Not All Cows Moo

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Abstract:

The goal of this paper is to gain a deeper understanding of onomatopoeic words that symbolize animal cries in four different languages: Brazilian Portuguese, Spanish, French, and Japanese. Each language is first analyzed individually to discern whether or not its onomatopoeic words are *marked*. Marked words are distinct from the regular forms of the language either due to their individual phonemes or the structures in which they are combined. To determine this, the phonemic inventories of the regular and onomatopoeic forms present in each language are compared to one another. The animal cry data is then reviewed in the context of the phonotactic rules of the appropriate language. The scope is then expanded outwards to compare the representations of the same animal cries as they appear in Brazilian Portuguese, Spanish, French, and Japanese.

I. Introduction

If you ask a child in France 'What noise does a farmer wake up to?' they will tell you [kokoRiko](Jean-Pierre Zerling 1995). Ask a different child in Brazil the same question and the answer will be [kɔkɔrikɔ](Coutinho 2003), while a child in Spain will respond *quiquiriquiar* . A Japanese child will respond to the question with *kokekorkoo*. These responses are similar while still having distinct variations, but correspond to the noise made by the same animal, a rooster. Regardless of the exact makeup of these representations of the call of a rooster, the fact stands that even the youngest speakers of each of these languages can answer the question. Thus, it is an inherent feature of each of these languages to be able to refer to the cry of an animal, in this case, a rooster. This means that all four of them have words that symbolize the noises made by animals.

In this paper, I will analyze the speech sounds used to represent animal cries in the lexicons of Brazilian Portuguese, French, Spanish, and Japanese. To clarify, a 'sound' corresponds to any noise that the human ear can perceive; a 'speech sound' is within the subset of sounds that can be recognized as a unit of human language, similar to a 'phone' (Bladon 1977: 158) . It is important to identify the children's responses from the anecdote as onomatopoeic representations of animal noises, as opposed to mimicry. An onomatopoeic representation of an animal noise is a phonetic interpretation of the noise put into the form of a word. Mimicry, in this context, is considered to be the "best possible human imitation of a source sound" (Bladon 1977: 161). Furthermore, any significant alternation in the natural voice of a person in order to create a sound is considered an instance of mimicry instead of onomatopoeia (Bladon 1977: 161). Also relevant to this subset of language are ideophones and iconicity. Iconicity refers to the ability of a word to embody the semantic meaning to which it maps. Ideophones are defined in the literature review later on in this section. In order to create an accurate representation of this data, I will avoid examples of mimicry in order to maximize the universality of the items. The onomatopoeic representations of an animal cry should be mostly unanimous across all speakers of a language, similar to the meaning of any other phone

sequence within the lexicon. I have chosen this category of onomatopoeia because it is present within the vast majority of languages that contain ideophone systems.

This analysis will be performed both within each language and across all four. I will analyze whether in each of these languages, the phonetic representations of animal cries is markedly different from those of the rest of the words in the language. By markedness, I refer to an inherent syllabic or phonemic distinctness of these sequences of phones from the non-iconic forms of the language. Throughout my analysis, I will try to identify any patterns or consistencies made within the animal cry representations of each language as well as any patterns that are relevant cross-linguistically.

1.1 Literature Review

Introduction to Ideophones

Mark Dingemanse's survey paper has been the most comprehensive source I have found for ideophones. Dingemanse presents his own definition of ideophones as "marked words that depict sensory imagery…ideophones are MARKED in the sense that they stand out from other words" (Dingemanse 2012: 655). This is the definition that I will base any reference to ideophones on throughout my paper. Furthermore, there is an explicit description of the sensory imagery that ideophones are depicting. This type of imagery is drawn from human sensory perception of our bodies and nature. Sensory perception includes, but is not limited to, information derived from sounds, odors, and visual stimuli.

Dingemanse's work is also relevant here due to the fact that it stresses the cross-linguistic value of ideophones. The main difference across languages in ideophone systems is the range of semantic mappings that they cover. However, Dingemanse refers to an implicational hierarchy of ideophones that can be used to explain the semantic diversity of these systems. He exemplifies this in the diagram, which I have reproduced below.

> SOUND < MOVEMENT < VISUAL PATTERNS < OTHER SENSORY PERCEPTIONS < INNER FEELINGS AND COGNITIVE STATES (Dingemanse 2012: 633).

This hierarchy implies that languages that contain minimal systems will contain ideophones representing sounds, but they may not necessarily incorporate visual patterns or movement as well. It also suggests that any system that has entities representing inner feelings and cognitive states will have words symbolizing the other four categories. In this context, it is important to know that iconic words symbolizing sound are included in even the most basic systems because animal cries fall under this category. Therefore, even languages with simplistic schemas of ideophones are likely to have phone sequences representing them.

In order to better understand the patterns found cross-linguistically in sound symbolism analyses I have found Bladon's work to be extremely useful. Bladon's work is useful to identify and distinguish some of the key terms associated with the topic such as onomatopoeia versus mimetics and speech sounds versus sounds in general. The paper analyzes specific examples of onomatopoeic items from five languages: English, German, French, Turkish, and Japanese. From this data, Bladon is able to conclude that nearly all the phonological segments are derived from the normal phonologic inventory of the language Despite this similarity in the phonological segments, it is of great significance that the morphophonological structure is irregular with respect to the rest of the items in the languages' lexicons. The structural peculiarities that Bladon mentions in particular include the following as quoted on page 166 in *Approaching Onomatopoeia*:

(1) "Widespread preference for single-syllable items"
(2) "Tendency to homorganicity of initial and final consonants"
(3) "Sound-segments may be combined in phonotactically ungrammatical ways"
(4) "Extreme readiness of most of these forms to undergo reduplication, usually complete reduplication."

Later, I will consider these peculiarities and compare them to my conclusions for each of the languages analyzed in this study. Bladon's conclusions imply there is potential for universal features of ideophones.

Brazilian Portuguese

In order to provide a basis for what is considered *regular* phonemic and syllabic structure for each language, I have consulted a variety of sources. For Brazilian Portuguese, I have found Milton Mariano Azevedo's book *Portuguese: A Linguistic Introduction* to be the most useful. This source provides full consonant and vowel inventories for Portuguese as well as insight into grammatical structures. The description of the restrictions on syllable constituents that I refer to throughout Section 3 is from this work. It effectively explains the allowed consonant and vowel patterns available for a variety of different word sections such as the coda. Although this introductory guide is on Portuguese in general, Azevedo makes a point to distinguish between characteristics of Brazilian Portuguese that contrast those of the European dialect. The animal cries that I have used for my analysis are from a pedagogical source meant for French students learning Brazilian Portuguese (Coutinho 2003). Although it is not a rich source of linguistic information on the language, it provides a good amount of data on the topic with phonetic transcriptions included. In addition to these sources, I found it useful to consult the two English-Brazilian Portuguese dictionaries mentioned in the references section to have better understanding of the normative forms of the language.

Spanish

The main source that I have used for onomatopoeic data in Spanish is a dictionary of onomatopoeic sounds in Spanish compiled by Donald Kloe (1977). This book contains both Spanish-English and English-Spanish translations for multiple categories of onomatopoeia including an entire section on animal noises. Although the translations are in orthographic form as opposed to transcriptions, they are still very useful. The translations also provide insight into verb formation of the sounds listed so that the reader can recognize the noise made by the animal as well as someone describing the action.

There were several reputable linguistic sources available for Spanish. For the phonemic inventories, I have chosen to use the charts detailed in *The Handbook of Hispanic Linguistics* (Hualde, Olarrea, and O'Rourke 2012). This is a useful guide

for linguistic analysis of Spanish and provides very thorough information on the phonological processes of the language. These processes are used as a source for the syllabic constraints put on Spanish forms that I mention in Section 4.2. In addition to the work of Hualde, et al., the work of Piñeros on Spanish Phonetics and Phonology has a detailed account of syllable type preferences (2009). This account includes exact frequency statistics for the most desirable structures; it also explains the linguistic appeal of these structures.

French

For French, a multitude of sources are available to gain a deeper understanding of its linguistic distinctions. *French: A Linguistic Introduction* has provided the most insight into the phonological characteristics of the regular forms of the language (Fagyal 2006). The vowel and consonant charts in Section 5.1 are drawn from this source. This guide also contributes to the collection of phonotactic rules detailed in Section 5.2. *French Sound Structure* provides the clearest depiction of possible syllabic structures and the frequency of those structures. It also goes into great detail on several phonotactic phenomena prevalent in French including reduplication and the nuances of final consonants. Jean Casagrande's (1984) volume, *The Sound System of French*, is an excellent source for understanding some of the phenomena occurring in surface realizations of French regular forms. This source is better for analysis of the phonological processes involved in transitioning from underlying forms of words to surface realizations as opposed to restrictions on overall word structure. The work of Bernard Tranel (1987) has a similar set of information, but goes into great detail on the relationship between French orthography and the deletion of word final consonants.

The actual data set used for the analysis here was the work of Jean-Pierre Zerling (1996). Zerling wrote a series of articles for the Travaux de l'Institut de Phonetqiue de Strasbourg on the subject of French onomatopoeia. The second part of the series includes a lexicon devoted to the subcategory of French iconic words that refer to animal cries. The entire series is a useful resource for studying onomatopoetic words that includes plenty of lexical items across a number of

categories in addition to animal cries such as the words of adult humans and the words of children.

