technique, was perfectly appealing to a case in which I was repetitive on using literal translation. This case in particular reminded me that translation is not about transmitting words but ideas.

The translation chapter is followed by an analysis of the problems faced while translating. This, in particular, was the second challenge that I encountered while working on this monograph. There are several parts of a sentence that it is important to take into account when analyzing what went wrong in the translation of an idea. For instance, the tense, the subject, the verb, the complement, the direct object and the indirect object are some of the parts that need to bear in mind when comparing and analyzing a sentence. It is necessary to identify what type of problem it is according to what when wrong while translating. With the acquired knowledge from the English language major I could identify if the problem was a lexical, syntactic, morphological or semantic, while doing the analysis. Nevertheless, there are numerous differences in each language and meticulous grammatical categories that make the process of comparing and analyzing a demanding mental task.

The process of translation requires a wide range of resources so as to cope with the different problems that would emerge while working on this monography. In order to fully understand the text it was important to familiarize with the field in matter. Studies from the same author helped me to have a clear idea of the author's writing style. Some physical and digital dictionaries as well as books, and information from linguistic terms helped me out to comprehend the text. From my experience, I would recommend novice translators that they should have an extensive list of resources and tools in order to translate any type of text. It is essential to bear in mind that the first thing to do when translating is to fully understand all the ideas.

At the time of translating it is essential to provide an adequate register of the text as well as taking into account the target audience. All the resources mentioned above and chiefly, the help of an expert in Linguistics were the key to produce a loyal translation. Thanks to the



supervision of the experts a wide range of problems were solved, such as the misunderstanding in the Spanish production that contains technical vocabulary.

Novice translators must be aware that translation is not a simple task, on the contrary, it is a complex time-consuming mental task. It is advisable to keep steadily calm and not to precipitate when a problem emerges. Many drafts would have been written before accomplishing the final version of the translation, therefore making a pause and doing an external activity would help translators to clear their mind up when they get stuck in a problem that it may look impossible to solve.

With this work I hope to contribute to the translation academic texts and to provide a useful material for future translators, teachers, students and any person who would like to make use of this academic text. Future lines of investigation would be benefited also. This work will be available for any Spanish speaker who does not know English. In addition, translators will have access to this academic translation in which the analysis provides examples and solutions to the problems faced. Having all this information available would make easier the act of translating this sort of text.

## **REFERENCES**

- Arcona, C., (2012, September). La adquisición del lenguaje en la etapa de 0 a 3 años. Trabajo Fin de Grado en Educación Infantil. Universidad de Valladolid , Valladolid-Yucatan.
- Bennet, J. (2016). Proz. com. Retrived from <https://www.proz.com/kudoz/>
- Cambridge Dictionary Online, (2009). Cambridge Dictionary,. Retrieved from <https://dictionary.cambridge.org/>
- Core, C., & Scarpelli, C. (2015). Phonological development in young bilinguals: Clinical implications. In Seminars in speech and language (Vol. 36, No. 02, pp. 100-108). Thieme Medical Publishers. DOI: 10.1055/s-0035-1549105
- Diccionario de la Lengua Española. (2001). Real academia Española de la Lengua. Retrieved from <https://dle.rae.es/?w=diccionario>

- Farlex, I. (2003). TheFreeDictionary.com. Retrieved from <http://es.thefreedictionary.com>
- Flores, J.A. (2006). La malinche, portavoz de dos mundos. Estudios de cultura Náhuatl. Instituto de Investigaciones Históricas - UNAM, 37, 117-137. Retrieved from <http://www.historicas.unam.mx/publicaciones/revistas/nahuatl/pdf/ecn37/755.pdf>
- Garcia, E. (2011). La importancia de la traducción en la estructura y cohesión de textos: Vol. 1. Del texto a la lengua: la aplicación de los textos a la enseñanza-aprendizaje del español L2-LE (pp. 349-362). Retrieved from <https://dialnet.unirioja.es/servlet/articulo?codigo=5419402>
- Google traductor. (n.d.). Retrieved from <https://translate.google.com/?hl=es>
- Herrezuelo, M. E., (2014). El desarrollo del lenguaje oral de 3 a 6 años y sus principales trastornos. Trabajo Fin de Grado en Educación Infantil. Universidad de Valladolid, Valladolid-Yucatan
- Hoff, E., Core, C., & Bridges, K. (November, 2008). Non-word repetition assesses phonological memory and is related to vocabulary development in 20- to 24-month-olds. Journal of Child Language, 35(4), 903-916. DOI: 10.1017/S0305000908008751
- Hoff, E., & Core, C. (2013). Input and Language Development on Bilingually Developing Children. US National Library of Medicine National Institutes of Health, 34(04), 215-226. DOI: 10.1055/s-0033-1353448
- Hurtado, A. (1996). La traductología: lingüística y traductología. Universitat Autònoma de Barcelona. No. 1 pp 151-160.
- Instituto Cervantes. (2018). El Español: Una lengua viva. Informe 2018. Retrieved from [https://cvc.cervantes.es/lengua/espanol\\_lengua\\_viva/pdf/espanol\\_lengua\\_viva\\_2018.pdf](https://cvc.cervantes.es/lengua/espanol_lengua_viva/pdf/espanol_lengua_viva_2018.pdf)
- [CONFIRMAR EN PAGINA 221, INFORMES en esa página está, lo modifique pero si queda! :D](#)
- [hay dos opciones que considero](#)

- Landesman, B. (2002). WordReference.com. Retrieved from <http://www.wordreference.com>
- Latorre, C. & Puyuelo, M. (2016). Análisis del desarrollo lingüístico y comunicativo de un niño con síndrome de Asperger: un estudio de caso, 6(2), 142–168.
- Linguee Dictionary. (2019, December 19). Linguee. Retrieved from <https://www.linguee.com>
- Macola Rojo, C. (1998). English Grammar I. Chetumal, México: Universidad de Quintana Roo
- Martin, H., Nigel, D., Andrew, B. (2013). *Global ELT Phrasal Verbs Dictionary*. Global ELT.
- Munday, J. (2016). *Introducing Translation Studies: Theories and Applications*. Retrieved from [https://www.academia.edu/35098158/Introducing\\_Translation\\_Studies-Theories\\_and\\_Applications](https://www.academia.edu/35098158/Introducing_Translation_Studies-Theories_and_Applications)
- Newmark, P. (1988). A Textbook of Translation. Retrieved from [https://www.academia.edu/41125352/A\\_TEXTBOOK\\_OF\\_TRANSLATION\\_by\\_Peter\\_Newmark](https://www.academia.edu/41125352/A_TEXTBOOK_OF_TRANSLATION_by_Peter_Newmark).
- Nida, E. (1964). *Towards a Science of Translating*, with Special Reference to Principles and Procedures Involved in Bible Translating. Retrieved from <https://es.scribd.com/doc/294853332/Eugene-Nida-Toward-a-science-of-translating-bible-translating-1964-pdf>
- Nugroho, A. B. (2007). Meaning and translation. *JEE, Journal of English and Education*, 1(2). Retrieved from <https://journal.uui.ac.id/JEE/article/view/6442/5802>
- Ordudari, M. (2007). *Translation procedures, strategies and methods Translation Journal*,. Retrieved from <https://translationjournal.net/journal/41culture.htm>
- Oxford. (2009). *Diccionario Oxford Escolar Para Estudiantes Mexicanos de Ingles (español-in*. Oxford University Press.

