

Universidad Complutense de Madrid
Facultad de Ciencias de la Información
Departamento de Filología Española III
(Lengua y Literatura)



Tesis Doctoral

*Interacción del desarrollo fonológico y morfológico en la adquisición del español:
el desarrollo de las codas en la lengua materna*

Nuria Polo Cano

Licenciada en Filología Hispánica

Licenciada en Lingüística General

Directora: Carmen Aguirre Martínez

Departamento de Filología Española III

Universidad Complutense de Madrid

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Long summary

Through this investigative research project, I hope to have renewed interest in the ontogenetic development of language since, in the field of Spanish linguistic, studies regarding the acquisition of Spanish as a native language have been all but abandoned in recent decades. Nevertheless, studying this field continues to be essential not only for the purpose of gaining insight into the development of the language itself as a first language but also in order to make comparisons with the conclusions of second language studies, and obtain joint conclusions regarding both the acquisition and learning processes.

As with this field, the studies regarding phonological acquisition began with the analysis of segments and words: all child language phonologists agreed that segments or features can be found in any of the world's languages. At first, they described the phonological development of the segmental inventory and only at the word level.

During the 70s and 80s, researchers were divided into two groups: generativists and functionalists. The latter tried to prove Jakobson's ideas and thus focused their interest on exploring the order with which the distinctive characteristics and the opposition among phonemes were acquired. The purpose of their investigations was to establish a hierarchy of sound acquisition. The generativist researchers, inspired by *SPE*, understood the acquisition process as a series of innate and universal processes or learnt rules of articulation, which were grouped as elimination mechanisms, limitation mechanisms (substitution or assimilation) and the ordering of phonemes. While both generativists and structuralists agree on the variability of infant utterances, they do not offer a theory which takes into consideration the intrapersonal and interpersonal variations. Furthermore, these theories did not provide a holistic psycholinguistic explanation for the process of phonological acquisition of a native language. Due to the aforementioned reasons, the current work does not follow that specific line of investigation.

Nevertheless, at the end of the 80s and the beginning of the 90s, significant discoveries were made in phonological and morphological theory, for example the development of non-linear theories of phonological representation (*Prosodic Phonology*; Selkirk 1984, Nespor and Vogel 1986), non-derivational theories of phonology (*Optimality Theory*; Prince and Smolensky 1993/2004) and, in the area of morphology, *Natural Morphology* (Dressler 1987, Kilani-Schoch 1988) and *Prosodic Morphology* (McCarthy and Prince 1986).

These models applied to the acquisition studies differentiate themselves from the previous models in that they propose a prosodic analysis of the phonology which emphasises the importance of the input and selective and unitary perception: it understands the analysis of a word as a whole to the detriment of the segments themselves, per se. A child pays attention to that which stands out the most in the ambient signal and, consequently, this will be the first thing he or she produces. Understanding the acquisition of a first language in this way, as the learning of contrasts and an extension of the hierarchy of the constituents, is more logical than considering it as simply the result of rules or processes.

Furthermore, these new models offer the possibility of specifying the scope of application for phonetic features which go beyond the segment, such as the syllable and the prosodic word. Additionally, these approaches enable the researcher to take the intrapersonal and interpersonal variability into consideration. By means of this new vision, a psycholinguistic explanation for the difference between infant and adult language can be formulated, for example based on the constraints imposed by prosodic representations.

Therefore, this piece of research has been inserted amongst these theoretical currents due to the fact that these theories are considered to be the most appropriate at explaining the development of infant linguistics, on grounds that they are psycholinguistic models.

Another of the main problems with studies regarding phonological acquisition is that they view phonology (and, in general, language itself) as an innate or emergent ability found in the human brain. These two points of view, that which believes phonology is present in the brain from birth and that which feels it emerges during development, have resulted in studies that are at times contradictory in the area of

phonological acquisition. However, the current, less radical studies do accept a certain degree of gradualness and variability in grammatical development. This author believes that it is more appropriate, perhaps even what most truly reflects reality, to use both points of view conjointly: nativism (the innate existence of constraints) and emergentism (in the gradual development of the representations which are conditioned by the constraints).