Japanese

For Japanese, there is much more literature available on the sound symbolic system of the language. Considering Dingemanse's hierarchy noted above, Japanese has lexical items to account for all of the categories listed. A good general overview of this system has been provided by Shoko Hamano (1998). Hamano's work covers the differences between the standard Japanese lexicon and its iconic words. He discusses the patterns that are typical of this subset of the language. Additionally, he gives an in depth analysis of the mimetic words based on CV and CVCV roots individually. This book contains an explanation of the semantic mapping of specific consonants in the context of the varying roots. These semantic mappings include references to size and shape as well as types of movement, and other potential characteristics of the adverbs.

To better understand the phonotactic system of the regular forms of Japanese I have referred to the linguistic guide written by John Hinds (1986). Hinds' work gives a concise explanation of the syllabary nature of the Japanese writing system as well as significant phonotactic rules. There is also a section on ideophones that includes a generous lexicon of Japanese iconic words, a selection of which have been used as part of my collection of animal cry data.

1.2 Paper Overview

In the following section, I will explain the methods that I am using to analyze the data for each of the languages individually. I will then present the data that I have gathered for each language and explain the relevant phenomena. Once all of the languages have been analyzed individually, I will delve into any larger patterns that may have emerged across all four. These patterns will be compared to any preexisting work for consistencies between ideophones on the whole and those that fall within this particular category. Finally I will address the implications of these universal patterns.

2 Methodology

In sections 3-6, I will examine data from each of the languages individually. For each language, I will present a phonemic inventory for the language as a whole for both consonants and vowels. These will be presented in comparison to phonemic inventories of the animal cry data itself. By comparing these charts side by side, it will be possible to see whether Bladon was right in saying that onomatopoetic forms consist of the same phonological values as their non-iconic counterparts. All of the consonant charts will be presented in the same manner where the rows represent the manner of articulation of the phoneme and the columns represent the place of articulation. In the individual cells, a phoneme on the left side of the cell denotes the voiceless property, while the phoneme on the right is voiced. After examining the phonemic inventory itself, I will mention any significant restraints on the morphophonological structure for regular words in the language. By referring to *regular* or *normal* words, these are words whose semantic mappings do not correspond to a sensory perception. Essentially, normal or regular items in the lexicon of a language are the non-onomatopoeic words. These structural restrictions will then be compared to the syllabic structures that I have observed in the data set. The purpose of comparing both phonemic and structural regularities of a language to its onomatopoeic inventory is to search for markedness as it has been defined above. The full list of data that was considered for analysis can be found along with syllabic structure in Appendix A-D. All transcriptions are presented in a form consistent with the International Phonetic Alphabet (IPA).

2.1 Data

The data used for this paper was compiled from a series of different sources. Outside of Japanese, I found it difficult to locate a sizeable lexicon of onomatopoeic terms. The size of the lexicon was considerably reduced after narrowing it to the scope of this paper. For each language, I had to locate the data that fell under the category of 'animal cry onomatopoeia'. In this paper, this covers all onomatopoeic words of a language that correspond to noises made by an animal's vocal cords. The data is limited to iconic words representing sounds in order to avoid those that

address movements. This definition is also phrased as such to rule out any noises that are produced by the movements of an animal such as that of horse's hooves while they run. In contrast, the noise made by a horse neighing is considered a part of this lexicon. The full count breakdown of the data set by language can be seen in Table 1. The lexical entries used for each language and their interpretations can be found in Appendix A-D.

Language	Brazilian Portuguese	French	Japanese	Spanish	Total
Onomatopoeic Entries	25	29	21	51	126

Table 1: Count of Onomatopoeic Entries. The count of individual onomatopoeic entries for each language found in Appendix A-D. Each lexical item is counted once regardless of the number of interpretations.

The data set has been further classified into animal types in Table 2. The purpose of this table is to show the diversity of the data in each language and over all the languages. The groupings can also be used for analysis over groups of sounds. In the concluding section of this paper, I will analyze the data in relation to these larger groups for consistencies. It is also interesting to note which types of animals are most commonly found within this subset of onomatopoeic languages. Birds are the most represented set of animals across all four languages. French is the only language with more entries representing mammals than birds. The next most frequent category total is the group of iconic words representing the cries of mammals. Amphibians and reptiles, referring to animals related to snakes and frogs, is for the most part underrepresented. The category 'Other' refers to onomatopoeic sounds that were not inherently linked to a single species of animal or those referring to the noises of insects.

Language	Birds	Mammals	Amphibians/ Reptiles	Other	Total
Brazilian Portuguese	10	9	3	9	31
French	12	15	4	4	35
Japanese	10	9	2	3	24
Spanish	26	17	4	4	51
Total	58	50	13	20	141

Table 2: Data Distribution Over Animal Type. This table shows the distribution of data across the four languages based on the type of animal. For onomatopoeic entries with multiple interpretations, each

interpretation is counted separately. The total counts are based on the total number of interpretations for onomatopoeia, not the total number of onomatopoeic entries for each language.

It is easy to speculate what is the cause of this frequency distribution across the classifications. The high presence of birds and mammals could be due to the amount of interaction that native speakers of these languages have with these species. In general, people are more likely to encounter a duck or a horse during their normal routine as opposed to a manatee or shark. Furthermore, there are certain animals whose calls we tend to learn at a very young age. Most children have had some experience reading a book that taught them what cows and sheep say. Yet, there are not many who read books teaching them what noise the turtle makes. It could even be said that these frequencies are caused by the nature of the animal noise itself; some could be more difficult than others for humans to imitate. The truth behind this speculation is not within the scope of this paper, but it leaves open new questions for further exploration. Instead, in the following sections I will focus on the phonotactic patterns found within the animal data in relation to animal classification, regular forms of the language, and similar forms across languages.

3 Brazilian Portuguese

In this section, I will analyze the syllabic and phonemic structure of animal cries from a Brazilian Portuguese lexicon. To begin, I will present a full phonemic inventory of Brazilian Portuguese alongside the phonemic inventory that I have compiled from the onomatopoeic data on animal cries. I will then address the phonemic restrictions found within the regular forms in Brazilian Portuguese, in particular the restrictions on consonant clusters in different parts of a word. The data entries on animal cries will then be evaluated in the context of these conditions to see which are upheld and which are being violated.

3.1 Phonemic Inventories

Consonants in Regular Portuguese Forms

	bilabial		labio-dental		dento-alveolar		alveolar		palatal		velar		uvular	
Stop	p	b			t	d					k	g		
Fricative			f	v			s	z	ʃ	ʒ				ʀ
Affricate														
Lateral								l	ʎ					
Nasal		m						n				ŋ		
Vibrant								ɾ						
Glides										j		w		

Table 3: Phonemic inventory of consonants in Portuguese found in regular lexical items. /ʀ/ here represents the allophones [ʀ r x h]. (Azevedo 2005: 42).

It is important to note that although the above table refers to consonants found in Portuguese as a whole, it does not include any consonants that are considered irregular in Brazilian Portuguese.

Consonants Found in Animal Cry Onomatopoeia of Brazilian Portuguese

	bilabial		labio-dental		dento-alveolar		alveolar		palatal		velar		uvular	
Stop	p	b			t						k	g		
Fricative							s	z	ʃ					ʀ h
Affricate														
Lateral								l						
Nasal		m												
Vibrant								ɾ						
Glides												w		

Table 4: Phonemic inventory of consonants for onomatopoeic words representing animal cries derived from the Brazilian Portuguese data in Appendix A.

The above table was derived solely on the relevant data that I had access to as found in Appendix A. This data consists of twenty-five different entries representing the cries of thirty animals. By comparing the two tables above, it is clear that Table 4 contains a subset of the consonants in Table 3. In fact, it appears as though the majority of the consonants of Brazilian Portuguese are represented in the onomatopoeic inventory that I have gathered. More notably, Table 4 does not contain any consonants that are not seen in Table 3. Therefore, there are no irregular consonants in my data. This suggests that if animal cry onomatopoeia are

markedly different from their non-iconic counterparts, then this property is not coming from the individual consonants.

Vowels in Regular Portuguese Forms

	front	central	back
High	i		u
Mid	e ɛ		o ɔ
Low		a	

Table 5: Vowels found in regular Portuguese Forms. This table excludes any values from Azevedo's original table that were only found in European Portuguese. (Azevedo 2005: 42).

Vowels Found in Animal Cry Onomatopoeia of Brazilian Portuguese

	front	central	back
High	i		u ʊ
Mid	ɛ		o ɔ
Low		a	

Table 6: Vowels found in animal cry onomatopoeia of Brazilian Portuguese. This table has been compiled by the data evaluated in Appendix A.

Table 6 is composed of the vowels that are present in the data found in Appendix A. In addition to the phones seen here, the high back vowel [u] is also seen in the geminate [u:] and nasalized [ũ] forms. Table 4 contains all of the items in Table 3 with the exception of the upper mid front vowel [e]. Additionally, the near-high back vowel [ʊ] appears in the onomatopoeic data but does not appear in the regular vowel inventory of Brazilian Portuguese. However, this phone appears in several of the animal cries used for analysis including [kuʀu'pakʊ] 'cry of a parakeet' and ['zuʀʊ] 'cry of a donkey'.