- Snell, R. (2016) Glossary of Linguistic Terms. *Hindi Worksheets*. Retrieved from <https://repositories.lib.utexas.edu/handle/2152/41430>
- Tadeusz, J. (2015). *Translation procedures*. University of d .
- Thesaurus. (2020) Thesaurus Dictionary Retrived from <https://www.thesaurus.com>
- The history of translation.(n.d). Language Realm, Free Translation. Retrieved from <http://www.languagerealm.com/articles/history-of-translation.php>
- Vinay, J. & Darbelnet, J. (1984). *Comparative Stylistics of French and English. A Methodology for Translation*. Paris: Didier: Georgetown University Press
- Walter, E. (2008). *Cambridge advanced learner's dictionary*. Cambridge university press. (Third edition, pp 1577)

## APPENDIX

### 6 Assessing Phonological Knowledge

---

*Cynthia Core*

#### Summary

This chapter reviews phonology and methods for conducting phonological research in language development and describes several techniques used to assess phonological properties of children's speech productions, focusing on the age range from 18 months to 5 years. The chapter provides a brief overview of the ways that phonological information is relevant to language research and the importance of considering phonological properties of words and phrases in language research. Phonological development and terminology related to phonology are defined. Methodological considerations for data collection for both naturalistic and elicited speech productions and analysis are discussed. Definitions of related constructs are provided.



Children's earliest sound productions are linked to their earliest word productions, forming a natural relationship between the investigations of word learning and sound learning (Stoel-Gammon, 2010a). Before a child begins to produce the words or grammar of his language, he begins with sound production in vocal play and babbling. Children's first words tend to match the phonological properties of their babbling productions (Vihman *et al.*, 1985; Elbers and Ton, 1985). Sound learning and word learning are inextricably related and progress together. In order for children to learn words, they must master both content and form, and the form consists of the phonological properties of the words. Phonological properties of words, such as lexical stress patterns and word shape, can influence the ways in which children produce early words, and the phonological makeup of words may even influence which words children attempt to say (Schwartz and Leonard, 1982).

## Basic Concepts and Terminology

---

Phonology refers to a child's system of speech sound production and the child's mental representations of the sounds of his language. Individual sounds are referred to as segments or phones, and the sounds of a language are called *phonemes*. Phonemes are described in terms of combinations of phonological features that uniquely define each sound. Features include information on voicing, place, and manner of articulation. A child's phonological knowledge consists of the perception and production of the phonemes of his language and knowledge of the organization of the sounds within a language, or the *phonotactics* of the language, such as which sounds are possible as word-initial sequences. Phonology also consists of the *prosodic* or suprasegmental aspects of a language, such as speech rhythm, intonation, word- and phrase-level stress patterns, and phrase boundary cues, such as pitch fall and final lengthening.

*Articulation* refers to the way (or accuracy with which) a child produces individual speech sounds, e.g., how a child produces the sounds of his or her language, such as whether an /s/ is produced with distortion. *Phonology* goes beyond the surface or phonetic details of speech production to the way a child uses the sounds to change meaning in words, and is often used as an umbrella term to refer to all of the factors of child speech production and phonological knowledge.

The phonological units typically measured and reported on in studies of phonological development include individual speech sounds or phonemes. Researchers typically focus on consonant production rather than vowel production because there is little research available on vowel development, and also because there is more variability in production of vowels across dialects of English. Other phonological units of interest include the syllable and its parts, and words. A *syllable* is the primary unit of phonology that may be composed of a vowel alone, or a vowel in combination with one or more consonants preceding or following the vowel. The

Table 6.1 International Phonetic Alphabet symbols for American English phonemes

Symbol	Key word	Symbol	Key word
<i>Vowels</i>		<i>Consonants</i>	
/i/	be	/p/	pig
/ɪ/	p <u>i</u> n	/b/	boy
/e/	a <u>e</u>	/t/	tea
/ɛ/	r <u>e</u> nt	/d/	doll
/æ/	h <u>a</u> t	/k/	key
/u/	sp <u>oo</u> n	/g/	girl
/ʊ/	w <u>ou</u> ld	/m/	map
/o/	ph <u>o</u> ne	/n/	nose
/ɔ/	jaw	/v/	van
/ɑ/	f <u>a</u> ther	/ŋ/	th <u>ing</u>
/ə/	a <u>h</u> ead	/f/	fall
/ʌ/	o <u>v</u> en	/θ/	th <u>ink</u>
/ə/	f <u>i</u> nger	/ð/	th <u>is</u>
/ɜ/	bird	/s/	soup
<i>Diphthongs</i>		/z/	zipper
/aʊ/	cow	/ʃ/	sh <u>oe</u>
/aɪ/	fl <u>y</u>	/ʒ/	treas <u>ure</u>
/ɔɪ/	to <u>y</u>	/h/	house
/eɪ/	tr <u>a</u> y	/tʃ/	ch <u>in</u>
/oʊ/	to <u>e</u> s	/dʒ/	jud <u>ge</u>
		/w/	win
		/j/	y <u>ell</u> ow
		/r/	r <u>a</u> mp
		/l/	l <u>if</u> t

Syllable is made up of an *onset* and a *rhyme*, and the *rhyme* is made up of the *nucleus* and the *coda*. The consonants preceding a vowel in the same syllable are referred to as the *onset*, and consonants following a vowel in the same syllable are referred to as the *coda*. The general pattern or frame of a word in terms of the types and sequences of sounds that make up the word is called the *word shape* (or phonotactic pattern) and is expressed in terms of the CV (consonant + vowel) structure of the *phonemes* of the word.

Speech sounds are represented in written form using the International Phonetic Alphabet (IPA), which is a set of symbols designed to represent the sounds of the world's languages with a one-to-one correspondence. The process of transcribing speech using the IPA symbols is called *phonetic transcription*. Table 6.1 contains a list of IPA symbols commonly used to transcribe standard English speech.

## Overview of Phonological Development

---

At the onset of meaningful speech, children tend to use a limited set of early-acquired consonants (nasals, stops, and glides) and simple syllable structures, relying heavily on CV (consonant + vowel) and CVCV productions. The period from 1 year to 2 years is a period of growth from using primarily single words that represent early phonological forms to using word combinations. At the point of word combinations, children expand their phonological system quite quickly, acquiring more consonants, gaining greater accuracy of consonants used, and producing a broader range of word shapes. From around the ages of 2 to 5, children acquire a large vocabulary and their sound system matures to nearly adult-like productions. By the age of 5 years, most children have acquired most consonants in all word positions. Table 6.2 shows proposed ages of acquisition for English organized by early, middle, and late sounds.

Some of the factors that influence how accurately a child produces sounds have to do with the auditory, motoric, and memory abilities of the child, while other factors have to do with the phonological properties of the words and phrases the child attempts to produce (Sosa and Stoel-Gammon, 2007). Frequency of occurrence of a sound in a language, or of a word in the input, seem to facilitate production (e.g., Pye, Ingram, and List, 1987; Zamuner, Gerken, and Hammond, 2004). There are also positional effects such that sounds are produced more accurately in syllable positions that are more acoustically salient, e.g., word-initial position, stressed syllables. These positional effects interact with properties of phrasal stress to affect a child's accuracy of an individual sound in complex ways, typically facilitating production of the sound due to the prosodically strong environment, though this is not always the case (e.g., Inkelas and Rose, 2008; Kent, 1982; Kirk and Demuth, 2006).