In recent years, interest in phonological acquisition has been expanded to both grammatical (internal) and extragrammatical (external) influences which are responsible for the specific acquisition of phonology of a native language. On the one hand, grammatical influences deal with the notions of phonological markedness or complexity of the system: the acquisition processes occur starting with the least marked and progress to the most. The extragrammatical influences, on the other hand, refer to memory, attention, the development of the vocal tract and motor control, representational/symbolic development, neurological, emotional and social development, etc., as well as the frequency with which segments appear in the target language. Individual differences, the personal style of each child and the unique rhythm with which they evolve must also not be forgotten. Only those extragrammatical influences dealing with frequency have been used for this work due to the fact that the remaining influences go beyond the scope of this research and the objectives accomplished.

The main objective of this work has been to contribute to the knowledge of phonological acquisition of Spanish by first language learners and, concretely, to go further into the study of coda development as part of syllable structure development. An additional objective, dependent on the first, has been to uncover relationships between the phonological and morphological acquisition of this language. This topic has been virtually ignored up to now, at least in the case of Spanish. As a secondary objective, this work has attempted to give a possible answer for the more or less inexplicable individual variation in the production of grammatical morphemes in Spanish and, by extension, for in potentially any language.

Specifically, to analyse the development of the more frequent codas in Spanish: nasals, laterals, rhotics, and fricatives: to describe the development of the acquisition of the /-n/, /-r/, /-l/, and /-s/ found in final versus non-final codas of words in Spanish,

considering the various contexts in which they appear (both lexicon-based and belonging to a grammatical morpheme; in stressed and unstressed syllables) in order to analyse the different behaviours of the development of these segments according to the aforementioned contexts. Secondly: to observe these behaviours throughout the entire process in which the prosody is developed, and to analyse how the prosodification of the constituents, particularly in the coda position, can be related to morphological development.

In addition to the aforementioned objectives, this work has encouraged and opened the way for new research on, above all, the acquisition of a native language in children before three years of age especially in light of the help new technologies have provided by introducing the new fields of quantitative studies. It is also necessary to stress the importance of continuing the investigation regarding the acquisition of native languages due to the fact that the results obtained up to now have been far from conclusive.

The methodology of the current research has consisted of a longitudinal analysis used to observe the language development of a child throughout the months required for the acquisition process of a native language. The detailed analysis of two monolingual Spanish children, from 1;7 years to 2;7 years, has provided the fundamental keys upon which the conclusions of this work are based. The analysis program Phon was used for the expurgation and classification of the data.

Finally, reference to a broad body of literature has been addressed, based on the combined consultation of texts in traditional Hispanic linguistics, of publications dealing with the acquisition of other languages (e.g., English, German, and Dutch), of psycholinguistic studies relevant to addressing the current questions as well as web-based bibliographical sources.

The results of the current study have implications not only for a monolingual development point of view but also for a cross-sectional study regarding the acquisition of different languages, for the language development in bilingual children, for comparative studies of the acquisition of the Spanish language as first and second language or even to help evaluate the morphophonological developments in specific language pathologies.

Building on these theoretical notions, this study has shown that children generally acquire the nasal codas first, then the laterals. These are followed by the fricatives. They acquire the rhotic consonants last. Based on the scant data available regarding the frequency of phonemes in Spanish, it can be inferred that the nasal and fricative codas are most common, followed by the lateral and rhotic consonants, although this data is more general in nature and does not specifically concern codas.

And so, both children begin their acquisition with the sonorant codas (nasal and lateral), acquiring the obstruents (fricatives) subsequently. The rhotics are acquired much later in Spanish. One must not forget, however, that these appear in the first months of development, however, their correct production, as judged by the adult model, does not occur until the child is nearly three years old. These results indicate that the acquisition of the codas in these two children is conditioned by complexity or markedness phonological issues since they acquire the less marked forms sooner. Frequency is a factor which only influences development once these constraints have been overcome, as in the case of the unstressed fricatives which are produced more frequently than those that are stressed once the child is 2;3. This also occurs in the case of the nasals which, with their high frequency in the target language, can reinforce markedness issues or, perhaps, can underly the accurate production of these segments from the beginning of the development. Such is the case that they even acquire the unstressed nasals before the stressed fricatives, which could have a greater degree of perceptibility.