With few discrepancies, the phonemic inventory of the onomatopoeic data is nearly identical to that of the regular forms found in Brazilian Portuguese. This is consistent with Bladon's hypothesis. Even with a small representation of the full set of possible animal cry ideophones, nearly every phoneme in the regular phonological system can be found in the animal data. The animal data does

however contain the near-high back vowel [ʊ], which is not seen in the standard vowel inventory. Although this extraneous vowel is present in several of the lexical items, it remains the only significant difference between the phonemic compositions of the two sets of forms. Therefore, any degree of markedness that the onomatopoeic entries are presenting in Brazilian Portuguese is not derived from the phonemes themselves.

3.2 Constraints in Syllabic Structure of Brazilian Portuguese

There are distinct limitations on the syllabic structure of words found in Brazilian Portuguese. In general, syllabic structure is analyzed in three parts: the *nucleus*, *onset*, and *coda.* All syllables have a *nucleus*, which can be thought of as the core or center of the syllable. The *onset* of the syllable consists of the consonant or set of consonants preceding the nucleus. The *coda* is the set of consonants that follow the nucleus. The syllable onset in Brazilian Portuguese is restricted to "a single consonant (C) or a cluster of two specific consonants, C_1 C_2"(Azevedo 2005: 47). Although a single consonant onset is not restricted, there are limitations on the identities of the values in an onset cluster. The consonants in the cluster are designated as follows: C_1 is one of the following phones /p b t d k g f v/ and C_2 is either /l/ or /ɾ/. The only combination unavailable in any Portuguese form is /dl/. The nucleus of Portuguese syllables has to be a vowel or diphthong. Finally, the coda position is limited to the four phonemes /l ɾ ʀ s/ and their respective allophones. Clusters of multiple consonants cannot occur in the coda (Coutinho 2003: 47-48). A table of syllable types in Portuguese can be seen below. In the table V represents a vowel, C is a consonant, and G is a glide. The subscripts on the consonants indicate that they are different.

V	*é* 'is'	CV	*pó* 'dust'	C_1C_2V	*crê* 'P3sg believes'
VG	*oi* 'hi'	CVG	*boi* 'ox'	C_1C_2VC	*três* 'three'
VC	*ar* 'air'	CVGC	*dois* 'two'	C_1C_2VG	*frei* 'friar'
VGC	*eis* 'here is'	CVC	*voz* 'voice'	C_1C_2VGC	*freis* 'friars'
C_1C_2VCC	*trans*-*	CVCC	*perspirar* 'to perspire'		

Table 7: Adapted from Table 2.4 on page 50 in Azevedo (2005). *assumes the transcription /trans/

Brazilian Portuguese has one other regularly occurring phonotactic process. There is a tendency to insert a vowel /i/ between consonant clusters when the cluster consists of an irregular consonant combination. Based on the above restrictions on consonant clusters, an irregular cluster would have to consist of a stop followed by a liquid or the voiceless fricative /f/ followed by a liquid. This rule is the reason that the word *psiquitatra* does not have the surface realization [psi-ki-'a-tɾɐ] with the form C_1C_2V in the first syllable. Instead, /i/ is inserted between C_1 and C_2, producing the form [pi-si-ki-'a-tɾɐ] (Coutinho 2003: 225). In the next section, I will confirm whether or not these constraints are upheld by the onomatopoeic data.

3.3 Brazilian Portuguese Data in Light of Constraints

In Section 3.1, I have already shown that from a phonological standpoint, onomatopoeic forms of animal cries are not markedly different form regular forms in Brazilian Portuguese. Yet, there are some structural distinctions between the onomatopoeic data and the regular forms. The following syllables have been derived from the data in Appendix A:

CV CVG CGV	[‘bɛ] ‘sheep’ [‘piw ‘piw] ‘fish’ ['kwaʃʊ 'kwaʃʊ] ‘frog, toad’	VC C_1C_2V VG	[aw ‘aw] ‘dog’ ['kɾa 'kɾa] ‘owl’ [aw:] ‘wolf’

Table 8: Syllables derived from lexical items in Appendix A.

One of the entries that stands out in this table in comparison to Table 7, is the structure CGV. This is not a viable syllabic structure found in the regular forms of Brazilian Portuguese. The /kw/ cluster can be found in both ['kwaʃʊ 'kwaʃʊ] representing the sound made by a frog or toad and [‘kwa ‘kwa ‘kwa] representing the cry of a duck. These sounds are markedly different from regular forms because of this unusual structure.

For the most part, the makeup of the onsets and codas themselves are not unusual in the animal cry data. All of the clusters present in the set of iconic words conform to the restraints laid out in Section 3.2. The one abnormality found in the iconic set of data is the presence of [w] in coda position both word-medially and word-finally. The central approximant is not considered a valid consonant in this

location. It appears both word-medially and word-finally in [aw ‘aw] ‘cry of a dog’. In [mi ‘aw] ‘cry of a cat’ it is appearing word-finally as well.

Overall, the phonemic content found in the onomatopoeic data of Brazilian Portuguese is consistent with the standard values, but the syllabic structures do contain irregularities. Interestingly enough, the irregularities stem from the involvement of the central approximant [w]. It is found in the non-viable cluster /kw/ as well as in the restrained coda position. The unusual positioning of this phoneme could be an indicator of onomatopoeic sound in Brazilian Portuguese. These findings are consistent with Bladon’s theory that the phonological makeup of onomatopoeic forms is the same as the regular forms, but they are combined in unusual ways. As in his work, reduplication is a common feature in the animal cry data I have collected for Brazilian Portuguse. However, there is not an overwhelming tendency in the data towards single syllable structures.

4 Spanish

All of the data on Spanish onomatopoeia within this section has been derived from the English-Spanish onomatopoeic dictionary by Donald Kloe. The data selected based on the standards defined in Section 2.1 can be seen in Appendix B. There are fifty-one different lexical entries that fall into my definition of Spanish animal cry onomatopoeia. This data set is unique in that it consisted solely of orthographic translations of English onomatopoeic words. Thus, the phonemes and structures that have are referred to in the following sections are based on my own phonetic analysis of the Kloe’s work. Similar to the analysis of Brazilian Portuguese, the phonemic inventories will be compared first and then I will describe some of the primary phonotactic rules of Spanish. To conclude the section, I will address the onomatopoeic subset of Spanish as a whole in relation to the rest of the words in the language. I will also mention any significant patterns that appear across the iconic words.

4.1 Phonemic Inventories

Consonants in Regular Spanish Forms

	bilabial		labio-dental	inter-dental	dental		alveolar	alveo-palatal	palatal	velar	
Stop	p	b			t	d			ɟ	k	g
Fricative			f	θ			s			x	
Affricate								tʃ			
Nasal		m					ŋ		ɲ		
Lateral							l		ʎ		
Rhotic-tap							ɾ				
Rhotic-trill							r				

Table 9: Consonants found in regular forms of Spanish. (Hualde, Olarrea, and O'Rourke 2012: 93).

Consonants Found in Animal Cry Onomatopoeia in Spanish

	bilabial		labio-dental	inter-dental	dental		alveolar		alveo-palatal	palatal	velar	
Stop	p	b			t	d				ɟ	k	g
Fricative			f				s	z				
Affricate									tʃ			
Nasal		m						n		ɲ		
Lateral								l		ʎ		
Rhotic-tap								ɾ				
Rhotic-trill								r				

Table 10: Consonants found in onomatopoeic forms of Spanish. This inventory has been derived from the data in Appendix B.

In addition to the phonemes above, I propose that the alveolar approximant [ɹ] may also be appearing in certain forms such as *ranraneo*, /ɹan-ɹan-e-o/, meaning 'the purring noise of a cat'. Across the data, it was difficult to determine which of the rhotic consonants was present in certain lexical items. In order to properly identify these phones, it would be best to do transcriptions based on readings of this data by native Spanish speakers. Also, there is an allophone of the velar fricative [x] appearing in some of the lexical entries including *rugido*, /ru-**x**i-do/ 'the voice of a lion' and *gemido*, /**x**ɛ-mi-do/, but without transcriptions based on native speaker elicitations it is difficult to identify the exact phones present.

There is a consonant present in the onomatopoeic data that are not appearing in the regular forms listed in Table 9. The first of these would be the voiced alveolar fricative [z]. [z] is present in several of the entries in Appendix B including the following:

Gaznar	[gaz-naɾ]	To caw
Rebuzno	[re-buz-no]	Bray (of a donkey)
Zumbar	[zum-baɾ]	To buzz

These forms show [z] appearing in both onset and coda positions of syllables. It is possible that [z] is used for emphasis on the iconic nature of these words.

Vowels in Regular Forms of Spanish

	front	central	back
High	i		u
Mid	e		o
Low		a	
	unrounded		rounded

Table 11: Vowel inventory of regular forms in Spanish. (Hualde, Olarrea, and O'Rourke 2012: 90).

Vowels Found in Animal Cry Onomatopoeia in Spanish

	front	central	back
High	i		u
Mid	e ɛ		o
Low		a	
	unrounded		rounded

Table 12: Vowel inventory of onomatopoeic data in Appendix B.

The vowels I found in the onomatopoeic data were nearly identical to that of the regular forms in Spanish. In my transcriptions I have included the additional front mid-vowel /ɛ/ which is not included in the table from Hualde, et al. It is

possible that this is due to vowel variation, which is fairly common in Spanish. In addition to the monophthongs displayed in Table 12, the diphthong /ɑʊ/ was present in some of the iconic entries found in Appendix B. For example, it is found in the lexical entry for the onomatopoeic noise made by a dog barking, *guau* [gʎɑʊ].