Two lexical properties that can affect phonological accuracy are neighborhood density and phonotactic probability. Neighborhood density refers to how phonologically similar two words are by counting the number of phonological neighbors a word has. Phonological neighbors are words that differ from one another by only one phoneme (Luce and Pisoni, 1998), e.g., *sit* has phonological neighbors that include *hit*, *sat*, and *sip*. Phonotactic probability is the likelihood that a sound will occur in a given word position, or that a sound sequence may occur in a word (Jusczyk, Luce, and Charles-Luce, 1994). Sound sequences with high phonotactic probability are produced more accurately than sound sequences with low phonotactic probability in both real words and nonwords (Edwards, Beckman, and Munson, 2004; Zamuner, Gerken, and Hammond, 2004).

## What To Study

---

Phonological investigations may be either qualitative or quantitative in nature. Researchers may be more interested in describing the nature or patterns of a child's productions, or in examining the accuracy of a child's productions. Researchers may



Table 6.2 Proposed ages of acquisition for English organized by early, middle, and late sounds

Phoneme	Age of acquisition (years:months) <sup>b</sup>	GFTA-2 standardized sample ages <sup>c</sup>
<i>Early developing sounds<sup>a</sup></i>		
/p/	3:0	2:0–3:0
/b/	3:0	2:0–3:0
/d/	3:0–3:6	2:0–3:0
/m/	3:0	2:0
/n/	3:0–3:6	2:0–3:0
/j/	4:0–5:0	5:0
/w/	3:0	3:0
/h/	3:0	2:0
<i>Middle developing sounds<sup>a</sup></i>		
/t/	3:6–4:0	3:0
/k/	3:6	3:0
/g/	3:6–4:0	3:0
/f/	3:6–5:6	3:0–4:0
/v/	5:6	5:0–6:0
/tʃ/	6:0–7:0	5:0
/dʒ/	6:0–7:0	5:0
/ŋ/	2:0–6:0 <sup>d</sup>	3:0–5:0
<i>Late developing sounds<sup>a</sup></i>		
/θ/	6:0–8:0	7:0–8:0
/ð/	4:6–7:0	7:0
/s/	7:0–9:0	5:0
/z/	7:0–9:0	5:0–7:0
/ʃ/	6:0–7:0	5:0
/ʒ/	6:0–8:0 <sup>d</sup>	n/a
/l/	5:0–7:0	5:0
/r/	8:0	5:0–6:0

<sup>a</sup>Order of acquisition: Shriberg (1993).

<sup>b</sup>Age of acquisition: Smit *et al.* (1990).

<sup>c</sup>Age at which 85% of Goldman–Fristoe Test of Articulation–2 standardization sample correctly produced the consonant and consonant cluster sounds (Goldman and Fristoe, 2000).

<sup>d</sup>Sander (1972).

want to know about a child's ability to produce individual sounds, or about the nature of errors in children's productions, or they may want to know about the breadth of the child's phonological system, including such things as the sounds and sound classes and the syllable and word patterns produced by the child (Gedel-Gammon, 2010b).

Quantitative analyses typically rely on a single outcome measure to quantify children's productions. These kinds of measures have been used to report the number of different consonants or syllable shapes used by children, regardless of the accuracy of the child's productions (Paul and Jennings, 1992; Rescorla and Ratner, 1996; Carson *et al.*, 2003). Some researchers have suggested that both elicited tasks and spontaneous speech tasks are needed to assess the phonological abilities of a child (Miccio, 2002; Tyler *et al.*, 2002). Elicited tasks ensure that all the phonemes of interest are sampled, and spontaneous speech tasks provide information on prosody and the relationships between speech production and language.

## Spontaneous Speech

---

Methods of phonological assessment can be divided into those that are applied to children's spontaneous speech and those that elicit speech. Spontaneous speech samples are the most ecologically valid in that they provide the examiner with a picture of the child's typical performance, and they show how a child uses sounds in connected speech, which is often different from the way that words are produced in isolation. They represent the child's typical abilities rather than the optimal or maximal abilities.

One difficulty with using spontaneous speech samples as the basis for phonological assessment is that in naturalistic conditions there is considerably more variability than in elicited tasks. Children may say one word several times, and productions of the same word may vary within a session and across sessions. As a result, there are decisions to be made about how to score the multiple productions of the same target word. Children may avoid saying words that contain sounds they cannot produce, or may select words which they are able to produce most accurately. Some children may not speak much or at all, and some young children limit their speech to simply labeling their toys, or repeating a phrase, such as "Look, a ball ... Look, a dog." This limits the variety of linguistic contexts in which a word is produced. Spontaneous sampling may also be problematic for analyzing the speech of young children with limited vocabularies or unintelligible speech.

One way to provide some structure in elicited tasks is to have a standard set of toys for children to play with (e.g., Williams and Elbert, 2003). The toys should contain items that contain a variety of different sounds and provide opportunities for mono- and multisyllabic productions. Spontaneous samples can be collected during any child-caregiver interaction, but toy play and book reading are particularly conducive to eliciting language in young children (see Rowe, Chapter 13 this volume).

One of the biggest threats to recorded child speech data is the interference of background noise, so it is critical to anticipate this problem and plan to prevent it to the degree possible during data collection. Unwanted noise can come from toys, people in the data collection session, or environmental noise, such as the child's microphone rubbing against his or her clothing. To help decrease the noise created by toys, we use a soft surface for children to play on, such as a foam mat or a blanket. Many

young children are difficult to understand, particularly from a video or audio recording. If the examiner feels that the child's productions are unclear or ambiguous, one strategy to aid in later analysis is to repeat the child's utterance. So, if a child points to a boat and says "da bo" for "That's a boat," the examiner would repeat after the child, "That's a boat."

Other concerns involve the validity of comparing child productions across separate samples. Morris (2009) found that the number of different words produced by ten 18–22-month-old children across two 20 minute sampling sessions was not correlated. The number of different words produced in a single session ranged from 44 to 219 for subjects in this study. Based on her results, Morris determined that a 20 minute conversational session was not necessarily sufficient to get enough different words to provide stable measures of word shape or number of consonants in a child's phonetic inventory. This points to the lack of information we have on measurement in phonology. Researchers have recommended sample sizes for spontaneous speech based on the number of utterances produced during a session (Robb and Bleile, 1994) and the length of session (Carson *et al.*, 2003; Rescorla and Ratner, 1996; Stoel-Gammon, 1987). To date, there are no studies that establish how long a single sampling session should be to obtain reliable data for individual children, nor is there clear guidance on how to handle data from multiple sampling sessions when the number and quality of children's productions vary from session to session. Since children's abilities can change quickly over time during the early stages of development, sessions should be scheduled at frequent intervals, such as weekly or monthly. Dense sampling may help reveal the developmental patterns in more detail (see Lieven and Behrens, Chapter 15 this volume).

## Elicited Productions

---

When speech is elicited, it is often done so to provide a basis for standardized, norm-referenced assessments of articulation and phonology or to provide a basis for researchers to investigate a set of phonological or lexical constructs of interest.