In that sense, special mention must be made of the analysis carried out on the substitution of the segments in coda position which shows that from the moment the children realise this prosodic slot must be filled, and faced with the possibility of producing a consonant, they begin by uttering a *glide* (the front segment [-j] in the majority of the cases) which they gradually substitute for other segments: the sonorant codas are replaced by sonorant segments and the obstruent codas are substituted by obstruent segments. One must also mention the case of the alveolar fricatives where the child studied controls the fricative manner first but substitutes the alveolars for obstruent fricatives with a different place of articulation for an additional 3 or 4 months. In the case of the rhotics, the substitution of a *glide* [-j] in the non-word-final position is preferred while other types of approximants are preferred for the word-final position.

This analysis has shown then that coda substitution can be explained by phonological and prosodic constraints.

The other issues contemplated in the acquisition of codas, the coda position within the word and the accent, has completed the explanation of the development of this type of segments. The data has revealed that, in the acquisition of Spanish the position of the coda, whether medial or word-final, is not a relevant factor. A possible reason for this is, as proposed by some authors, that children are sensitive to the distributional factors of Spanish, delimited by the [+ coronal] constraints in the coda position.

With regards to the accent, it has been observed that the stressed codas are acquired prior to those which are unstressed. Mostly likely, this indicates that the greater degree of perceptibility (or saliency) of the former accelerates their acquisition. That means that codas are easier to produce in stressed syllables. The only exception seems to appear in the development of the fricatives where accents do not seem to be as relevant. Without a doubt, the explanation for this can be found in terms of frequency: in this type of segment, the frequency of the unstressed segments is very high and, during their acquisition, complexity matters compete with those regarding frequency. The frequency seems to be more important in the acquisition of this segment.

Likewise, not only are stressed segments preferred, generally speaking, but word-final stressed segments are preferred even more so. This development can be explained in terms of markedness and perceptibility, given that the universal prosodic tendency is for this position to be more salient, as well as frequency since the Spanish language is characterised by having an extremely high frequency of stressed word-final codas.

Moreover, it has been observed that syllable stress can contribute to two types of development, quantitatively or qualitatively improving the production of the codas. On the one hand, this implies an early accurate production of the codas with the target language. In other words, it seems that for some of the analysed segments, such as the fricatives, when these codas are found in a stressed syllable, the substitution for another type of segment occurs less than when the codas are found in an unstressed syllable. On the other hand, it implies more production of, for example, the nasals or rhotics, which are produced in higher quantities than the unstressed, or the stressed word-finals in

general which exhibit a higher degree of substitution. This indicates that stress assists in the production of these and, most likely, puts them on the same level as the word-finals as far as acquisition is concerned. For this reason, different development patterns related to position are not found.

These factors in fact can provide useful explanations for the variability observed in the acquisition of codas. All of the aforementioned characteristics together account for the interpersonal and intrapersonal variability observed in the linguistic developments of children. Some children are driven by the accent and some are guided by syllable structure and rhythm. Others are more influenced by the types of consonants and the degree of sonority while yet others give more importance to the frequency with which elements appear in the target language. In other words, the range of children's hypotheses is limited by the universal grammar; however, the particular properties of the input they are acquiring must contribute to the formulation of these hypotheses.

Based on analysis carried out in this thesis, it has been discovered that the codas are licensed first during the acquisition process of the syllabic structure. Secondly, grammatical contexts are allowed in which morphemes appear. Only when these two conditions have been met does the production of morphological codas occur, beginning with the stressed elements followed by those that are unstressed. This process implies that the morphological content which these codas also carry does not mean that their acquisition is accelerated. Prosodic development, in relation to the development of morphology, governs its production.