4.2 Preferred Syllabic Structures in Spanish

Spanish has distinct preferences when it comes to syllabic structure. Most notably, the majority of Spanish syllables contain at least one consonant in the onset, 85% of the syllables total. In contrast, final consonants appear in only 29% of all syllables. These numbers help explain the fact that [CV] is the most common syllabic structure in Spanish. Over half of all syllabic structures in Spanish conform to this type. The second and third most frequent types are [CVC] and [V] and respectively. These two have dramatically lower occurrences in Spanish than [CV] (Piñeros 2009: 100).

Spanish is also limited in the composition of each of the individual positions in the syllable. The variations on Spanish syllable structure can be seen in the following diagram:

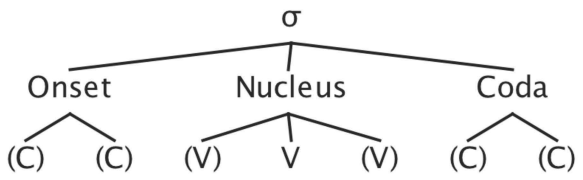

Figure 1: Possible projections of syllabic structures in Spanish. Translated from Figure 8.2 in Piñeros on page 101(2009).

Figure 1 demonstrates the maximal projections for the onset, nucleus, and coda in Spanish syllables. Both complex onsets and codas are limited to at most two consonants. However, in a complex nucleus there can be up to three vowels.

Although nuclei can only consist of vowels, diphthongs have a tendency to create a gray area for syllabic structure in Spanish. "Spanish exhibits a clear preference for syllabifying a sequence of two vocoids in the same syllable, as a

diphthong, consisting of a glide ([- vocalic] vocoid]), and a vowel ([+ vocalic] vocoid)"(Hualde, Olarrea, and O'Rourke 2012: 141). Vocoids encompass both glides and vowels. The glide is not restricted to appearing in a specific position in the diphthong. It is widely accepted that if glide appears prevocalically in a diphthong then it in the nucleus; otherwise, the diphthong is considered to be in the coda.

There are further restrictions on the makeup of onsets and codas. Glides and vowels are not allowed to appear as a simple onset in a syllable. Any non-glide consonant is permissible. As mentioned above, it is also possible to see a complex onset. The set of available onset clusters in Spanish include combinations of a stop or/f/ and a liquid. However, the cluster /tl/ is only allowed in certain Spanish dialects, including Mexican Spanish, and */dl/ is not available in any of them. For the coda, there are different restrictions based on whether or not the syllable is word-final or word-medial. In word-medial codas, it is possible to see /l/, /r/, /s/, and /θ/. It is also possible to have a word-medial nasal in the coda; however, it must have assimilated to the place of articulation of the consonant that it precedes. Coronal consonants are the only available phones to use word finally in the Spanish lexicon with the exception of loan words. This set of possible phones includes /l n r s θ d/. Across all Spanish dialects, it is abnormal to see an obstruent other than /s/ in word-final position (Hualde, Olarrea, and O'Rourke 2012: 145).

4.3 Spanish Data in Light of Constraints

V	***hoo**poe*, 'call of the hoopoe'	C_1C_2V	*cro* 'croak'
VC	*hinnn* 'neigh'	C_1C_2VC	***graz**nido* 'caw'
C	*sssss* 'hiss'	CGV	*guau* 'dog barking'
CV	*be*, 'cry of the sheep'	CGVC	*cuac* 'duck quacking'
CVC	***ron**roneo*, 'cat purring'		

Table 13: Syllables derived from the Spanish orthographic items listed in Appendix B.

This table highlights the syllables found within the Spanish iconic words listed in Appendix B. None of the structures listed above violate the maximal projection of Spanish syllables portrayed in Figure 1. Furthermore, the three most frequent syllabic types of Spanish are included within this set of structures as well.

This suggests that at least on the surface level—in which only the consonant, vowel, or glide status of a phone is viewed—the syllable types found in Spanish iconic words are normal in relation to the rest of the language. To see if these words truly conform to the structural requirements of Spanish, it is thus necessary to take a deeper look at the makeup of these segments.

As stated above, there are limitations on consonant clusters in Spanish based on both their location within the syllable (onset or coda) and their location within the word (medial or final). First, I will examine the makeup of the onsets throughout the data. The set of onset consonant clusters that are seen in the animal cry onomatopoeia of Spanish adhere to the constraints mentioned above. They include the following: /br/ *bramido*; /gl/ *gluglu-gluglu*, /gr/ *graznido*; /kl/ *clo clo clo*; /kr/ *croac*; and /tr/ *trisar*. Each of these clusters contains an oral stop followed appropriately by /l/ or /r/.

The nuclei present in the data fit within the restrictions of Spanish phonotactics. The vast majority of the nuclei in this data set consisted of a single vowel within the set of normal vowels listed in Table 11. Other than /ɑʊ/ mentioned above, there were also diphthongs comprised of glides followed by a vowel in the data. One example includes /wa/, seen in *cuac cuac cuac*, representing the noise made by a duck. This combination of vocoids fits within the structural guidelines of Spanish.

There is some irregularity in the codas present in the onomatopoeic lexicon. There are a few entries that contain the voiced alveolar fricative /z/ in the coda position. This phone occurs in a word-medial coda in *graznido* /graz-ni-do/ 'caw', *gaznar* /gaz-nar/ 'to caw' and *rebuzno* /re-buz-no/ 'bray (of a donkey)'. /z/ as its own entity is irregular in relation to the standard consonant inventory of Spanish. These syllables show an additional irregularity in allowing it to appear in coda position.

There are some noticeable differences between the regular and iconic forms of Spanish, but for the most part the structures remain constant. In the data that I have collected, the markedly different words contain the phone /z/. This phone is unusual for the phonemic inventory in Spanish; it also appears in the illegal coda

position in several different animal cries. Otherwise, there are no consonant clusters present in either the coda or onset of the animal cry data that would not be available for the regular forms. Additionally, the nuclei of this subset of the Spanish lexicon contain regular vowels and diphthongs. The structural integrity of the syllables remains intact throughout the data set as well. These findings seem to conflict with the theories proposed by Bladon. In the context of this set of Spanish onomatopoeic data, the phonemes are not entirely consistent with those found in the regular forms—including in coda position—and the combination of the sounds in terms of the syllabic structure conforms to the required constraints.

Reduplication is common amongst several of the entries, now consistent with Bladon's proposal. Partial reduplication with vowel alternation is seen in *caracaquear* transcribed as /karakear/ meaning 'cackle'. Full reduplication can be seen in *chiii chiii chiii* and *pipi* both of which can be used to signify 'cheep'. It is possible that reduplication is used to better imitate the animal call or indicate the duration of the call during a story. In both cases, the duplicated forms, partial or otherwise, are markedly different from the forms found in the regular data of Spanish in this way.

In general, Spanish animal cry words are very similar to their standard counterparts; yet, they do display certain distinct properties. There is a striking difference in animal cry words made up of syllables without vowels, but the rest of the syllabic structures present are allowed in regular morphemes. The forms exhibiting reduplication are also clearly distinguished as being onomatopoeic. Spanish appears to conflict with most of Bladon's assumptions about iconic words, especially given the fact that the majority of the iconic words are not monsyllabic, but reduplication remains a prominent feature in my data.

5 French

The French data used for my analysis can be found in Appendix C. Fortunately, this data does contain orthographic representations of the lexical items as well as IPA transcriptions. The original source is written entirely in French. As

such, all of the English translations were translated by me with the help of the Cambridge Online Dictionary. The data set is diverse in the types of animals represented; French is the only language where there are more interpretations representing the cries of mammals than the number representing cries of birds. After analyzing the consonants, I will present vowel charts for both the onomatopoeic data outside of table form. This visualization of the data is useful when dealing with such a large number of vowels as is present in the French lexicon. Following the phonemic comparison, I will show how the majority of the forms fit within the syllabic restraints that apply to the rest of the language. Any significant patterns within the onomatopoeic subset of the language will be mentioned as well.

5.1 Phonemic Inventories

Consonants in Regular Forms of French

	bilabial		labio-dental		alveo-dental		palato-alveolar		palatal		velar		uvular	
Stop	p	b			t	d					k	g		
Fricative			f	v	s	z	ʃ	ʒ						χ
Affricate					ts		tʃ	dʒ						
Nasal		m						n		ɲ		ŋ		ʁ
Trill								r						ʀ
Approximant														
Lateral												l		
Central														ɥ

Table 14: Consonants in regular forms of French. (Fagyal 2006: 41).

Consonants Found in Animal Cry Onomatopoeia of French

	bilabial		labio-dental		alveo-dental		palato-alveolar		palatal		velar		uvular		glottal	
Stop		b			t	d					k	g			ʔ	
Fricative					s	z										
																h
Affricate																
Nasal		m														
Trill								r						ʀ		
Approximant																
Lateral												l				
Central										j,ɥ*						

Table 15: Consonants found in animal cry onomatopoeia from Appendix C.