### *Standardized Tests*

Standardized tests of articulation generally measure production of individual speech sounds and provide norm-referenced data to determine how a child's sound production abilities relate to those of his peers in the form of a standard score. For a review of standardized tests of articulation and phonology, see Eisenberg and Hitchcock (2010). The elicitation method for real words is usually a picture-naming task that is designed to sample a variety of consonant sounds. The examiner shows the child a picture of a familiar object and asks the child to name it. If the child does not spontaneously produce the target, then the examiner may ask the child to repeat or imitate the examiner saying the target word. Standardized tests generally yield

standard scores that are based on the number of target sounds a child produces in error. Thus, standardized tests do not generally yield information on which sounds a child produces correctly or incorrectly, but are designed to determine whether a child produces the same number of sounds accurately as other children his or her age. In order to tell whether an individual sound is acquired at the expected age, one could consult published normative data (e.g., Smit *et al.*, 1990; Sander, 1972), or consult the norms published in the manual of an articulation test. As a caveat, there is little consensus among the published norms on when sounds are acquired. Differences among studies exist due to the investigator's definition of "acquired" and the methodologies for eliciting productions across studies. Edwards and colleagues (Edwards and Beckman, 2008a) have found that accurate production of sounds develops gradually, so there may be a period in which a child is producing a sound, though less accurately than the adult form, and this period may continue for quite a long time. Age norms for production do not address this phenomenon.

### *Researcher-Generated Elicitation Tasks*

In researcher-developed elicitation tasks, children may name objects or pictures of real words, or they may repeat words or nonword stimuli presented by the researcher. At times, researchers want to control the properties that influence sound production accuracy, such as neighborhood density, frequency of a sound or sound sequence (phonotactic probability), or phonetic complexity of a word. In other cases, researchers may be interested in production of a particular sound or a sound class. In these cases, researchers will want to create their own elicitation tasks. (For examples of researcher-generated tasks, see Munson, Edwards, and Beckman, 2005a; McLeod *et al.*, 1994; Preston and Edwards, 2007; Wolk, Edwards, and Conture, 1993; Yavas and Core, 2006). Real-word repetition has been used in studies of crosslinguistic consonant acquisition (Edwards and Beckman, 2008a), and as a predictor of grammatical development (Dispaldro *et al.*, 2009).

### *Nonword Repetition*

Nonword repetition has become a widely used technique to study phonological short-term memory or phonological working memory (Gathercole and Baddeley, 1989; 1990) and to examine the lexical effects on phonological development (see Stoel-Gammon, 2010a). Phonological working memory skills are associated with word learning in young children (Gathercole and Baddeley, 1989) and adolescents (Gathercole *et al.*, 1997; 1999). Nonword repetition is a measure that seems to differentiate children with and without language impairment (Bishop, North, and Donlan, 1996; Dollaghan and Campbell, 1998; Gathercole and Baddeley, 1990). Nonword repetition measures have been used recently with children as young as 20 months (Hoff, Core, and Bridges, 2008), and also with bilingual children (Ebert *et al.*, 2008; Gutiérrez-Clellen and Simon-Cerejido, 2010; Girbau and Schwartz, 2008; Parra, Hoff, and Core, 2011). In nonword repetition tasks, the examiner

produces (or plays a pre-recorded presentation of) a nonword and the child repeats the nonword. For older children, stimuli are recorded to ensure consistency of presentation (e.g., Girbau and Schwartz, 2008; Gathercole and Baddeley, 1989). For very young children (18 to 22 months old) we found that we needed to modify the way we presented stimuli, so we used a toy-naming game in which children were asked to repeat the name of a toy presented by the examiner. Additionally, in order to parse the general articulation abilities of the children from their ability to repeat nonword sound sequences, we administered a real-word repetition task and a phonologically matched nonword repetition task. We found that even controlling for accuracy of real-word repetition, children's nonword repetition abilities predicted their vocabulary size (Hoff, Core, and Bridges, 2008).

## Equipment

---

The current state of digital media recording and storage has brought about a revolution in speech data collection. The state of the art for recording child speech is high quality digital video with high quality digital audio. The video allows the examiner to view the child's face and observe the greater context of the utterance. This enhances the ability to determine which of phonetically similar sounds a child says by watching the child's mouth. High quality digital audio allows the examiner to visually examine the sound wave or spectrogram of an utterance while listening to it, and this also helps improve accuracy of phonetic transcription.

There are three parts of the equipment system to consider in collection of speech data. The first is the microphone that picks up the speech signal from the child; the second is the device that takes the signal from the microphone and records it to a digital file (recorder); and the third is the set of equipment that allows a listener to assess the speech – typically headphones. Investigators should check the specifications for the equipment to make sure that all three parts of the system have the appropriate qualities to capture the physical properties of speech in a way that makes possible both perceptual judgments of speech accuracy and acoustic analysis of speech using speech analysis software. Equipment should be sufficient to transmit or receive an auditory signal ranging from about 50 Hz to 15,000 Hz in order to pick up all of the sound frequencies of speech.

A variety of microphone types are available. As long as a digital video camera has an external microphone jack, the examiner can use a separate microphone to ensure the quality of the audio recording. Boundary microphones, which rest on a flat surface and pick up sound signals from multiple directions, are useful when a child is stationary and the examiner wants to hear the adult and child speech. Wireless microphones worn by the child allow the child freedom of movement, while maintaining a constant distance between the child's mouth and the microphone, improving the quality of the speech signal in the recording.

Data collection procedures should always begin with a check of the sound system. This can be done with an audio output connected to the video recorder. Using

headphones or an earbud, the examiner is able to listen to the sound as it is being recorded. This prevents mishaps from battery failure or poor connections. Some researchers choose to collect a separate audio back-up using a digital audio recorder with a good quality external microphone to ensure audio quality.

## Data Analysis: Transcription

---

Once the speech samples have been recorded, they must be phonetically transcribed. The transcriber writes a gloss for the target word, which is the target word as produced by an adult speaker in regular orthography, and typically also in IPA. Then the child's production is transcribed using either broad or narrow transcription. Broad transcription is phonemic and does not include information about fine phonetic details such as aspiration or degree of voicing. Use of additional diacritics can increase the level of detail in the transcription, but more detailed transcriptions usually make it more difficult to achieve good intertranscriber agreement. Broad transcription is generally used to represent a child's phonemic ability, while narrow transcription includes phonetic detail and represents the phonetic accuracy of a child's sound production.

There are several limitations to consider with phonetic transcription, the first being that it is extraordinarily time consuming and requires trained listeners who are knowledgeable about speech science (the properties of individual sounds) and the phonological and phonetic characteristics of the sounds of the language they are transcribing. Phonetic transcriptions are influenced by a transcriber's experience with child speech, experience with phonetic transcription, and knowledge of phonetics and the sounds of the language they are transcribing, and by the transcriber's native language (Edwards and Beckman, 2008b). In studies making crosslinguistic comparisons or studies of bilingual children, it is important to have a native speaker of each language provide the transcriptions in order to prevent the perceptual biases of a nonnative listener (Munson *et al.*, 2010).

Because phonetic transcription relies on the subjective judgments of individual transcribers, researchers usually report on transcription agreement or reliability. Reliability is expressed as a percentage of agreement between the transcriptions produced by two transcribers. This method of validating the transcriptions used in analysis is problematic because interrater agreement can be related to many factors, including the type of speech being transcribed and the training of the transcribers. The degree of transcriber agreement contributes to the power of a study. In a study in which there is low agreement between transcribers, the validity of all analyses based on the transcription is called into question. Transcribers may agree on a majority of sounds a child produces and use the same IPA symbol to transcribe the sounds. But for intermediate productions and distorted sounds, the transcribers are more likely to disagree. It is precisely these points of disagreement that may provide the most information about a child's abilities; so without transcriber agreement on these less accurate productions, a considerable amount of information about the child's abilities is lost (Pye, Wilcox, and Siren, 1988).