Normally, the first codas with morphological content to develop are the nasals. The fricatives develop next. This is the same order of acquisition which is seen in those codas without morphological content. In other words, sonorants are acquired first, followed by the obstruents with morphological content. As with the non-morphological elements, the prosodic and rhythmic characteristics, a greater degree of perceptibility of stressed syllables also cause the stressed morphological codas to be produced sooner. Such is the case that the unstressed morphological nasals develop before stressed morphological fricatives in Magín while in Andrea, contrarily, both develop simultaneously. Thus, the stressed word-final codas develop first followed by the unstressed. The next to develop are the stressed morphological codas. Finally, the unstressed morphological codas develop, mostly in the nasals. The development for

fricatives is more parallel meaning that, as with the development of the codas in general, the development of those codas having morphological content responds to issues of markedness.

It is also worth mentioning the development of fricative codas with morphological content. These elements are more complex given that, in Spanish, they correspond to the nominal plural markers and, in some cases, verbal inflection. The development of fricatives most likely has to do with the frequency of the plural coda in Spanish due to the impositions of agreement. Additionally, the delay experienced in the acquisition of the morphological elements with regards to those which are not morphological is not as significant as in the case of the nasals. Once again, the frequency of these components in the target language and the morphological content is what allows the codas to be acquired sooner since unstressed morphological fricative codas are preferred over the non-morphological elements. More specifically, both children produce the stressed morphological fricative codas until they are 2;2 years old.

Moreover, an increased number of cases demonstrating the substitution of segments in the unstressed word-final morphological codas are seen. This mostly occurs in the nominal plural which indicates that the higher frequency of these elements in the target language influences in their production by making them occur sooner, however, this does not adjust them to the adult model.

These results indicate that the acquisition of the morphemes is also driven by prosodic issues during the first months of development. Only after two years of age does the frequency in the target language directly influence in the acquisition of these codas. One must obviously not forget the morphosyntactic and semantic issues that add increased cognitive complexity in the case of Spanish verbs which, without a doubt, also influences in the acquisition of codas containing morphological elements.

In sum, the codas of grammatical morphemes show a development which is parallel to that found in the rest of the codas and that is determined, in the majority of the cases, by the structural markedness of each individual segment. The frequency in the target language does not play as important a role since the least marked morphological codas and the most perceptible are those which are acquired first. Thus, the variability observed by authors who study the development of grammatical morphemes in Spanish is now explained in prosodic terms: the morphemes with the least marked phonological

forms are acquired first. Additionally, morphological production begins with the most salient forms: the stressed forms. For this reason, the phonological and prosodic constraints can explain the variable appearance of the grammatical elements in the development of a native language. The variations found in the acquisition of the morphemes is not, therefore, casual. Focused from this point of view, an answer to their acquisition can be given.

These results also indicate that both children differentiate the morphological content of the codas from the beginning of their coda production (1;7-1;8). Traditionally, it has been said that the development of morphology occurs after that of phonology. Nevertheless, this study has shown that it is the phonological and prosodic characteristics of the input which explain the appearance of the morphemes, at least during the first months of development. The distributional characteristics of the target language become more important, however, when the children progress linguistically.

Most definitely, these discoveries, in line with those recently proposed by other authors, imply that the grammatical knowledge of children is greater and develops sooner than previously thought, around 2 years of age. Due to this, it can be concluded that children are sensitive to the prosodic structures of their native language from the very beginning of their development and they use this information to organise their first utterances, at least with regards to the acquisition of the codas. The acquisition of morphemes in coda position is, therefore, the result of these prosodic and morphological requirements as well as of the effects of the frequency of the target language.

That said, however, assuming this implies supposing the children show a significant knowledge of how the phonology itself works from a very early age or even innately. In addition, this also implies that the phonology not only develops so soon but also that this knowledge is used to acquire morphology and syntax (at least in the development of Spanish syllabic codas).

Nevertheless, more studies, statistical analysis, greater sample sizes, and more longitudinal and cross-sectional data are needed to corroborate the results. Additionally, more data is needed regarding adult language, for example with regards to the frequency of the codas in order to verify the hypotheses set forth in this research. With all this in mind, this study has introduced a series of previously unpublished data which will contribute to a better understanding of the acquisition of language, of our own cognitive

system, as well as offer further grounds for empirical verifications of phonological and morphological theory.