By comparing the two tables above, it is clear that the consonants found in the animal cry data found in Appendix C are a subset of those found in the consonant inventory of French in Table 14. In addition to the phones above, the voiced labio-velar approximant /w/ is present in the onomatopoeic data. The only apparent oddities are the presence of the approximants /ɥ/, /j/, /w/, the glottal stop /ʔ/ and the fricative /h/ in the onomatopoeic data. However, given that the transcriptions in the source material did not provide place of articulation for these phones, it is likely that they are simply allophones of normal sounds of French. The set /ɥ j w/ could be considered allophones of the uvular central approximant /ɰ/. The variation is probably caused by assimilation. The voiceless fricative /h/ is probably an allophone of /χ/. Therefore, with slight allophonic variation, these are not abnormal phonemes. The glottal stop on the other hand is exceptional. It has no relation to the consonants listed in Table 14. This phone appears in the iconic word representing the cry of the donkey [ʔiʔã]. As a general proposition, the animal cry onomatopoeia in French exhibit certain phonemic variations on central approximants and fricatives in the standard phonemic inventory based on assimilation. The main distinction between the phonological breakdown of these two lexical sets is the presence of the glottal stop in the onomatopoeic data.

Vowels in Regular Forms of French

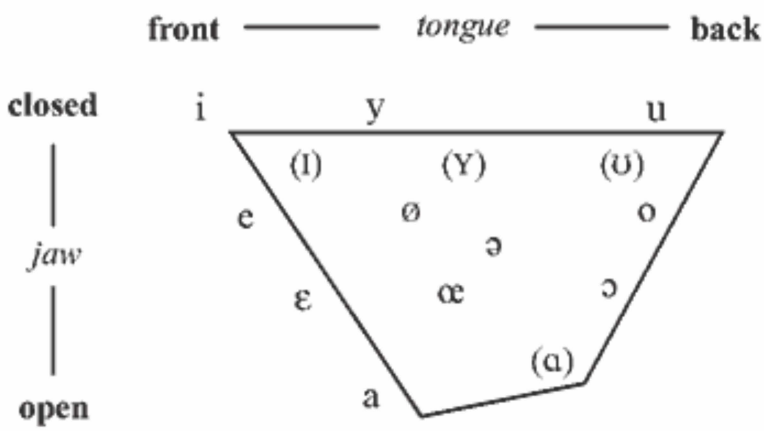

Figure 2: Vowels in regular forms of French. (Fagyal 2006: 25).

Vowels Found in Animal Cry Onomatopoeia of French

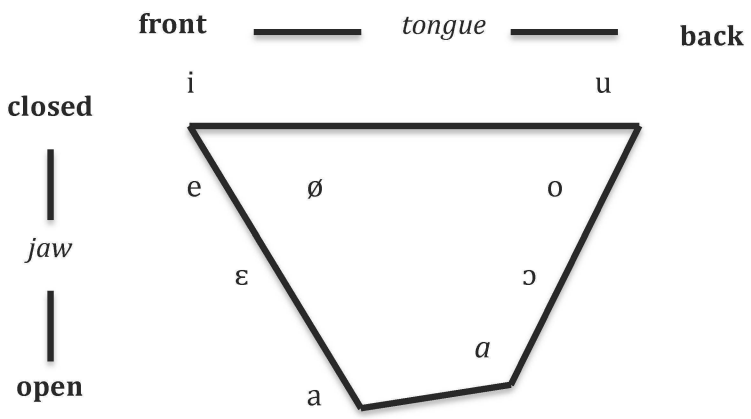

Figure 3: Vowel inventory of the animal cry onomatopoeia present in Appendix C.

There are no unusual vowels found in the onomatopoeic data of French that I have collected in Appendix C. Within the forms, there is some vowel variation. It is fairly common in the onomatopoeic data to see geminate vowels such as the geminate /ɛ/ found in [bɛ:] 'cry of a sheep' or the elongated /u/ found in [wu:] 'cry of the wolf. In addition to vowel lengthening, nasalization of vowels also appears in several of the iconic words. There are instances of the nasalized low back vowel /*a*/, the front mid vowel /ɛ/, the front high vowel /i/, and the back mid vowel /ɔ/.

The distribution of the phonemes found in the animal cry onomatopoeia of French is very similar to that of the regular forms. In the consonants, there is some variation among the approximants but it appears as though it is due to assimilation of the place feature. The glottal stop is present in one of the lexical entries, which is highly unusual for French words. All of the vowels exhibited in the onomatopoeic data are contained within a subset of the regular vowels. The vowels do appear in both lengthened and nasalized forms, but neither of these variations is significantly different from the rest of the French lexicon.

5.2 Phonological Processes and Syllabic Constraints of French

French includes a wide variety of syllabic structures in its lexicon. However, it is still possible to distinguish certain forms as being more common than others. These forms include: "V *on* /ɔ̃/, CV *bon* /bɔ̃/, CCV *trop* /tʁo/, VC *âme* /am/, VCC *Est*, /ɛst/, CVC *par* /paʁ/, CCVC *blonde* /blɔ̃d/, CCVCC *triste* /tʁist/, GV *oui* /wi/, and CGV *bien* /bjɛ̃/, with open syllables and in particular, CV syllables being considered the most simple" (Walker 2001: 26). Based on the forms mentioned in Walker's analysis (2001), a maximal syllable template can be derived for French of the form CCCGVCCC. Within these structures, there are normal patterns found in the individual segments of the syllables. For onsets containing three consonants, /s/ must be the first consonant. Onset clusters with two consonants are usually an obstruent followed by a liquid or /s/ followed by a nasal or voiceless obstruent (Walker 2001: 27).

Forward syllabification is one of the underlying rules that create the syllabic structure of French words. This rule causes a single consonant between two vowels to adhere to the vowel on their right. In the event there is a consonant cluster in this position, their division is based on two constraints: the *Maximal Onset Principle* and the *Sonority Hierarchy.* Fagyal (2006) explains these two axioms:

> [The Maximal Onset Principle] is a constraint maximizing the size of the onset rather than that of the coda. For instance, when the group /kstʁ/ before and after /ɛ/ in *extraire*, 'extract' is to be divided between the preceding and the following vowels, the cut maximizing the onset of the following syllable (/ɛk|stʁɛ/) rather than the coda of the preceding syllable (/ɛks|tʁɛ/) will be preferred … Sonority hierarchy, on the other hand, is a relative scale of sounds based on their inherent loudness (54).

The Sonority Hierarchy dictates the ordering of phonemes based on their sonority or those with the largest amount of energy based on their airflow due to the fact that they are considered the most sonorous sounds; vowels find themselves in the nucleus of the syllable. Furthermore, within an onset cluster of a syllable the consonants will be in order of increasing sonority. The class of phonemes known as sonorants including /l/, /ʁ/, and glides occur closest to the nucleus, while voiceless

fricatives occur in the leftmost position because they are considered the least sonorous (Fagyal 2006: 54).

Vowel harmony is a common phonological phenomenon that refers to the tendency of vowels within the same word to assimilate or become more similar to one another. In French, it appears in the form of vowels partially assimilating in height to the vowel in the following syllable. There are two significant restrictions on this change: (1) vowels only harmonize by becoming more closed, and (2) the result height of a vowel only becomes [nonlow], not [high] (Casagrande 1984: 90). Formally, Casagrande describes this rule as follows:

> RULE VOWEL HARMONY (final version): In open syllable, word-internally, a low vowel followed by a syllable whose peak is [nonlow] becomes [nonlow] (90).

This alternation explains why the vowel /ɛ/ might raise to /e/ preceding /u/ but not to /u/.

Another notable phonological event in French concerns final consonants. It is very normal to see the deletion of word final consonants throughout the regular forms of the language. This phenomenon is of particular concern when explaining the process of *liason* in French, which causes word final consonants to become apparent when followed by a word beginning with a vowel. However, given that all of the instances of onomatopoeia that I am concerned with are being referred to in an isolated context, I will exclude any mention of liason for my analysis. Of all the consonants presented in Table 14 above, there are only two that do not occur in word-final position in regular forms: [w] and [ɥ]. In terms of the orthographical representation of French words, clusters of consonants representing suffixes such as /nt/ in *réellement* are never pronounced (Tranel 1987: 155).

French nouns also occasionally exhibit *reduplication*, a process by which a part of or an entire syllable is repeated within a word. An affectionate pet name in French is *chouchou* pronounced [ʃʊʃʊ] is representative of full reduplication. French also contains lexical items demonstrating partial reduplication wherein "the first or reduplicated syllable is a partial copy of the second or stem syllable, which must itself begin with a consonant" (Walker 2001: 199). This partial copy can be realized

in multiple ways. In some cases only the 'consonant + vowel' of the stem syllable materializes in the reduplicated syllable. At other times, there is vowel alternation between the two as demonstrated in *bric-à-brac*, 'odds and ends' (Fagyal 2006: 165).

5.3 French Data in Light of Constraints

C	[s:] 'hissing of a snake'	V	[u:] 'cry of an owl or wolf'
CV	[bɛ:] 'cry of the sheep'	GV	[wu:] 'howl of a wolf'
CVC	[kɔt kɔt] 'cry of the chicken'	CGV	[kwɛ̃kwɛ̃] 'quack of a duck
C_1C_2	[bz:] 'buzz of a fly or bee'	CGVV	[mjau] 'cry of a cat'
C_1C_2V	[kʀikʀi] 'chirp of a cicada or cricket'	CVG	[kajkaj] 'cry of a sick dog'

Table 16: Syllabic structure of French onomatopoeic data found in Appendix C.