Another method of establishing the validity of a phonetic transcription is to use a consensus method, such as the ones described by Morris (2009) or Shriberg, Kwiatkowski and Hoffman (1984). In this method of validation, transcribers work independently to transcribe data, then transcriptions are compared, and discrepancies are listened to again by a third party until transcribers reach agreement on all sounds produced by the child. In cases where two transcribers disagree on a production, a third party listens to the data and contributes his or her perception to the discussion until consensus among transcribers is obtained. Phon, a phonological analysis program within CHILDES (see Corrigan, Chapter 18 this volume), contains a blind transcription mode and allows two independent transcribers to listen to a production and phonetically transcribe what they hear. Once both transcriptions are prepared, a validation mode allows transcribers to see any discrepancies between the transcriptions, and to access the sound files for those productions to referee or validate the production. The validated transcription is the one used in final analyses. In this type of transcription validation, productions for which consensus is not possible can be eliminated from the analysis, providing for greater reliability of the phonological data.

Phonetic transcription may be supported by acoustic analysis to determine finer details of sound production, such as voicing or aspiration of a consonant. While acoustic analysis may support and aid transcription in many cases, many phonetic properties, such as voice onset time, are subject to influence from speaker variables, such as speech rate and stress patterns of the word or phrase, and acoustic analysis cannot be used to resolve all ambiguities in phonetic transcription (Rose, in press).

## Analyses

---

There are two primary types of phonological analysis for spontaneous speech. The first is an *independent analysis*, which is typically used to report on the speech production abilities of very young children at the early stages of language development, from the onset of speech to about 24 months. The second is a *relational analysis*, which reflects how closely a child's production matches a target, and is used for children who are in later stages of phonological development, producing a variety of word shapes and sound combinations.

### *Independent Analyses*

The *phonetic inventory* is the primary form of independent analysis. This measure is purely descriptive and reflects the sounds the child produces, usually organized by word position. The examiner listens to spontaneous speech produced by the child (usually during a toy play activity with a parent) and tallies the sounds the child produces in word-initial, -medial, and -final position. There is no decision on the part of the examiner as to whether the child's production is "correct" or accurate.

It is simply a report of the sounds heard. Typically, a sound must occur in two different words in order to be considered a part of the child's phonetic inventory. Phonetic inventories are typically reported in the number of phones a child produces (Dyson, 1988; Stoel-Gammon, 1985; Roberts *et al.*, 1998; Rescorla and Ratner, 1996). The number may be organized by word position (initial, medial, or final), or it may simply be a table containing all of the sounds a child uses by word position. Phonetic inventories generally report on consonants produced, but other inventories are possible as independent analyses as well – e.g., vowel inventories (the vowels produced by a child) or word shape inventories (the variety of phonotactic syllable and word shapes produced by a child). See Velleman (1998) for examples of inventory worksheets to aid in organization of the data.

### *Relational Analyses*

A relational analysis relates a child's production to an intended target, usually an acceptable adult form of a word, and the goal is to measure accuracy and examine error patterns. Outcome measures can focus on individual sounds, such as percentage consonants correct (including consonant variants), percentage vowels correct, and percentage phonemes correct. They can also focus on word shape accuracy, like word shape match, or even whether whole words match the possible and accepted adult forms in measures like proximity of whole word production or percentage words correct. Investigators may also wish to report on a child's use of specific phonological patterns or phonological processes, particularly for clinical use, such as fronting or stopping. These are measured in percentage occurrence with respect to the opportunity for a process to occur (e.g., Williams and Elbert, 2003).

One problem researchers face in elicited tasks is whether utterances produced spontaneously or in imitation of an adult model should be analyzed as the same type of response. Researchers who have investigated differences between spontaneous and imitated productions found that children perform similarly under the two conditions and that the conditions are highly related and reflect roughly the same abilities in children, though for some children the imitated condition is more accurate than the spontaneous condition, and vice versa (Goldstein, Fabiano, and Iglesias, 2004; Wertzner *et al.*, 2006). There is little research addressing this question, so some researchers have chosen to use exclusively repetition tasks to avoid the possibility of having spontaneous and repeated productions, which may be produced differently by children (Edwards and Beckman, 2008b).

In imitation tasks, particularly in nonword repetition tasks that may be prone to more variability in production by adult speakers, a standard format for presentation may be helpful to make sure all children hear the same stimuli produced in the same way. Gathercole and Baddeley (1989) used pre-recorded stimuli presented at 3 second intervals in their study of nonword repetition. In our experience, younger children do not respond well to pre-recorded stimuli. In response to difficulty getting our data collection team to pronounce the nonword stimuli the same way each time, we tried to use a furry dog with a speaker in its hindquarter, and that made the children cry (see Ambridge, Chapter 8 this volume, for a similar experience). Instead, we had the



examiner present the stimuli live, but in that case errors and inconsistency in presentation are inevitable, and thus both the examiner's presentation and the child's repetition need to be considered in the accuracy measure. In an imitation task, the child's production should be scored relative to the adult model that was presented. In our data, we found some dialectal variability in the children's productions, so when a child presented an acceptable variation of a consonant according to his/her dialect, it was scored as being correct. A good example of this was production of the palatal glide (the sound corresponding to the "ll") in "caballo" in Spanish. If a child produced the glide as a fricative because that is the sound that is standard in his dialect, we accepted it as a correct sound production.

Commonly used accuracy measures for individual sounds include percentage consonants correct, percentage vowels correct, and percentage phonemes correct. Percentage consonants correct (PCC) is widely used and has several variants (Shriberg and Kwiatkowski, 1982; Shriberg *et al.*, 1997). The basic metric is calculated by awarding a point value for each consonant a child produces correctly relative to the adult target, divided by the total number of consonants in a word.

A few researchers have proposed whole word measures to measure accuracy. The most widely reported whole word measure is Ingram's phonological mean length of utterance (PMLU), and the relational measure is proportion of whole word proximity (Ingram and Ingram, 2001; Ingram, 2002). PMLU is calculated as an independent measure of a child's word-level accuracy. Each word produced by the child receives a point value based on the number of sounds produced by the child and the number of consonants in the word produced accurately with reference to the adult target form. This measure is used to track the growth in a child's phonological ability over time, but there is little information available on the psychometric properties of this measure. The proportion of whole word proximity (PWP) is a ratio of the child's PMLU divided by the PMLU of the adult form of the target word.

Stoel-Gammon (2010b) reported on a word complexity measure and a proportional word complexity measure. Each word in a sample is awarded a complexity "score" based on word patterns, syllable structures, and sound classes. Complexity as a concept in phonological development is not well agreed upon, though in this case it relates to patterns of early productions by young children and normative data on sound acquisition. In general, developmental patterns observed in children with early-acquired sounds and patterns are described as less complex, and those with later-acquired sounds and patterns are described as more complex. The word complexity measure can be used as an independent analysis considering only the child's productions, or as a relational analysis by calculating a ratio of the complexity of a child's utterances to the corresponding adult forms of the same target words. Stoel-Gammon's measure is similar to the index of phonetic complexity, developed by Jakielski, Maytasse, and Doyle (2006) and described in Morris (2009).

For elicited tasks, one problem that arises is that a child might not produce a target word, even when prompted by the examiner, or in repetition. In order for an elicited task, such as a standardized test, to be scored the same way for all children, each child must produce all of the test items. Missing data in a closed dataset result in a dilemma for scoring. In the case of our real-word and nonword imitation tasks, we have scored nonresponses as 0, and this has been problematic because inaccurate

responses may also be scored as 0 in some cases, yet nonresponsiveness is very different from poor accuracy in response. We have calculated PCC of items produced versus PCC of all items administered, including nonresponses. In analyses from our large database, the two measures were highly correlated, and the difference in mean values did not affect our analyses. But this is a good example of a case in which a weighted measure or a more complex accuracy measure, such as one of the complexity measures mentioned earlier, might be more robust, particularly for individual children or smaller groups of children.