There are two syllabic structures present in the above table that conflict with the restrictions on French words laid out in Section 5.3. They are C and C_1C_2. In standard French, the minimal syllable is V thus these structures are highly irregular because they do not even contain a vowel. The exclusion of a vowel in a syllabic structure does create a markedly different surface representation of these iconic forms.

Outside of these abnormal structures, the syllables found in the iconic subset of French are fairly similar to the regular ones. There does appear to be a similar preference for open syllables, with over twenty of the onomatopoeic entries containing at least one open syllable. Furthermore, vowel harmony is present in the iconic forms. This effect can be seen in the surface representation [kokeʀiko] of *cocorico*, 'the cry of the rooster'. Given the orthography *cocorico*, I presume that the underlying representation of this word is actually /kokoʀiko/. However, due to vowel harmony the /o/ becomes fronted like the following /i/ resulting in [e].

Additionally, all of the codas and onsets found in the onomatopoeic data conform to the previously mentioned restraints. The adherence of these phonemes to restrictions on onset and coda compositions is compliant with Bladon's proposal. The unusual syllabic structures are also consistent with his theories.

The onomatopoeic data seen does seem to have certain consistencies across the entries. One of which is reduplication, something that is known to appear in the regular lexicon of French as well. The data set shows exhibits full reduplication as in[kajkaj] 'cry of a sick dog', as well as partial reduplication with vowel alternation in [ʔiʔã], 'bray of the donkey'. Furthermore, there are consistencies across certain categories within the dataset. For example, the voiceless velar stop [k] appears most frequently in iconic words that represent the call of a bird. This fact becomes more significant in light of the realization that the majority of iconic words that refer to birdcalls contain [k]. This suggests that there could be a semantic mapping between the velar consonant and the categorization of an iconic word as representing the sound made by an avian animal. It is difficult to identify a similar semantic mapping to the rest of the categories given that they are not as well represented. The mammals category should be able to provide further insight, but there is not a consistent pattern across all of the forms. In fact within the three forms present that all refer to dogs including [kajkaj] 'cry of a sick dog', [gʀː] 'growl of an angry dog', and [wawa] 'bark of a dog', there are no distinguishable patterns. This suggests that although there may be semantic mappings from certain phones to representations of certain animals in French onomatopoeic data, they are not available in all cases.

6 Japanese

In relation to the previous three languages, Japanese has the most complex sound-symbolic system; it also has the system that has been most researched by other linguistis. In order to properly examine iconic words in Japanese are split into three categories: *giongo, giseigo,* and *gitaigo*. Each of these categories is explained in the following table:

Classification	definition	example	definition of example
Giseigo	the sounds of animals	nya-nya	the sound a cat makes
Giongo	the sounds of objects	pota-pota	the sound of dripping water
Gitaigo	the sounds of physical and emotional states	fura-fura	the sound of being dizzy

Table 17 The Sound Symbolic System of Japanese. (Sharlin 2010: 13).

Based on the definitions in the table above, the classification that I am concerned about in this context is *giseigo*. The pre-existing analyses of Japanese sound symbolism are also unique in that they describe the productive nature of this set of lexical items. By productive nature, I am referring to the fact that individual phonemes in sound symbolic words signify particular semantic meanings. These significant phone sequences is most often found in items under the umbrella of *gitaigo*. They are also present in *giongo*, but they do not have as large an impact on *giseigo* according to Naomi Sharlin (2010: 16).

Given that there is a large selection of pre-existing data on the distinctions between the sound-symbolic system in Japanese and its regular lexicon, my analysis of Japanese will take an alternate direction from that of Sections 3-5. As opposed to presenting the phonemic inventories themselves, I will mention the previously identified phonotactic rules of Japanese Section 6.1. In Section 6.2, I will examine the work done on idiosyncrasies in syllabic structure of Japanese mimetics as well as their unique characteristics. Then in 6.3, I will focus on the Japanese data that I have collected and apply the preceding analyses to this collection of items.

6.1 Japanese Phonotactics

Japanese has a straightforward set of rules governing the phonology and syllabic structure of its regular forms. In order to properly analyze the syllabic and phonemic content of the data I have gathered for Japanese, it is important to understand the basis of the writing system. Hinds (1986) describes it as follows:

> The Japanese writing system is based on a syllabary rather than a phonetic system. This syllabary is termed in Japanese *go-juuon* 'the fifty sounds'. It is based on five vowel sounds which occur with a

> number of consonants. Each vowel sound and its accompanying consonant has a separate symbol, termed *kana* (389).

The set of five vowel sounds that Hinds is referring to is [a, i, u, e, o]. Dialectal variations on the vowel can occur and [u] is found preceding [i], it changes to [ɨ]. The full set of basic syllables can be seen in the following table from Hinds (1986: 390).

n	wa	ra	ya	ma	ha	na	ta	sa	ka	a
		ri		mi	hi	ni	chi	shi	ki	i
		ru	yu	mu	fu	nu	tsu	su	ku	u
		re		me	he	ne	te	se	ke	e
	o	ro	yo	mo	ho	no	to	so	ko	o
					pa	ba	da	za	ga	
					pi	bi	ji		gi	
					pu	bu	zu		gu	
					pe	be	de	ze	ge	
					po	bo	do	zo	go	
		rya		mya	hya	nya	cha	sha	kya	
		ryu		myu	hyu	nyu	chu	shu	kyu	
		ryo		myo	hyo	nyo	cho	sho	kyo	
					pya	bya		ja	gya	
					pyu	byu		ju	gyu	
					pyo	byo		jo	gyo	

Table 18: Basic syllable structures in traditional form (Hinds 1986).

Japanese syllables are defined based on a set of structural restrictions. The maximal projection of Japanese syllables is (C) V (Q) (C) V. In this context, Q refers to a geminate consonant and V can be any of the five previously mentioned vowels or syllabic [n]. C represents any consonant found in the language. Japanese vowels are fairly flexible in that they are not limited in the positions in which they appear. All five of the vowels can appear in any combination with the others and in any word position. Japanese has more restrictions on consonants based on the position within the word. Voiceless consonant clusters are the only type of consonant cluster allowed to appear word-initially. These clusters are typically a result of high vowels that become voiceless in between two voiceless consonants. In some cases, the high vowel is lost from the sequence entirely. A similar effect is seen both in the middle of a word and at the end of one; in both cases it is only possible to have a cluster consisting of voiceless consonants (Hinds 1986: 400).

6.2 Idiosyncrasies And Semantic Mapping in Japanese Iconic Words

The most distinct phonological difference between the sound-symbolic system of Japanese and the rest of the language is the presence of the word initial /p/. This phone is rarely found in such a position in the regular lexicon; however, it is fairly common in iconic words from all three of the categories. When seen in the regular forms, it is usual an indicator of a foreign word such as *piiza* (pizza) (Sharlin 2010: 15).

On the structural level, there are two major types of mimetic roots found in Japanese: CV and CVCV. Hamano notes that of the two, CV roots have a tendency to be more iconic (1998: 28). His analysis reveals the fact that the movement and tactile nature of an object are represented by the initial consonant in this pattern (1998: 86). For example, the labial oral stops /p/ and /b/ signify "an abrupt and explosive movement or event such as hitting and explosion, or the precondition for such in the form of tension" (1998: 86). In contrast, /s/ is typically associated with movements that are smooth in nature. A word initial /w/ is an indicator of a noise produced by a living being such as an animal or a human. The voicing feature of consonants has a deep-seated impact on the meaning of an iconic word. Smaller objects and in turn lighter sounds are found in conjunction with voiceless phones. Loud sounds and bigger objects or movements are indicated by the voiced feature (Sakamoto 1991: 15).

More semantic information can be gained from iconic forms in Japanese by looking at the vowels. Vowel length has a direct correlation with the size of the event. Long vowels indicate greater temporal duration or a larger distance of an action, while short vowels do the opposite. With the exception of the vowel /e/, Japanese vowels correspond to the size and shape of objects. They can also have the secondary function of signifying the pitch of a sound associated with the object's action. For instance, high-pitch is signified by the front high vowel /i/.

6.3 Animal Cry Data of Japanese

The observations that I have made in regards to the animal cry onomatopoeia listed in Appendix D are consistent with the previously discovered findings mentioned in Section 6.2. Two of the entries listed have a word initial /p/: *pii-pii* 'peep' and *pii^-tiku* 'the shrill peeping of a bird'. Interestingly enough, the central approximant /w/ only appears in one of the entries, *wanwan*, signifying the cry made by a dog. This is of note considering the fact that word initial /w/ is supposed to denote that a human or living being made the noise.

The data in Appendix D also exhibits semantic mapping between the voicing feature and the size of the animal producing the sound. For example, the peeping sound made by a chick *pii-pii*, has voiceless bilabial stop whereas the representation of 'moo' *mūmū* has the bilabial voiced nasal stop. Even within categories this size difference is present. For example this distinction is seen between two birds, *kuukuu* 'coo of a pigeon' has a voiceless consonant word initially and *gūgū* 'cry of a turkey' has a voiced one. It is easy to say that a turkey is in fact larger than a pigeon; and a cow is larger than a chick. There is also a noticeable association between the front high vowel/i/ in the context of words mapping to the noise made by smaller birds and insects. However, not all lexical entries corresponding to birdcalls include /i/, or any high vowel. Furthermore, *hinhin* 'neigh of a horse' also contains the same vowel, and a horse is on the larger end of range of sizes for animals. It is possible that the size scale applies to animal cry onomatopoeia within Japanese when occurring within a related set of animals.