### Automated Analysis Programs

---

There are a few software programs that provide automated or semi-automated analysis of phonetically transcribed speech. The Logical International Phonetics Program (LIPP), developed by Kim Oller and colleagues, is a commercial software program for phonological analysis. It runs on Windows operating systems, and data are stored in a proprietary format. LIPP allows for a weighted accuracy measure, developed by Oller and colleagues (Oller and Ramsdell, 2006), as well as PCC.

Phon is an open-serve program designed for phonological research (Rose *et al.*, 2006). It is part of the CHILDES system and supports multimedia, and it allows for automated searches of large databases of phonological data. Phon has some unique attributes, such as the ability to link multimedia video and audio files directly to transcriptions. Phon's search feature allows users to design their own complex phonological queries based on sounds or features and to consider syllable or word position and stress patterns in data analysis. It allows users to track a child's productions over time for longitudinal studies, and it allows for group comparisons for cross-sectional studies, e.g., by age groups or populations. Data may be exported (as Unicode IPA symbols) in a spreadsheet and analyzed separately for accuracy.

### Related Constructs

---

There are some psycholinguistic measures related to phonology which are also worth mentioning, given the frequency with which they are described in the literature on reading development and language disabilities. *Phonological processing*, *phonological awareness*, *phonological sensitivity*, and *phonological memory* are terms that refer to the psychological processing of speech sounds rather than to the production or direct knowledge of speech sounds. These measures of phonological knowledge are highly associated with literacy outcomes in young school-age children.

*Phonological processing* refers to a trio of skills that are related to literacy development. The three skills are phonological awareness, phonological memory, and rapid automatic naming. *Phonological awareness* refers to a set of metacognitive

skills involving the manipulation of sounds and sound sequences in words. The term may refer to a number of different skills that address larger or smaller units of phonology, such as the word or the syllable, or individual phonemes. Most typically, phonological awareness refers to tasks that tap awareness of syllables, subsyllabic units (onsets and rimes), and individual phonemes. Syllable-level tasks are generally reported to be easier than onset/rime- or phoneme-level tasks, and phoneme-level tasks are the most difficult. Phoneme awareness refers to the ability to manipulate individual phonemes within a word and is usually measured by having a child delete word-initial or word-final phonemes from a word and say the remaining part of the word, or by identifying or naming sounds at the beginnings and ends of words. As with other measures of phonological knowledge, task type influences performance. For example, identifying matching rhymes is easier than producing or generating rhymes. The word position of a sound and the features of speech sounds can also affect performance. For example, it is easier to identify sounds in word-initial position than in word-final position (de Graaff *et al.*, 2008), and it is easier to delete a final obstruent than sonorant (Yavas and Core, 2006). There are several standardized measures of phonological awareness and phoneme awareness available.

*Phonological sensitivity* is a term proposed by Stanovich (1992) to encompass the set of related skills that are associated with phonological awareness at different levels of difficulty. In the reading research literature, phonological awareness is often referred to as phonological sensitivity, particularly when different phonological awareness tasks are used as a composite measure.

*Phonological memory* is also called verbal working memory, and it is generally assessed through nonword repetition. It has been proposed as the memory for speech sounds, though nonword repetition measures tap into other constructs as well, such as speech perception and the motoric aspects of speech planning and production. The most widely used nonword sets are from the CNRep (Gathercole and Baddeley, 1996), NRT (Dollaghan and Campbell, 1998), and Munson, Edwards, and Beckman (2005b). For a review of nonword repetition tasks, see Archibald and Gathercole (2006). There are also recently published nonword repetition tasks for Spanish (see Gutiérrez-Clellen and Simon-Cerejido, 2010; Girbau and Schwartz, 2008; Ebert *et al.*, 2008; Summers *et al.*, 2010).

## Conclusion

---

This chapter reviewed assessment of phonology in young children and described ways that phonology is studied in language development. Phonology and phonology-based constructs such as frequency of sounds and sound combinations affect word learning, and the phonological properties of words may influence which words children say and how accurately they are able to produce them, and may influence which words children attempt to produce. Phonological information may be gathered through spontaneous language samples or elicited tasks, such as a standardized test of articulation. Both independent (qualitative) and relational (quantitative) measures

can be used to analyze phonological data. Nonword repetition tasks are useful for investigating the lexical/phonological interface and phonological memory abilities in young children. There are several factors that can affect reliability of phonological (child speech) data, including elicitation methods, recording quality, and reliability of phonetic transcription. Recently, automated methods for data organization and analysis have become available, and these tools should enhance the productivity of research in phonological development and the role of phonology in language development.

### Key Terms

- Neighborhood density** The number of words that differ from a target word by a single phoneme.
- Phoneme** The smallest unit of sound of a language that can be used to contrast meaning in that language.
- Phonetics** The study of the production and perception of speech sounds, including acoustic and physiological descriptions of sounds.
- Phonological awareness** The ability to identify and manipulate the sounds of a language in auditory tasks.
- Phonological memory** Short-term working memory for speech sounds.
- Phonological processing** A set of skills related to phonological coding, including phonological awareness, phonological memory, and rapid automatic naming.
- Phonological sensitivity** Ability to analyze speech sounds at a variety of levels, including phonological and phonemic awareness skills.
- Phonology** The study of sounds and sound patterns of a language, including the way sounds are put together to form words and change meaning. Phonology can include the study of syllables, stress patterns, prosody, and intonation.
- Phonotactic probability** A measure of the likelihood of the occurrence of a sound sequence in a language.
- Phonotactics** The possible sequences of sounds and syllable structures in the words of a language.

### References

- Archibald, L.M.D., and Gathercole, S.E. (2006) Nonword repetition: a comparison of tests. *Journal of Speech, Language, and Hearing Research*, 49, 970–983.
- Bishop, D.V.M., North, T., and Donlan, C. (1996) Nonword repetition as a behavioural marker for inherited language impairment: evidence from a twin study. *Journal of Child Psychology & Psychiatry & Allied Disciplines*, 37, 391–403.
- Carson, C.P., Klee, T., Carson, D.K., and Hime, L.K. (2003) Phonological profiles of 2-year-olds with delayed language development: predicting clinical outcomes at age 3. *American Journal of Speech-Language Pathology*, 12, 28–39.
- De Graaff, S., Hasselman, F., Bosman, A., and Verhoeven, L. (2008) Cognitive and linguistic constraints on phoneme isolation in Dutch kindergartners. *Learning and Instruction*, 18 (4), 391–403.
- Dispaldro, M., Benelli, B., Marcolini, S., and Stella, G. (2009) Real-word repetition as a predictor of grammatical competence in Italian children with typical language development. *International Journal of Language & Communication Disorders*, 44, 941–961.