Japanese onomatopoeia exhibit the reduplication mentioned in Bladon's analysis, but they are lacking the other properties. There are abnormalities in the makeup of onsets and codas. Some of the syllabic structures are unusual, but the combinations are for the most part consistent with normal Japanese syllables and there is no apparent tendency towards monosyllabic forms.

7 Cross-Linguistic Observations and Future Directions

Throughout this paper I have compared onomatopoeic data within the subcategory of animal cries of four languages to the regular forms of their respective language and cross-linguistically in order to gain a deeper understanding of iconic forms. At this point, a data set composed of animal cry onomatopoeia has been compared to pre-existing information on the regular forms of each of these languages. The results have been fairly consistent. With the exception of a few consonants or vowels, the onomatopoeic phoneme inventories are a subset of the phonemic inventories found in the regular forms of the language. In Brazilian Portuguese, the near-high back vowel [ʊ] is present in the animal cry data, but not in the regular forms of the language. The consonants found in this data set, however, are a direct subset of those found in the rest of the lexicon. In French, there is slight variation of the place of articulation of the approximants and the fricative [h], but these are most likely allophones of consonants found within the standard inventory. The Spanish onomatopoeic data contains the additional consonant /z/. Japanese onomatopoeia can exhibit the word-initial /p/ which is highly unusual in the rest of the language.

From a structural standpoint, there are marked differences in the syllables present in the animal cry onomatopoeia and that found in the regular words of the languages. In Brazilian Portuguese, there is the irregular cluster /kw/ present in numerous entries including ['kwaʃʊ 'kwaʃʊ] representing the noise made by a frog or toad. Typically, the surface realization of such a form would have the insertion of an /i/ between the consonants, but this is not the case in the animal cry onomatopoeia. The French onomatopoeic data contains lexical items that have no vowels whatsoever. These are highly irregular. Outside of these forms though, the syllables do tend to conform to the other restraints including that of vowel harmony. The Spanish animal cry words consistently adhere to the structural rules of the language and have proper makeup of consonant clusters. The only exception to this rule is the presence of /z/ in coda position; it is rare to see any obstruent other than /s/ in this location. Taking into account these facts, it appears as though in each of

these languages, there are some iconic words that exhibit a marked difference from the standard accepted words. However, there are still a fair number of onomatopoetic words in the data sets for all four languages that perfectly conform to the appropriate phonotactic rules.

For each language, I have also compared the data against Bladon's analysis of onomatopoeic forms. Bladon was right in assuming that there is a tendency for reduplication in iconic words; this pattern has been observed in all four languages. However, I have not observed a tendency towards monosyllabic words in any of the languages. The other two propositions—the first regarding the homorganicity of onset and coda composition and the second regarding the unusual combination of sounds—are not consistent in the data. While the majority of the phonemes in the onomatopoeic data are also present in the regular forms, this is not a strict restraint. Additionally, the vast majority of the syllabic structures and consonant clusters are viable in regular words of the language as well. Therefore, I believe that Bladon may have assumed too much about the universality of his onomatopoeic analysis.

Now that I have examined the relationship between standard and animal cry onomatopoeic words of each language, I will analyze the iconic forms mapping to the same semantic meaning. The chart below shows the iconic representation of the cry of twelve different animals in Brazilian Portuguese, Spanish, French, and Japanese. For items without a lexical entry corresponding to the appropriate semantic meaning there is a hyphen.

Animal	Brazilian Portuguese	Spanish	French	Japanese
Bee	[z:]	*(1) zzzzzzz, zzzzzzz* (2) *zumbar*	[bz:]	-
Cat	[mi'aw]	*miau*	[mjau]	-
Chicken	['kɔ 'kɔ 'kɔ]	(1) *clo, clo, clo* (2) *cloc, cloc, cloc*	[kɔtkɔt]	-
Cow	['mu:]	*mu*	[mø]	*Mōmō*
Cricket	(1) ['ʃiʊ] (2) [ʃi'ʀiʊ] (3) ['kɾi 'kɾi] (4) [zizi'ah]	*chiar*	[kʀikʀi]	(1) *Chirinchirin* (2) *Chinchirorin*

Dog	[aw ‘aw]	*guao*	[wawa]	*Wanwan*
Duck	[‘kwa ‘kwa ‘kwa]	*paaaa, paaaa, paaaa* *cuac, cuac, cuac*	[kwɛ̃kwɛ̃]	-
Frog	['kwaʃʊ 'kwaʃʊ]	*cro*	[kɔa]	*Kerokero*
Horse	['ʁĩ:ʃ]	*Hinnn, hinnn*	[hihihi]	*Hinhin*
Rooster	(1) [kɔkɔɾi'kɔ] (2) [kɔkɔɾi'kɔ]	*quiquiriquiar*	[kokeʁiko]	*Kokekokkoo*
Sheep	[‘bɛ]	*be*	(1) [bɛ:] (2) [mɛ:]	-
Turkey	['glu 'glu]	*gluglu-gluglu*	[gluglu]	-

Table 19: A look at the representations of different animal cries in all four of the languages. The Brazilian Portuguese and French entries are IPA transcriptions. The Spanish and Japanese entries are based on the orthography used in the appropriate language.

By looking at the forms in the table above, it is clear that there are distinct similarities between the representations of the same iconic meaning across all of the languages. The voiced alveolar fricative /z/ is present in all of the lexical entries relating to the noise made by a bee. This is true even of Spanish where /z/ is not found in the standard phonemic inventory. The entries for cat are also similar in that they all have an /m/ word-initially followed by a combination of vowels and glides. All of the iconic words related to dog —assuming *guao* is transcribed as /gw*a*u/—the approximant /w/ is present. In the Brazilian Portuguese transcription, the form is also markedly different from the standard forms because of the /w/ in word-final position. Looking at the three available translations for the cry of a turkey, all of the forms contain the same syllables. The only difference is that in Spanish the root syllable /glu/ is repeated four times as opposed to two in Brazilian Portuguese and French. The striking similarity in syllable structure between languages is exemplified in the forms representing the cry of a rooster that started the paper. All of these forms have the structure $C_1VC_1V(C_1|C_2)VC_1V$ (removing the verbal ‘*ar*’ from *quiquiriquiar* and assuming the transcription of *kokekokkoo* to be /kokekoku/. Furthermore, in all four languages, C_1 is the voiceless velar stop /k/. C_2 is an allophone of /r/ in Brazilian Portuguese, French, and Spanish. This table shows that there are significant patterns in the structure and phonemes of iconic words relating to animal cries across these four languages.

Through analysis of the iconic and regular forms present in Brazilian Portuguese, Spanish, French, and Japanese I propose the following: there is potential for the existence underlying structural and phonemic frameworks for animal cry onomatopoeia. Within each language, there are certain forms that appear markedly different from the standard forms within its respective lexicon either based on phonological makeup or due to contrasts with syllabic structure constraints. The forms that are markedly different still manage to conform to the underlying frameworks set out for the semantic mapping of specific animal cries. This is exemplified by the inclusion of /z/ in the phonemic inventory of Spanish in order to accommodate the /z/ found within all of the other available lexical entries corresponding to bees in Table 19. It also explains the presence of abnormal syllable structures in Brazilian Portuguese. I further suggest that the variation between the iconic realization of the sound is not identical in all cases due to constraints of the language in which the onomatopoeia is appearing. Native speakers of any language prefer to assimilate foreign words with the rest of the lexicon; the same is true of the attempt to assimilate onomatopoeic words relating to animal cries into the lexicon. Therefore, the surface realization for each language is affected by the rules present in the rest of the standard lexicon. In order to definitively prove that these are true, it would be necessary to examine a much larger corpus of onomatopoeic data to which I do not have access. It would be even better to elicit data from native speakers of more than just four languages from a variety of different families. I leave these tasks up to future research, and in the meantime I can safely conclude that some—but not all—cows do say moo.

Appendices

The following appendices contain the full set of data used for this paper. All of the translations are either exact English translations or they are the type of animal making the onomatopoeic sound listed. Any necessary translations have been made by myself using the Cambridge Online Dictionary (2014).

A. Brazilian Portuguese Animal Cry Onomatopoeia

The table below was derived from the work of Guadeloupe Coutinho (2003).