- Dollaghan, C., and Campbell, T.F. (1998) Nonword repetition and child language impairment. *Journal of Speech, Language, and Hearing Research*, 41, 1136–1146.
- Dyson, A.T. (1988) Phonetic inventories of 2- and 3-year-old children. *Journal of Speech and Hearing Disorders*, 53, 89–93.
- Ebert, K.D., Kalanek, J., Cordero, K.N., and Kohnert, K. (2008) *Communication Disorders Quarterly*, 29, 67–74.
- Edwards, J., and Beckman, M.E. (2008a) Some cross-linguistic evidence for modulation of implicational universals by language-specific frequency effects in the acquisition of consonant phonemes. *Language Learning & Development*, 4 (2), 122–156.
- Edwards, J., and Beckman, M.E. (2008b) Methodological questions in studying consonant acquisition. *Clinical Linguistics & Phonetics*, 22, 937–956.
- Edwards, J., Beckman, M.E., and Munson, B. (2004) The interaction between vocabulary size and phonotactic probability effects on children's production accuracy and fluency in nonword repetition. *Journal of Speech, Language, and Hearing Research*, 47, 421–436.
- Edwards, J., Munson, B., and Beckman, M.E. (2010) Lexicon–phonology relationships and the dynamics of early language development. *Journal of Child Language*, 38 (1), 35–40.
- Eisenberg, S.L., and Hitchcock, E.R. (2010) Using standardized tests to inventory consonant and vowel production: a comparison of 11 tests of articulation and phonology. *Language, Speech, and Hearing Services in Schools*, 41, 488–503.
- Elbers, L., and Ton, J. (1985) Play pen monologues: the interplay of words and babbles in the first words period. *Journal of Child Language*, 12, 551–565.
- Fikkert, P. (1994) *On the acquisition of prosodic structure*. The Hague: Holland Academic Graphics.
- Gathercole, S.E., and Baddeley, A.D. (1989) Evaluation of the role of phonological STM in the development of vocabulary in children: a longitudinal study. *Journal of Memory and Language*, 28, 200–213.
- Gathercole, S.E., and Baddeley, A.D. (1990) Phonological memory deficits in language disordered children: is there a causal connection? *Journal of Memory and Language*, 29, 336–360.
- Gathercole, S.E., and Baddeley, A.D. (1996) *The Children's Test of Nonword Repetition*. London: The Psychological Corporation.
- Gathercole, S.E., Hitch, G.J., Service, E., and Martin, A.J. (1997) Phonological short-term memory and new word learning in children. *Developmental Psychology*, 33, 966–979.
- Gathercole, S.E., Service, E., Hitch, G.J., et al. (1999) Phonological short-term memory and vocabulary development: further evidence on the nature of the relationship. *Applied Cognitive Psychology*, 13, 65–77.
- Girbau, D., and Schwartz, R.G. (2008) Phonological working memory in Spanish–English bilingual children with and without specific language impairment. *Journal of Communication Disorders*, 41, 124–145.
- Gnanadesikan, A. (2004) Markedness and faithfulness constraints in child phonology. In R. Kager, J. Pater, and W. Zonneveld (eds), *Constraints in phonological acquisition* (pp. 73–108). Cambridge: Cambridge University Press.
- Goad, H., and Rose, Y. (2004) Input elaboration, head faithfulness and evidence for representation in the acquisition of left-edge clusters in West Germanic. In R. Kager, J. Pater, and W. Zonneveld (eds), *Constraints in phonological acquisition* (pp. 109–157). Cambridge: Cambridge University Press.
- Goldman, R., and Fristoe, M. (2000) *Goldman–Fristoe Test of Articulation–Second Edition*. Circle Pines, MN: American Guidance Service.
- Goldstein, B., Fabiano, L., and Iglesias, A. (2004) Spontaneous and imitated productions in Spanish-speaking children with phonological disorders. *Language, Speech, and Hearing Services in Schools*, 35, 5–15.

- Gutiérrez-Clellen, V., and Simon-Cereijido, G. (2010) Using nonword repetition tasks for the identification of language impairment in Spanish–English-speaking children: does the language of assessment matter? *Learning Disabilities Research and Practice*, 25, 48–58.
- Hoff, E., Core, C., and Bridges, K. (2008) Nonword repetition assesses phonological memory and is related to vocabulary development in 20- to 24- month-olds. *Journal of Child Language*, 35, 1–14.
- Ingram, D. (2002) The measurement of whole-word productions. *Journal of Child Language*, 29, 713–733.
- Ingram, D., and Ingram, K. (2001) A whole word approach to phonological analysis and intervention. *Language, Speech, and Hearing Services in Schools*, 32, 271–283.
- Inkelas, S., and Rose, Y. (2008) Positional neutralization: a case study from child language. *Language*, 83, 707–736.
- Jakielski, K., Maytasse, R., and Doyle, E. (2006) Acquisition of phonetic complexity in children 12–36 months of age. Poster presented at the convention of the American Speech–Language–Hearing Association, Miami.
- Jusczyk, P.W., Luce, P.A., and Charles-Luce, J. (1994) Infants' sensitivity to phonotactic patterns in the native language. *Journal of Memory and Language*, 33 (5), 630–645.
- Kent, R.D. (1982) Contextual facilitation of correct sound production. *Language, Speech, and Hearing Services in Schools*, 13, 66–76.
- Kirk, C., and Demuth, K. (2006) Accounting for variability in 2-year-olds' production of coda consonants. *Language Learning and Development*, 2, 97–118.
- Luce, P.A., and Pisoni, D.B. (1998) Recognizing spoken words: the neighborhood activation model. *Ear and Hearing*, 19, 1–36.
- McLeod, S., Hand, L., Rosenthal, J.B., and Hayes, B. (1994) The effect of sampling condition on children's productions of consonant clusters. *Journal of Speech and Hearing Research*, 37, 868–882.
- Miccio, A.W. (2002) Clinical problem solving: assessment of phonological disorders. *American Journal of Speech–Language Pathology*, 11, 221–229.
- Morris, S.R. (2009) Test–retest reliability of independent measures of phonology in the assessment of toddlers' speech. *Language, Speech & Hearing Services in Schools*, 40, 46–52.
- Munson, B., Edwards, J., and Beckman, M.E. (2005a) Phonological knowledge in typical and atypical speech–sound development. *Topics in Language Disorders*, 25, 190–206.
- Munson, B., Edwards, J., and Beckman, M.E. (2005b) Relationships between nonword repetition accuracy and other measures of linguistic development in children with phonological disorders. *Journal of Speech, Language & Hearing Research*, 48, 61–78.
- Munson, B., Edwards, J., Schellinger, S., et al. (2010) Deconstructing phonetic transcription: language specificity, covert contrast, perceptual bias, and an extraterrestrial view of vox humana. *Clinical Linguistics and Phonetics*, 24: 245–260.
- Oller, D.K., and Ramsdell, H.L. (2006) A weighted reliability measure for phonetic transcription. *Journal of Speech, Language & Hearing Research*, 49, 1391–1411.
- Parra, M., Hoff, E., and Core, C. (2011) Relations among language exposure, phonological memory, and language development in Spanish–English bilingually developing 2-year-olds. *Journal of Experimental Child Psychology*, 108, 113–125.
- Pater, J. (1997) Minimal violation in phonological development. *Language Acquisition*, 6, 201–253.
- Paul, R., and Jennings, P. (1992) Phonological behavior in toddlers with slow expressive language development. *Journal of Speech & Hearing Research*, 35, 99–107.
- Pierrehumbert, J. (2003) Phonetic diversity, statistical learning, and acquisition of phonology. *Language and Speech*, 46, 115–154.