Orthography	IPA Transcription	Animal/English Translation
Au-au!	[aw ‘aw]	Dog
Auuuuuu!	[aw:]	Wolf
Bé	[‘bɛ]	Sheep
Chio	[‘ʃiʊ]	Birds, mice, and crickets
Chirrio	[ʃi'ʀiʊ]	Cicada, cricket
Có! Có! Có!	['kɔ 'kɔ 'kɔ]	Hen
Coaxo! Coaxo!	['kwaʃʊ 'kwaʃʊ]	Frog, Toad
Cocoricó!	[kɔkɔɾi'kɔ]	Rooster
Cocorocó!	[kɔkɔɾi'kɔ]	Rooster
Crá-crá	['kɾa 'kɾa]	Owl
Cricri	['kɾi 'kɾi]	Cricket
Cuco	['kuko]	Cuckoo
Currupaco	[kuʀu'pakʊ]	Parrakeet
Gluglu	['glu 'glu]	Turkey
Miau	[mi'aw]	Cat
Muuuu!	['mu:]	Cow
Piu! Piu!	[‘piw ‘piw]	Fish
Quá! Quá! Quá!	[‘kwa ‘kwa ‘kwa]	Duck
Riinch!	['ʀĩ:ʃ]	Horse
Ronrom	['ʀõ'ʀõ]	Cat purring
Roooom	['ʀõ:]	Cat purring
Trisso	[tɾisʊ]	Lark, Swallow
Ziziar	[zizi’ah]	Cricket
Zunzum	['zũ'zũ]	Bees, insects
Zurro	['zuʀʊ]	Donkey
Zzzzzzz	[z:]	Bee

B. Spanish Animal Cry Onomatopoeia

The table below is from the work of Donald Kloe (1977). The asterisk (*) indicates a lexical entry that was marked as 'truly onomatopoeic' according to Kloe. Translations with starting with (N.) refer to the noun that signifies the action of the call, e.g. *the bark of a dog*.

Orthography	**English Translation/Animal**
Arullar	To coo
Be*	Sheep, goat
Bramido	N. Bellow, roar
Cacaraquear*	Cackle (of a hen and other domestic poultry or game birds)
Cacarear*	Cackle (of a hen and other domestic poultry or game birds)
Castañetear	Chatter/chirp
Chiar	To cheep/chirp
Chicharrear	Chirp (of cicadas)
Chiii, chiii, chiii*	Chatter (of birds)
Chirriar*	Chatter/chirp (of birds)
Clo, clo, clo*	Clucking of a hen
Cloc, cloc, cloc*	Clucking of a hen
Cro*	Croak
Croar*	To croak
Cuac, cuac, cuac*	Duck
Cucu*	Cuckoo
Fu fu fu*	Noise of an angry cat
Gaznar	To caw

Gemido	N. Whine
Gluglu-gluglu	Turkey
Graznido	N. Caw
Gruñido*	N. Growl
Guau*	Dog
Hinnn, hinnn *	Neigh or whinny of a horse
Hoopoe*	Call of a hoopoe (bird)
Hoopoo*	Call of a hoopoe (bird)
Jui, jui, jui*	Pig
Miau*	Cat
Morrrr, morrrr, morrrr *	Cat purring
Mu*	Moo
Mugido	N. Moo
Paaaa, paaaa, paaaa*	Duck quacking
Piar*	To cheep
Pipi*	Cheep
Piular*	To cheep
Quiquiriquiar*	Rooster
Rebuzno	N. Bray of a donkey
Relincho	N. Noise of a horse
Ronroneo	N. Cat purring
Rr-rr*	Dog snarling

Rrrr, rrrr, rrrr*	Cat purring
Ru*	Coo
Rugido	N. Voice of a lion
Sisear*	To hiss
Sssss, sssss*	Hiss
Trisar	Swallow
Ulular	To scream/hoot (owl)
Zumbar*	Buzz
Zurear*	The act of a dove cooing
Zurrrr	Dove coo
Zzzzzzz, zzzzzzz	Buzz

C. French Animal Cry Onomatopoeia

The table below has been derived from the work of Jean-Pierre Zerling (1996). The translations were done by myself with the help of the Cambridge Online Dictionary.

Orthography	**Transcription**	**English Translation/Animal**
Bêê	[bɛ:]	Sheep, Goat
Bzzz	[bz:]	Fly, bee
Coâ	[kɔa]	Frog, toad
Cocorico, coquerico	[kokeʀiko]	Rooster
Coin-coin	[kwɛ̃kwɛ̃]	Duck
Coco	[koko]	Parrakeet
Cot-cot	[kɔtkɔt]	Chicken

Coucou	[kuku]	Cuckoo
Cri-cri	[kʀikʀi]	Cicada, cricket
Croâ	[kʀɔa]	Raven, crow
Cui-cui	[kɥikɥi]	Bird
Glou-glou	[gluglu]	Turkey
Grrr	[gʀ:]	Growling dog
Henissement	[hihihi]	Horse
Hi-han	[ʔĩʔã]	Bray of a donkey
Hou$_1$	[u:]	Owl, wolf
Hou$_2$	[wu:]	Wolf
Kaï-kaï	[kajkaj]	Sick dog
Mêê	[mɛ:]	Sheep, goat
Meuh	[mø]	Cow
Miaou	[mjau]	Cat
Ouah-ouah	[wawa]	Dog
Pioupiou	[pjupju]	Fish
Ronron	[rɔ̃rɔ̃]	Cat purring
Roucoulement	[ruru:]	Pigeon
Rugissement	[ʀ:]	Lion
Rugissement	[ʀwa̯u]	Lion
Sifflement	[s:]	Snake

D. Japanese Animal Cry Onomatopoeia

Orthography	English Translation/Animal
Chirinchirin	Cricket
Chinchirorin	Cricket
Chuuchuu	Twitter, chirp, squeak
Doodoo	Roar
DodoQ	Roar
Gaagaa	Croak, quack, squawk
Hinhin	Horse
Hiyohiyo	Chick
Jiijii	Locust
Kokekokkoo	Rooster
Wanwan	Dog

The above entries and their English translations are taken directly from the work of John Hinds (1986). The translations included may not be the only translation for the word, but instead they are the most relevant translation for this context.

The additional entries below are from Hiroko Fukuda (2012).

Būbū	Pig
Gūgū	Pigeon
Kerokero	Frog
Kīkī	Monkey
Konkon	Fox
Mōmō	Cow

The following are from Hamano (1998).

Kuukuu	Cooing (of a pigeon)
Pii-pii	Peep
Pii^-tiku	Shrill peeping of a bird

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References

Azevedo, Milton Mariano. 2005. *Portuguese: A Linguistic Introduction*. Cambridge University Press,.

Bladon, R. A. W. 1977. "Approaching Onomatopoeia." *Archivum Linguisticum* 8 (2): 158–66.

Casagrande, Jean. 1984. *The Sound System of French*. Georgetown University Press,.

Coutinho, Guadalupe. 2003. "Onomatopoeias Expressing Various Sounds and Animal Cries in Brazilian Portuguese." *Travaux de l'Institut de Phonetique de Strasbourg* 33: 119–38.

Dingemanse, Mark. 2012. "Advances in the Cross-Linguistic Study of Ideophones: Advances in the Cross-Linguistic Study of Ideophones." *Language and Linguistics Compass* 6 (10): 654–72. doi:10.1002/lnc3.361.

Fagyal, Zsuzsanna. 2006. *French, a Linguistic Introduction*. Cambridge University Press,.

Fukuda, Hiroko. 2012. *Jazz Up Your Japanese with Onomatopoeia: For All Levels*. Translated by Tom Gally. Rep Blg edition. New York: Kodansha USA.

Hamano, Shoko. 1998. *The Sound-Symbolic System of Japanese*. Studies in Japanese Linguistics. United States: CSLI Publications.

Hinds, John. 1986. *Japanese*. Croom Helm Descriptive Grammars Series. Croom Helm,.

Hualde, José Ignacio, Antxon Olarrea, and Erin O'Rourke. 2012. *The Handbook of Hispanic Linguistics*. West Sussex, UK: Blackwell Publishing Ltd.

Kloe, Donald R. 1977. *A Dictionary of Onomatopoeic Sounds, Tones, and Noises in English and Spanish*. Detroit, Michigan: Blaine Ethridge--Books.

Marques, Amadeu. 2010. *Brazilian Portuguese-English, English-Brazilian Portuguese Concise Dictionary*. Hippocrene Concise Dictionary. Hippocrene Books,.

Piñeros, Carlos-Eduardo. 2009. *Estructura de Los Sonidos Del Español*. Upper Saddle River, New Jersey 07458: Pearson Education, Inc.

Sakamoto, Naomi. 1991. "Sound-Meaning Relationship: A Cross-Cultural Analysis in Japanese and English." M.A., United States -- California: California State University, Fullerton. http://search.proquest.com.ezproxy.haverford.edu/docview/205392698/abstract/1C11374905B3438APQ/1?accountid=11321.

Santos, Osmar de Almeida. 2004. *Brazilian Portuguese-English/English-Brazilian Portuguese Dictionary & Phrasebook*. Hippocrene Books,.

Sharlin, Naomi. 2010. "Sounds Like...: Understanding Japanese Sound Symbolism." http://triceratops.brynmawr.edu:8080/dspace/handle/10066/10745.

Tranel, Bernard. 1987. *The Sounds of French: An Introduction*. Cambridge University Press,.

Walker, Douglas C. 2001. *French Sound Structure*. University of Calgary Press,.

Zerling, Jean-Pierre. 1995. "Onomatopoeias and Interjections in French: A Concise Phonetic Lexicon for Foreign Students." *Travaux de l'Institut de Phonetique de Strasbourg* 25: 95–109.

Zerling, J.-P. 1996. “Onomatopées du français, bruits divers et cris d’animaux : Petit lexique phonétique à l’usage des étudiants étrangers. (2ème partie).” *Travaux de l’Institut de phonétique de Strasbourg*, no. 26: 157–70.
2014. Cambridge, England: Cambridge University Press. dictionary.cambridge.org.