- Preston, J.L., and Edwards, M.L. (2007) Phonological processing skills of adolescents with residual speech sound errors. *Language, Speech & Hearing Services in Schools*, 38, 297–308.
- Pye, C., Ingram, D., and List, H. (1987) A comparison of initial consonant acquisition in English and Quiche. In K.E. Nelson and A. van Kleeck (eds), *Children's language* (pp. 175–190). Hillsdale, NJ: Erlbaum.
- Pye, C., Wilcox, K.A., and Siren, K.A. (1988) Refining transcriptions: the significance of transcriber "errors." *Journal of Child Language*, 15, 17–37.
- Rescorla, L., and Ratner, N.B. (1996) Phonetic profiles of toddlers with specific expressive language impairment (SLI-E). *Journal of Speech & Hearing Research*, 39, 153–165.
- Robb, M., and Bleile, K. (1994) Consonant inventories of young children from 8 to 25 months. *Clinical Linguistics and Phonetics*, 8, 295–320.
- Roberts, J., Rescorla, L., Giroux, J., and Stevens, L. (1998) Phonological skills of children with specific expressive language impairment (SLI-E): outcome at age 3. *Journal of Speech, Language & Hearing Research*, 41, 374–384.
- Rose, Y. (in press) Corpus-based investigations of child phonological development: formal and practical considerations. In Jacques Durand, Ulrike Gut, and Gjert Kristoffersen (eds), *Handbook of Corpus Phonology*. Oxford: Oxford University Press.
- Rose, Y., MacWhinney, B., Byrne, R., et al. (2006) Introducing Phon: a software solution for the study of phonological acquisition. In *Proceedings of the 30th Annual Boston University Conference on Language Development* (pp. 489–500).
- Saffran, J.R., Aslin, R.N., and Newport, E.L. (1996) Statistical learning by 8-month-old infants. *Science*, 274, 1926–1928.
- Sander, E. (1972) When are speech sounds learned? *Journal of Speech and Hearing Research*, 37, 55–63.
- Schwartz, R.G., and Leonard, L.B. (1982) Do children pick and choose? An examination of phonological selection and avoidance in early lexical acquisition. *Journal of Child Language*, 9, 319–336.
- Shriberg, L.D. (1993) Four new speech and prosody-voice measures for genetics research and other studies in developmental phonological disorders. *Journal of Speech and Hearing Research*, 36, 105–140.
- Shriberg, L.D., Austin, D., Lewis, B.A., et al. (1997) The percentage of consonants correct (PCC) metric: extensions and reliability data. *Journal of Speech, Language, and Hearing Research*, 40, 708–722.
- Shriberg, L.D., and Kwiatkowski, J. (1982) Phonological disorders III: a procedure for assessing severity of involvement. *The Journal of Speech and Hearing Disorders*, 47, 256–270.
- Shriberg, L.D., Kwiatkowski, J., and Hoffmann, K. (1984) A procedure for phonetic transcription by consensus. *Journal of Speech and Hearing Research*, 27, 456–465.
- Smit, A.B., Hand, L., Freilinger, J.J., et al. (1990) The Iowa articulation norms project and its Nebraska replication. *Journal of Speech and Hearing Disorders*, 55, 779–798.
- Spencer, A. (1986) Towards a theory of phonological development. *Lingua*, 68, 3–38.
- Stanovich, K.E. (1992) Speculations on the causes and consequences of individual differences in early reading acquisition. In P.B. Gough, L.C. Ehri, and R. Treiman (eds), *Reading acquisition* (pp. 307–342). Hillsdale, NJ: Erlbaum.
- Stoel-Gammon, C. (1985) Phonetic inventories, 15–24 months: a longitudinal study. *Journal of Speech and Hearing Research*, 28, 505–512.
- Stoel-Gammon, C. (1987) Phonological skills of 2-year-olds. *Language, Speech, and Hearing Services in Schools*, 18, 323–329.

- Stoel-Gammon, C. (2010a) Relationships between lexical and phonological development in young children. *Journal of Child Language*. Available on CJO 18 October 2010. DOI:10.1017/S0305000910000425.
- Stoel-Gammon, C. (2010b) The word complexity measure: description and application to developmental phonology and disorders. *Clinical Linguistics & Phonetics*, 24 (4–5), 271–282.
- Stoel-Gammon, C., and Sosa, A.V. (2007) Phonological development. In E. Hoff and M. Schatz (eds), *Handbook of child language* (pp. 238–256). Oxford: Blackwell.
- Summers, C., Bohman, T.M., Gillam, R.B., et al. (2010) Bilingual performance on nonword repetition in Spanish and English. *International Journal of Language and Communication Disorders*, 45, 480–493.
- Tyler, A.A., Tolbert, L.C., Miccio, A.W., et al. (2002) Five views of the elephant: perspectives on the assessment of articulation and phonology in preschoolers. *American Journal of Speech–Language Pathology*, 11, 213.
- Velleman, S. (1998) *Making phonology functional: what do I do first?* Boston: Butterworth-Heinemann.
- Vihman, M.M., Macken, M.A., Miller, R., et al. (1985) From babbling to speech: a reassessment of the continuity issue. *Language and Speech*, 61, 395–443.
- Wertzner, H.F., Papp, A.C., Camargo S., and Galea, D.E. (2006) Provas de nomeação e imitação como instrumentos de diagnóstico do transtorno fonológico. *Pró-Fono Revista De Atualização Científica*, 18, 303–312.
- Williams, A.L., and Elbert, M. (2003) A prospective longitudinal study of phonological development in late talkers. *Language, Speech & Hearing Services in Schools*, 34, 138–153.
- Wolk, L., Edwards, M.L., and Conture, E.G. (1993) Coexistence of stuttering and disordered phonology in young children. *Journal of Speech & Hearing Research*, 36, 906–917.
- Yavas, M., and Core, C. (2006) Acquisition of #sC clusters in English speaking children. *Journal of Multilingual Communication Disorders*, 4, 169–181.
- Zamuner, T., Gerken, L., and Hammond, M. (2004) Phonotactic probabilities in young children's speech production. *Journal of Child Language*, 31, 515–536.

## Recommended Reading

### *Phonology*

- Johnson, W., and Reimers, P. (2010) *Patterns in child phonology*. Edinburgh: Edinburgh University Press.
- Smith, N. (2010) *Acquiring phonology: a cross-generational case-study*. Cambridge: Cambridge University Press.
- Vihman, M.M. (1996) *Phonological development: the origins of language in the child*. Chichester: Wiley-Blackwell.
- Vitevitch, M.S., and Luce, P.A. (2004) A web-based interface to calculate phonotactic probability for words and nonwords in English. *Behavior Research Methods, Instruments, and Computers*, 36, 481–487.
- Yavas, M. (2011) *Applied English phonology*. Chichester: Wiley-Blackwell.

### *Phonetics*

- Ladefoged, P., and Johnson, K. (2010) *A course in phonetics*. Cengage-Heinle.
- Small, L. (2004) *Fundamentals of phonetics: a practical guide for students*. Allyn & Bacon.



### Additional Resources

Phonotactic probability calculator: <http://www.people.ku.edu/~mvitev/PhonoProbHome.html>.

Neighborhood density calculator (and phonotactic probability calculator): [http://www.bncdnet.ku.edu/cgi-bin/DEEC/out\\_ccc.vi](http://www.bncdnet.ku.edu/cgi-bin/DEEC/out_ccc.vi).

Logical International Phonetics Program: <http://www.ihsys.com/site/LIPP.asp?tab=4>.

The PhonBank Project and Phon: <http://chiles.psy.cmu.edu/phon/>.

Praat Acoustic Analysis Software: <http://www.fon.hum.uva.nl/praat/>.

IPA fonts: Charis SIL font package, [http://scripts.sil.org/cms/scripts/page.php?item\\_id=CharisSILfont](http://scripts.sil.org/cms/scripts/page.php?item_id=CharisSILfont).